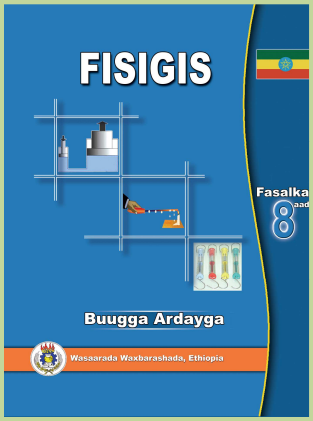
Buuggan si wanaagsan u daryeel



Buuggani waa hantida dugsiga. Buuggan ka taxadir waxyeeladiisa iyo lumistiisa.

Hoostan waxaa ku cad toban godob oo kaa caawin doona sida aad u daryeeli lahayd buuggan.

1. **Ku jeldiyee buugaan shay adag sida bac, joonaal iwm.**
2. **Marwalba, ku ilaali buugga meel nadiif ah oo qalalan.**
3. **Ha isku deyn in aad wax ku qorto buugga dushiisa iyo gudahiisa.**
4. **Marka aad doonaysid in aad ogaato meeshii u danbeeysey ee aad akhrisanaysey ku calaamadayso gobol yar oo warqad ah.**
5. **Marna ha jarin amase ha jeexjeexin sawirada amase warqadaha buugga.**
6. **Xabagee waxii warqado ah ee jeexma.**
7. **Si deggen ugu rid buugga shandadaada dugsiga.**
8. **Si taxadir ku jiro u gudbi buugga marka aad qof kale u dhiibaysid.**
9. **Marka aad buuggan akhrisanaysid, hubi in ay gacmahaagu nadiif yihiin.**
10. **Marka aad iticmaalaysid bug cusub, si wanaagsan oo aan buugga wax-yeeleen u soo rog-rog warqadaha. Sidaasina, xaaladda bogga sare ee buugga waxay ka dhigaysaa mid wanaagsan.**

FISIGIS

Fasalka 8aad

Buuga Ardayga

Diyaariyaha:

Abdi Mohammed Worsme

Musa Jama Aden

Abdirezak Sheik Kassim

Tafatire:

Mohammed Yusuf Farah

Sajin Abdi Muhumed

Wasaarada Waxbarashada, Ethiopia

AL GHURAIR
PRINTING AND PUBLISHING LLC

Mahadnaq

Dib u habaynta, daabacadda iyo baahinta buuggan ardayga waxaa maal-geliyey mashruuca la yidhaahdo Mashruuca horumarinta tayada waxbarashada guud, marka la soo gaabiyana (GEQIP), ujeeddadiisu na tahay in uu horomariyo tayada waxbarashada ee fasallada 1 – 12 ee dugsiyada dawladda ee Itoobiya. Dawladda dhexe ee Itoobiya waxay maalgelintaasi soo gaadhaa iyadoo mashruuca (GEQIP) ay u soo marinayso hay'adaha IDA, FTICF iyo dawladaha innaga taageera horumarka sida: Fiinlaand, Talyaaniga, Nedarland iyo DFiD

Wasaaradda waxbarashadu waxay jeceshahay in ay u mahadnaqdo shakhsiy adaha faraha badan, kooxaha iyo dadyowga kale ee si toos ah amase si dadban uga qayb qaatay hirgelin ta buuggan ardayga iyo ka macallinkaba. Dawladda Dhexe ee Dimuqradiga ee Itobiy, Wasaaradda waxbarashada.

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Tusmo

Booga

CUTUBKA 4: TAMARTA KULKA

CUTUBKA 5: DANABKA YO BIRLABDANABOWGA

CUTUBKA 6: ILAYSKA

Cutubka 1aad

FISIGISKA IYO CABBIRAADA

Natiijada cutubka: Cutubkani markuu dhamaado waxaad a woodi dontaa

- ✓ Fahantid Fikrada laxidhidha Cabbir Saleedka. Kobcisid xirfadaha cabirada muga cufnaanta, iyo bedka. Kobcisid xirfadahe cabirada keynaanka, barabaxa iyo kul – qaadka
- ✓ Kobcisid xirfadaha soo saarista iyo qiimaynto loo qoondeeyo mashruucyada oo lagu daba qayo (adeegsanayo) xeerka iyo dhisida fisigiska.
- ✓ Garatid xidhiidhka ka dhexeeya dhamaan walxaha.
- ✓ Adeegsatid xadka wayn ee suurta galka k u ah Kor u qaadista aqoonta Fikradaha la xidhiidha fisigiska.

Hordhac

Midka mid ah xirfadaha ugu muhimsan ee barashada fisigiska waa cabbiraada. Fasalkii 7aad waxaad. Kusoo baratay sida loo cabbiro dhererka, aminta, iyo cufka, qalab kaladuwan baa lagu cabbiraa dhererka, amint iyo cufka soobaratay. Halbeegyada dhaqanka iyo halbeeg Qiyaas lagu cabbiro kala duwanaan shahooda. Waxa kale aad soo baratay cabbir saleedka in la cabbirayo laakiin. Waxad kajawaabi xaddi Fiisikeed isagoo kuu qeexaya cabbir saleedka asaasiga waxaa lagu magacaabaa xadi lasoodhiraandhiriyey.

Cutubkan waxaadku baran doonaa sida wax loo cabbiro iyo xisaabinta Qaybahakala duwan, muga walaxaha kaladuwan iyo cufnaanta walaxaha.

1.1 Cabbirka Bedka

Qaybtan waxad kubaran sida loo cabbiro bedka oogadiisa kala duwan.

Hawlgalka 1.1

Cabbirka dhererke iyo balaca ee Qalabkan Sosocda

	Qalabka	Dherre (m)	Balac (m)	$\ell \times w$	Halbeega
1	Fasalka 8aad fiisigiska buuga				
2	Fasalkaaga				

Maka haysataa wax fikrad ah maadada xisaabta ooku saab san taranta dhererke iyo ballala

Dhamaan oogooyinka, ha' ahaadan mid qaabsan iyo mid Qaab laawee ah laynan bay leeyihiin.

Bedka oogadu waa meesha banan ee laynka halbeega bedkuwaa mitier lab Jibaaran. (m^2). Halbeeg kale waa: cm^2, mm^2 iyo km^2

Shaxda 1.1 Xidhidhika u dhexeya SI iyo kuwa aan a hayn. SI	
$1m^2$	$10,000cm^2$
$1m^2$	$1,000,000\ mm^2$
$1m^2$	$100\ dm^2$

Hawlgalka 1.2

1. m^2 waxaad ubadashaa cm^2, mm^2 iyo km^2.
2. $1cm^2$, waxaad ubadashaa $1mm^2$, iyo
3. km^2 waxad ubadasha m^2.

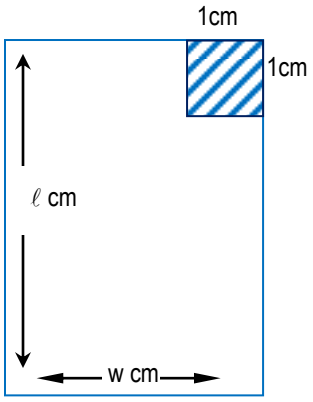
Xisaabinta bedka

Hawl golka 1.3

Raadi warqad adag u Go'na Qurubo yeryar 1cm × 1cm. Gudahaan Soo saar 10 Qurub oo laba Jibaarane ah (Sm^2) Qurubada waraaqaha iskudhaji si sentimitier labaaji baarane Qaabsan ah adoon midnakatagin meel udhaxays a buugaaga

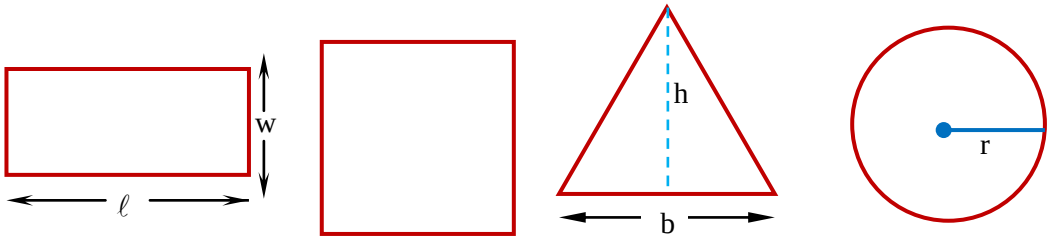
- waa imisa Qurub ku waad isticmaashay si ay udaboosho dhamaan ogada buuga?
- Isbarbardhig tiradan Qurubahawarqada notiijada $\ell \times w$ ee buugaag.

Habka aadisticmaalayso cabbirka oogadu waa mid ladhiraandhiriyey toos ahaan kaaso ah habka cabbirka ee fogaanta. Bed waxaa lagu cabbiraa iyadoo la dooranayo habaynta halbeeg labajibaarane. Cadee waaimisa halbeeg kaasooka kooban ogada waxaan garanaynaa Bedka. Maxaa lagu cabbiri dherer iyo balaca oogada markaa waxaa la eega, heerka natiijada cabbirka.



Jan 1.1 1cm x 1cm labajibaarna

Beddka oogoyinka Qaar waxay leyihiin xisaabahaan xidhidh Qaloc a KugudaJir. Waxaad soo baratey xisaab ahaan sida labajibaaranaha iyo goo bada. Kuwa sosocda nanakhtiin ahaan urogaadi bedkooda ogoyinka kala duwan. .



b) laydi t) laba Jibaarane **J= Sadex Xagal** ***x) Goobo***

Jan 1.2 Bedka Qaababkoodu way Kaladuwan yihiin

Tusaale: 1 Bedka laydiga ogada lagusiyey natijada dherer iyo balac.

Bed = dhere × balac

$A = \ell \times w$

2. Bedka labajibaarane ogada lagusiyey natijadeedu waa labada cidhif.

Bed = dherer × dherer

$A = \ell^2$

3. Bedka Sadex xagalka oogad lagusiyey natiijadeedu waa badhka salkeeda iyo Jooga. Oo La iskudhul fto

$$\text{Bed} = \frac{1}{2} \times \text{salka} \times \text{Joog} = \frac{1}{2} \times b \times h = \frac{1}{2} bh$$

4. Bedka Ogada goobada ee lagusiyey:

Bed = $\pi \times$ (Gacanka)^2

$A = \pi r^2$

Table 1.2 Qaaciidada lagu raadinayo beddka oogada kaladuwan		
Oogooyinka	**Qaaciidada**	
Laydiga	**$A = \ell \times w$**	**Bed = dhere × balac**
Labaji baarane	**$A = \ell \times \ell = \ell^2$**	**Bed = dherer × dherer**
Sadex Xagal	**$A = \frac{1}{2} \ell \times h$**	**Bed = $\frac{1}{2} \times$ salkax joog**
Goobo	**$A = \pi r^2$**	**Bed = $\pi \times$ (Gacanka)^2**

Tusaale 1.1

Waa imisa oogoda bedka miiska, hadii dhererku yahay 120cm iyo balacuna 80 cm?

Siin	weydiin	Fur - Furis
ℓ = 120 cm w = 80 cm	A = ?	A = $\ell \times$ w = 120cm $\times$ 80cm = 9600 cm^2 or 0.96m^2

Tusaal 1.2

Waa imisa bedka labajibaarane hadii cidhifkiisu yahay 2m midwalba?

Siin	Waydiin	Fur - Furis
ℓ = 2m	A = ?	A= ℓ^2 = $(2m)^2$ = $4m^2$

Tusaal 1.3

Raadi bedka salka ee dhalada hadii dhexroorka salkuyahay 4 cm. (uqaado qiimaha π=3.14)

Siin	Weydiin	Fur-Furis
Dhexrorka = 4cm $\therefore$ r = $\frac{\text{diameter}}{2}$ = 2cm	A= ?	Bedkagoobadu A = πr^2 = 3.14$\times$ $(2cm)^2$ = (3.14$\times$ 4) cm^2 = 12.56 cm^2

Hubin 1.1

1. Waa maxay bedku? Sidee loo cabiraa
2. Qorsida su'aalaha loguraadiyo bedka laydiga,laba jibaarnaha, sadex xagalka iyo goobada.
3. Qeex xidhidhka udhexeya dhexroorka iyo gacanka goobada.
4. Muuji xidhidhka u dhexeeya m^2 iyo halbeegyada kale sida cm^2, mm^2 iyo km^2.

1.2 Cabbirka Muga

Waxa xiga oo, aad baran doonaa sida loo cabbiro muga qaabsan (muga walaxda qaabsan), dareeraha, iyo walaxda qaablaawe. Dhamaan walxaha Fisikeed ee kugu xeersan waxay buuxinayaan meel. Qalabka kaladuwani waxa uuadeegimeelo kaladuwan. Meesha walaxi ay buuxisay (buuxiso) waxaalayidhaa muugawalaxda

Muga walaxdu waa inta walaxi meel buuxiso. halbeegyada mugu waa mitir sadexjibaaran (m^3)

Muga walaxda waxa lagu caddeeyaa disimitir sadex jibaarn (dm^3), sentimitir sadex jibaarn (sm^3) milimitier sadex jibaar (mm^3) I.W.M.

Shaxda 1.3 Xidhidhiika kadhexeeya halbeegyada (SI) iyo kuwa aan ahayn caalamiga	
$1m^3$	$1,000,000cm^3$
$1dm^3$	$1,000cm^3$
$1cm^3$	$1,000mm^3$

Tusaale 1.4

Imisa cm^3 buu lamidyahay $0.8\ m^3$?

Siin	Fur - Furis
$V = 0.8m^3$	$1m^3 = 1000,000cm^3$ $0.8m^3 = ?$ $\therefore V \text{ in } cm^3 = \frac{0.8\cancel{m^3} \times 1000,000cm^3}{1\cancel{m^3}}$ $= 800,000\ cm^3$

Walaxda adkaha, dareere, ama Neef sameeya intaa waxa dheer walaxda adkaha waxa noqodaa mid qaabsan ama qaab laawe ah qaabkisu sugan yahay dareere malaha qaab sugan, waxa uyeeshaa qaabka weelka sidaa darted habka la isticmaalayo muga adke, dareere , ama Neef.

Hawlgalka1.4

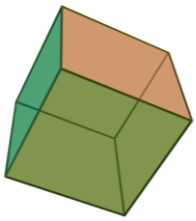
Kaladood saxibadaa adooqoraya xususyar sida loo cabiro muga

b. sanduuqa taraqa
t. Hawada fasal kaaga
j. dareere kasta
x dhagax kasta oo qaab laawe ah

1.2.1 Cabbirka Muga Qaabsan Eewalaxda Adke

Adkuhu waxa uleyahay qaab iyo mug. Qaabka adkuhu waxa uu noqon karaa qaab sugan iyo qaab laawe. Cabbirka muga qaableh:- qaabka adke waxaa siman si iskumid ah ogada bedka. Dhererka, balaca, iyo jooga walxdu waxay ubaahan yihiin cabbiraad. Marka muga waxaa lagu xisaabiyaa isticmaal ka natijada sadexdhinac (Jan 1.3 inatusayaa baloogalaydi, sadex jibaarane, dhululubo)

b. balaca laydi

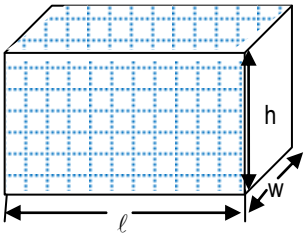


t. sadex jibaarane

J. dhululubo

Jaantuska 1.3 walxaha qaabsan

I. Muuga baloog laydi:



Jan baloog laydiga cidhifkisu yahay ℓ, w iyo h

muuga (V) baloog lay di, dherer (ℓ) balac (w), jog (h). siintuwaa

$V = \ell \times w \times h$

$V = \ell wh$

Tusaal1.5

Sanduuq tamaashiirah oo dhererkiisuyalay 4cm, balaciisuna yahay 5cm, iyo Joog of 6cm.

b. waa imisa muuga sanduuqa tamaashiirtu?

t. waa imisa halbeega tamaashirta loo baahanyahay si loo bixiyo haddi tamaashirtu $2cm^3$.

Siin	Fur - Furis
ℓ = 4cm w = 5 cm h = 6 cm muuga halbeeg tamashirta = $2cm^3$	b) v = tamaashirta sandu qeedu = 4cm×5cm×6cm = $120cm^3$ t) muga halbeeg tamaashirtu $2cm^3$. Sidaas darted tamaashirta lobaahan yahay waxa lagu xisaa binayaa "v" oo loqaybiye sdu sanduqa muuga tamaashirta

$$\text{Tirada tamaashirt} = \frac{\text{muuga sanduqa}}{\text{muuga halbeega}}$$

$$= \frac{120cm^3}{2cm^3} = 60$$

$\therefore$ waxaa loo baahanyahay 60 tamaa shiir ah

II. Muga sadex jibaarane

Baloog laydiga sadex jibaarne cidhif yadisu waa isku wada mid taa macnaheedu

dherer = balac = joog = ℓ

Muga = ℓ^3

1.2.2 Cabbirka Muga Dareere

Dareeruhu malaha qaabsugan. Markaad dareer hoose qaab kala duwan oo weelkuukujiro qaabkiisa si kastaba dareeruhu waxa uleeyahay muggo'an. Marka dareeruhu uqaata qaab weelka ukujiro, muguna dareere wuxuu leeyahay qaabka weelka uu ku jiro. Muga dareerewaxa lagu cabbiraa dhululubo (jan 1.5)

.

Jan 1.5 cabbirka dhululubad

Jan 1.6 Caagdhaloyinka eekala duwan waxay hayaan mugga biyaha eek ala duwan

Hawlgalka 1.5

Dhalada biyaha lagu shubayo cabbirka dhululubo. Haddi lacabbiro dhululubada miliitir (mL). akhrinta muga ee biyuhu waa cabbirka dhululubada

Shaxad 1.4	
1 L =	1000 mL
1 mL =	1cm^3
1m^3 =	1000 L
1L =	1dm^3

Tusaale 1.6

1. Barkad lagudabaash ayaal leh cabirade kolo ah 600cm, dhererkeeda , 300cm balac, iyo 200 cm joogeeda waaimisa muga weel biyuhu (barkada) m^3 = ?

Siin	weydiin	Fur-furis
ℓ = 600cm w = 300cm h = 200cm	muga m^3 = ?	V = ℓ × w × h marka hore halbeegyada badal taasi ℓ = 600cm = 6m; w = 300cm = 3m iyo h = 200cm = 2m. V = 6m × 3m × 2m. = **36 m^3**

1.2.3 Cabbirka Muuga Qaab Laawe

Dhagaxu waa qaab laawe ma'ufiirsatay duldhigida koobka shaaha marka malqacada sonkorta aad ku dhexrido koobka buuxa ee shaaha? Maxaa sababa kormarsita?

Hawlgalka 1.6

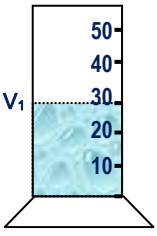
- **Kushub biyaha cabbirka dhululubad. Taxadar akhrinta (qiiyasta) biyaha iyo ubixi V_1 (Jan 1.8b)**
- **Dhagaxdhuban, ayaa lagu muquray dhagaxi dhululubad (qaabka sugan) biyaha dhex disa la cabiro dhululubada. Fiiri qiiyas ta cusub ee biyaha. Hadana akhri dhululubada. Kunamagacaw muuga V_2 (Jan 1.8t)**
- **Xisaabi $V_2 - V_1$ sharax waa maxay qiiyaastani**

Cadee muga qaab laawe

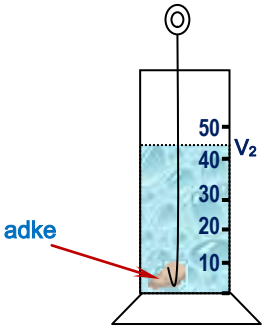
Talaabada 1: in biyoah ku shub cabbirka dhululu bada, diwaangali muga ama aan ku magacawno V_1.

Talaabada 2: kurid walaxda qaab laawe cabbirka dhululubo. Diwaangali hadana muga biyuha amaqaab laawaha aan kumagacawno V_2.

Talaabada 3: muuga qaab laawe (V) = $V_2 - V_1$



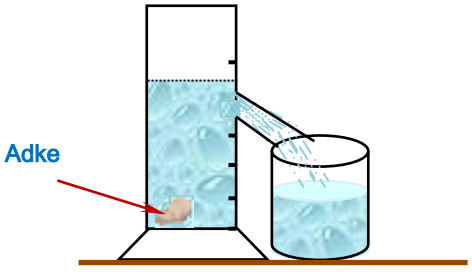
b) muugabiyaha



t) muuga biyaha ama walax da qaab laawe

Jaantuska 1.8

Laba walxood meel mawada fadhiisankaraan hal wakhti. Tusaale dhagaxa biyaha ku muquur weelka biyuhu kujiraan. Taniwaa sababta biyaha iyo dhagaxu ayna meel uwada fadhiisan. In lamidah wakht lamid ah biyuhu waxay katagayaan meel ugana tagayaan dhagaxa. Fiirjan 1.8 ama 1.9 muga barabaxa biyaha waxa uleeya hay muga adke ee biya ha lagu riday.



Jan 1.9 cabbirida muga walax da qaab laawe habka barabax

Hubinta 1.2

1. Qeex habka lagu xisaabiyo muga qaabsan.
2. Sidee baad ucabbirimuga dhululubada?
3. Sharax sidaad u cabbirtid muga dareere
4. Cadee faraqa udhexee ya adke, dareere, iyo gaaska xidhidhka muuga.
5. Sharax habka loo cabbiro muga qaab Laawe?
6. Qor halbeegyada muga adke, ama walaxda dareere.

1.3 Cabbirka Cufnaanta Walxaha

Hawlgal 1.7

Qabashada baloogu hayo alwaaxa birta mug iskumidah. Qiiyaas waxa aansoojiidan ama kukhaffiif ah. Keebaa labadoo da culus? Cabbir cufkooda iyo mugooda

Walaxda	Cufka	muuga	Cuf/muga
Baloog birta			
Balooga walaxda			

- Maxaadka fahamtey xaddiga $\frac{\text{cuf}}{\text{muga}}$?
- Walaxdee ugu weeyn $\frac{\text{cufke}}{\text{muga}}$?
- Waa imisa cufka birta ee halbeega muga?
- Waa imisa cufa alwaax halbeega muuga?
- Maxaad odhan samiga cufka, muga eewalaxda?

Hawlgalka sare waxaan ku cadaynay cufka loo qaybiyo halbeega muga ee birta iyo alwaaxi waxad heeli birtu in ay ka cuf badantahay halbeega muga alwaax

Qarsoodiga birtu wayka culustahay alwaax mug mid ahaan. Madaamu xaddiga Cuf ee halbeega muga. Xaddigan waxaa lagu qeexi Cufnaan.

Cufnaani waa samiga cufka iyo mug halbeegiba. waa xadiga cufka iyo muga summad cuf naan tu 'ρ' Waan Greek letter (xaraf Giriiga)

$$\text{Cufnaan} = \frac{\text{Cuf}}{\text{Muuga}} \; ; \quad \rho = \frac{m}{V}$$

m = Cufka walaxde

ρ = cufnaanta

v = Muuga

Waxaad u ha bayn kartaa qaaciidada 'm' iyo 'V'.

$m = \rho.V$ and $V = \frac{m}{\rho}$

Halbeega cufnaan tu waa kilogram loo qaybiyey mitier sadex jibaaran (kg/m^3) Tusaale cuf naanta biyuhu waa 1000 kg/m^3. Walxaha kala duwani waxay leeyi hiin cufnaan kala duwan.
Shaxda 1.5 waxay inatusay saa walxaha kala duwan

Shaxda 1.5 Cufnaanta walxaha kala duwan

Dareere		Adke	
Walxaha	Cufnaanta gr/cm³	Walxha	Cufnaanta (g/cm³)
Biyo	1.0	Alumunimyam	2.2
Korosen	0.8	Copper (koober)	8.9
Petrol	0.7	Dahabka	19.3
Saltiselin	1.2	Bir	8.0
Rubber	13.6	Meerkur	1.5
		Lead	11.3
		Baraf	0.9
		Silver (xaddi)	10.5
		Tin	7.3

Isticmaal shaxda 1.5 si aad uga jawaabtid su'aalaha

b. walxaha la inasiiyey keebaa cufan?

t. Mataqaan barafka sabeeya biyaha dushiisa . Qeex isticmaal fikrada cufnaanta.

j. Birtee baa ugu fudud (khafif) ah biraha lagu siye oo dhan?

Su'aalo fur-an

1. **Walaxda ugu culus cufanaan ta marka birta loo eego?**
2. **Walaxda baaka cufan biyaha?**
3. **Walaxdee baa ugu cufaanwayn?**
4. **Waa imisa cufnaanta biyaha b) kg/m^3 t) g/cm^3**

Cabbirka cufnaanta walaxda qaab laawe

Waxaad baratay sida loocabiro cuf naanta qaabsan ee walaxda siloo cabbiro cufnaanta walaxda siloo cabbiro cufnaanta walaxda qaab lawe. Waxaad ubaahan tahay cufka iyo muga walaxda qaab laawe.

Su'aalo Furan

1. **Sidee baa loo cabbiri walaxda qaab laawe cuf keed?**
2. **Sidee baa loo cabbiri muga walaxda qaab laawe.**

Waxaad cabbiri cuf adoo isticnaalaya miisaangarboole si aad u cabbirtid muga qaablawe ee adkaha waxa u le' eyahay cufka adkaha qaab lawe oo lo qeybiye muga biyaha labara bixiyay taasi waa muga biyaha la barabixiyay. Muuga adkaha qaablaawe.

Cufnaata walaxda qaab laawe= $\frac{\text{Cufka qaab lawe}}{\text{mugga danbe muggahore}}$

$$\rho = \frac{m}{V_f - V_i}$$

Cabbirka cufnaan ta dareere

Waxaad baratey dareeraha inuuna lahayn qaab su'gan waxa uqaataa qaabka weelka si lo cabbiro cufnaanta dareere waa inaad ta qaanid cufka iyo mugga

Su'aalo furan

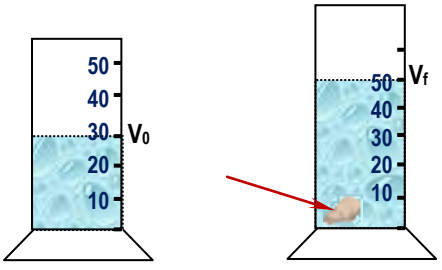
Side baad cabbiraysaa cufka dareeraha, iyo muga deeraha.

Kuwan soosocda (talaaboyinka) waxa uisticmaalaynaa cabbirka cufnaanta dareera h.

1. Cabbir cufka weel faaruq ah isticmaalna miisaan garboole m_1
2. Ku shub dareeraha mugga lagu siiyey ama cabbir cufka weelka amadareeraha iyo weelkaba m_2
3. Farqiga udhexeya m1 iyo m_2 dareere isku mid ah $(m_2 - m_1)$
4. Cufnaan ta dareerah = $\frac{m_2 - m_1}{V \text{ dareere}}$

Tusaale 1.7

1. Jan 1.10 waxa uu tusayaa dhululubo cm^3, marka qaablaawaha birta (yar) lagu rido dhululubada qiiyasta simani korbay ukici Cuf Birtu 150g waa imisa cufaantu



Jan 1.10 habka barabixinta cabbirka muga

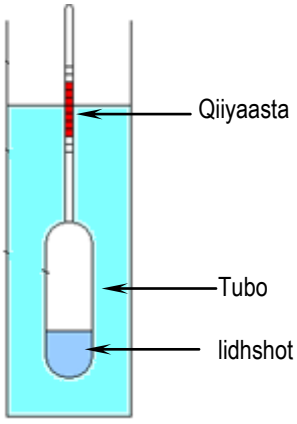
Siin	weydiin	Fur-furin
m =150g	ρ = ?	$\rho = \frac{M}{V} = \frac{150g}{20cm^3}$
$V_1 = 30cm^3$		$= \mathbf{7.5g/cm^3}$
$V_2 = 50cm^3$		
$\Rightarrow V = V_2 - V_1 = 50cm^3 - 30cm^3$		
$= 20\ cm^3$		

Haydiromitier

Hawlgalka 1.8

1. **Saaxibadaa kaladod (kuwafasalka) sidee baad ucabiraysaan cufnaanta dareeraha side bay ku kula garanayaan macaanaa mise waabiyo (sideebay dadku kala gartaan macaana mise waabiyo).**
2. **Waamaxay hy dromiter?**

Hydro mitr waa dhalo dhululubo ah culayskeedu waa salka ama dhuundhuuban baa xagsare kagataal



Jaamtiska .1.11 hydromitier

Si loo cabbiro cufnaanta dareeraha waxaa. u baahan tahay hydiromiter sabeey dareerah iyo jooga walaxdu liqayso. Tusaale cufnaanta caanaha waxaa lagu cabbiri hydiro mitir.

Cufnaanta caanaha way ka yar tahay qoton dheeradka hydiromiter ka quusa cufnaantayar ee caanaha aad bayuga Qotan dheer tahay. Tasoo marka hydromitirka qusa (caanuhu waa biyo oo kale marka cufnaantu yaraato amat duufaanka marka cufnaantu waynaato).

Muhimada aqoonsiga qalabka cufnaanta

1. Dayaarad, waxay ku soco taa ijinada, walxaha baska, Iwm way adag yihiin laakiin culusyihiin. Qaar kasameysan cufnaanyer. Tusaale, Almuniyam waxa uuleeyahay 2.7 g/cm^3. Waa kaweyn yahay birta ($\rho_s = 7.7g/cm^3$).
2. Cufnaatu waa muhiim si aad ugucadaysid iskudar ka walxaha. Tusaale cufnaanta dahabku 1.9.3 g/cm3. Dahabku marka loo ego birah kale cufnaatisu way ka yar tahay.

Hubin 1.3

1. Waamaxay cufnaantu?
2. Cadee xidhidhka udhexey cufka, muuga iyo cufnaanta?
3. Sidee baan ucabbirnaa
   - b. adkaha qaabsan
   - t. adkaha walaxda qaab laawe
   - j. dareer
4. Sharax sida uushaqeyo hydrometer.

1.4 Tibaaxda Dhaymanshinka (dhinacyada)

Xaddiiga fiisikeed. (dhameshinke) xaddi fiisiked waxa laga tixraacaa xaddi saleed ka as – aasiga halbeegiisa intuu ka kooban yahay.

Xaddikastoo lagu cabbirayo cufka waxaan odhaneyaa dhemeshinka cufka, Kan waxa lagu sharaxaa summad [m] sidookale xaddi kasta kaasog cabbira dhererka wuxuu yahay dhameeshin (dhinacyada) dherer (L) xaddifiisiked ookasta waxa lagu cadeeyaa weedhaha as – aasiga (saleedka) ama xaddisaleed ka habka halbeeg nimo M, L, T waa laisticmaali si u umatalo cufk,a dhererka, aminta isdabajogah. Awood habeeg saleedku waxa loo isticmaali raadinta xaddi fiisikeed ee layidhaa xadiga dhinac yada.

Tusaale dhinacyada bedka = dhererxdhere, waxay [L^2] dhinacyada xadigada fiisikeed waxa uu inatusi in ay xidhidh leyihiin su'aala hoodu, siay uno qo daan xaddi saleed.

Tusaale haddicabbirsaleedka xawaare (V) = [LT^{-1}] waxay utaag an tahay xawaare oo loo qaybiyo dherer, amin.

Xaddiyada qaarwaxaa lagu caddeeyaa tirada aan kusaleysneyn, halbeegyadan xaddiyadani waa dhinacyo laan tusaale, marka loo ego cufnaanta (labar bardhigo) walxaha dhinacyada la'aan ah. Halbeeg malaha ma'haa. Abdo makinaded iyo saamiga kaynaan ku waa xaddiyo dhinaceed. Makanikis. Mamagcaabikartaa xaddiyo kale oo dhinacyo la'an ah.

Shax 1.6 Tibaaxda dhinacya da xaddifiisiked

Halbeeg as aasiga			Halbeega la soo dhiraan dhiriyes		
Xaddi, Fii,	Halbeega	Dhincyal	Xaddi Fiisikeed	Halbeeg	Dhinec yadae
Cuf	Kilogram	[M]	Bed	m^2	$[L^2]$
Dheerer	Mitir	[L]	Muug	m^3	$[L^3]$
Amiin	sekan	[T]	cufnaan	$\frac{kg}{m^3}$	$[ML^{-3}]$
			Xawaare	m/s	$[LT^{-1}]$
			xoog	$kg.m/s^2$	$[MLT^{-2}]$

Halbeega lagadhiraandhiriyey oo kusaleeysan xadisaleed halbeeg siyaabo kala duwan, waxay ku wareegayaan hal xaddisdaleed halbeegii.

Talaabadu ookale dhinacyada halbeegyada waxaa lagu cadeeyaa guud'ahaan $k(M)^x (L)^y (T)^z$. halka kaykatahay x, y, iyo z ayutaagan yihiin amin intee le ega ayaa su'aalaha halbeega kusalaysan. Tusaale xoogu waa 10N waxaa loqori $10\ MLT^2$

Halka k = 10, x = 1, y = 1, z = -2 Qiimaha x, y, z waxa laguheli qeexida xadifiisiked awooda halbeeg saleedku waxa uxidhidh laleya hay halbeeg

Shaxda dhinacyada ugu muhimsan eexaddi fiisiked	
Xaddifiiskeed	**dhinacyaale**
Keynaan	**$[LT^{-1}]$**
Momantam	**$[MLT^{-1}]$**
Karaar	**$[LT^{-2}]$**
Tamar	**$[ML^2 T^{-2}]$**
Firguanci	**$[T^{-1}]$**
Awood	**$[ML^2 T^{-3}]$**
Danab	**[AT]**

Tusaale 1.8

1. **Bed:** Bedka labajibaarane, ee dhinacyadiisu kalayihiin 1m × 1m = $1m^2$ kan halbeeg labajibaarane dherer lagabilaabo (L), dhinacyadiisa (L) · (L) = L^2 sidoo kale bedka laba dhinac leh dhererkiisu.
2. **Mugga:** mugga 1m × 1m × 1m = $1m^3$ mugga sadexjibaarane dhinac yada
   [L] [L] [L] = $[L]^3$. Muuga dhinac yaal.
3. **Cufnaan:** $[M]^1 [L]^{-3}$
   Cufnaan $\frac{\text{Cuf}}{\text{Mugga}} = \frac{[M]}{[L^3]}$
   $= [M]^{+1}[L]^{-3}$

Isticmaalka dhinacyada

Weedhkasta oo sax ah fiisiked waa iskumid dhigandaded isticmaalka xaqiiqda maxa layidha dhinacyo

Su' aalaha fiisikeed ee saxda ah iyo halbeega mid walba waxay soobaxaan hadii aanay islee keyn, markaa isbadalka habka halbeeg tirada way is badali taaso ku saleysan isbadalka xaqiiqda. Su' aasha tirada halka aymarka hore ka ahayd.

i) Isku badalka halbeega

Marka habab kala duwan la isticmaalayo halbeegyada iskumid baa loo isticmaali habka dhinacyada kusiinaya isku badalka. Xaddiyada kale ee lasoo dhiraan dhiriyey ee halhabeega.

ii) Hubinta su'aalaha

Lagabilaabo su'aalaha fiisikeed dhinacyada, iskumidka ah weedhaha aan saxda ahayn horay bay ugu.

iii) Dhinacyada lamuujinayo (dhinacyada la qaadaa dhigo)

Waamid noo suurtoobayn in lamujiyo sida fisikeed waxa laga yaabaa in xidhidh uu laleeyahay

Hubin 1.4

1. **Maxaadka fahmaysaa dhinacyad tibaaxida.**
2. **Tibaaxida dhinacyada bedka muuga, cufnaan, xawaare, karaar, xooga, hawsha, iyo Awood.**

1.5 Qormo Saynis

Hawlgalka 1.9

Cabbirka, jooga, balaca, dhererka xisaabi fasalkaag a cm ahaan mugga fasalkaag.

i) m^3 ii) mm^3 iii) km^3

Mafahantey baraamijka ubadalida muga qolka halbeegyada sare.

- **Qeex faaiidada iyo faaido darada loo qorayo muga halbeeg yada sare.**
- **Mataqaan habkale oo loo qoro mugga**

Sida cad markaad qabaneysid Hawlgalke 1.9 waxa ku so maraya (aad soo martay) barmaaniijyo

- Tirada way badantahay qoraal keedu
- Tirada waxaa lagayaasaa in kor looqaado meeshedeedii
- Khaladka waxa lagayaabaa in la akhriy tiro eberah Iwm

Kasoo qaad fogaante qoraxda ilaadhulka inay tahay 150 milinon km. waana tan qoraalkeedu

s = 150,000,000km halka "s" ay utaagantahay

fogaanta fogaantan waxaa looqori

mitier, s = 150,000,000,000 m

sentimitir, s = 15,000,000,000,000 cm,

milimiter, s = 150,000,000,000,000 mm

ma'ufiirsatay faraqa in aad ka hadasho qoraalka tirada badan? Ma akhriin kartaa tiradan sentimitier keeda ama milimiterkeda sidoo kale qoraal ahaan, tirada yar, waxaad ubaahan tahay ebero badan. Isticmaalka tirooyinka ku celcelinaya waahawsha ladhameenayo boogsiiga ee buuga ee bugaaga sidaa dardeed, habka fu'dud ee lo qoro tirooyinka waawayn ee lobaahan yahay. Qormosaynis

Qormosaynis waa habka loo qoro tiro aad u badan iyada oo la isticmaalayo jibaarada toban looqoro tiro aad uwayn ama tiroyin aad uyar isticmaalka tirooyin ka 10 xasuus naw aqoontaada xisaabeed oo looqoro tirooyin ka Jibaarka 10.

Qormosaynis waa soo qudbinta xaddi-fisikeedka habka $a \times 10^n$. halka 'a' aykatahay tirada udhaxaysa 1 iyo 10 iyo "n" tirada abiyoone

Qormo saynis, waa kaliya ebarada, (tiro) Godka (digit) waxaa hadhi bedixda (xaga hore) ee barta jajabtoban laha. Si loogu hagaajiyo meesha barta ay katagtay si loo qabto waa in aad isticmaashid saltobanleh.
Tirada tusaalaha xaga sare kusu'gan waxa loo qori habka qormosayniska.

$s = 1.5 \times 10^8$km
$s = 1.5 \times 10^{11}$m
$s = 1.5 \times 10^{13}$cm
$s = 1.5 \times 10^{14}$mm

Su'aalo furan

Ubadal tirooyin kan soosocda qormo saynis

a) 300,000,000 cm

b) 0.000,000,000,000,128 cm

Horgaleyaal

Waxaad soobaratay in uujiro halbeegyo loo isticmaalo xadiyada saleed ama lasodhiraan dhiriyey. Sayniyahanadu waxay ogaadeen in jibaarada toban ee qormo saynis ku ayna kuhaboonayn qoraal ka. Sidaasdardeed, waxay siiyen summado qaarkamid ah jibaarada toban.

Horgalayaasha ay kujiraan jibaarkatoban kuwaas oo ah, dhufsanayaal iyo dhufsanyaal hoosaado. Summada loo isticmaaley jibbarada tobon waxaa layidhaa horgalayaal Erayga "Horgal" micnihisu waxaa shay ladhigo sheykale hortiisa sida magaciisu sheegayo, horgalaha waxaa ladhigaa halbeegyada hortooda.

Shaxda 1.8 waxay ina tusinaysaa horgalayaasha Dhufsaneyaasha ay wadaagaan qaarka mid ah iyo dhufsane – hoosaadada. Tusaale ahaan xaddiga 5kg, m waa summada mitir, xarafka "k" waa horgale u taagan 10^3.
Haddaba, $5\text{km} = 5 \times 10^3$ m.

Shaxda 1.8 Horgaleyaasha halbeegyada			
Horgale	summad	Isirka legu dhuftay halbeegasalka ah	
Tera	T	10^{12}	
Giga	G	10^{9}	
Mega	M	10^{6}	Dhufsaneyada
Kilo	k	10^{3}	
Hegtar	h	10^{2}	
Dici	d	10^{-1}	
Senti	c	10^{-2}	
Milli	m	10^{-3}	Dhufsaneyaal hoosaad
Maykro	μ	10^{-6}	
Naano	n	10^{-9}	
Biicu	p	10^{-12}	

Hubinta (xaqiijinta) 1.5

1. Maxaan uga jeednaa qormo saynis?

   Qor 1,000,000 w

   1,000 m

   0.001 sm Adigoo isticmaalaya qormo saynis

2. Sharax isticmaalka qormo sayniska.
3. Bixi waxoogaa tusaaleyaal gacan ka qabad ah oo la isticmaalayo horgale.
4. Waa maxay horgalaha loo isticmaali karaa si loo qoro;

   b) 1,000,000 (hal milyan)

   t) 1,000,000,000 (hal – bilyan))

   j) $\frac{1}{1,000,000}$

   x) $\frac{1}{1,000}$

Soo koobbidda cutubka

Cutubkan waxaad ku soo baratay in

- Bedku Dushu uu yahay gobolka ku xidhan garaaf xoodan. Hababka loo isticmaalo cabbiraada bedka dulaha waxaa laga soo dhiraadhiriyey Hababka cabbiraada fogaanta. Bededka qaarka mid ah walxaha qaabka leh waa
  1. Bedlka dul – laydi ah = dherer × Ballac
  2. Bedka labajibbaarane = ℓ^2
  3. Bedka du – seddexagal ah = ½ (bh)
  4. Bedka dul – Goo bo ah = πr^2.
- Halbeega caalamiga ah (SI) ee bedku waa mitir (m^2) labajibbaaran.
- Mugga walaxi waa meesha ay buuxiso walaxdo Halbeega caalamiga ah ee muggu waa mitir (m^3) seddex – jibbaaran..
- Mugga walax leh qaab - leydiyeed = ℓwh.
- Mugga walax leh qaab - seddexjibbaarane = ℓ^3.
- Mugga dareeraha waxaa lagu cabbiri karaa, in la isticmaalo dhululubo cabbiran, mugga walxaha qaab – laawaha ah waxaa lagu cabbiri karaa in lagu dhax – rido Dareere (Barabaxa).
- Cufnaantu waa xaddiga ama qiyaasta cufka halkii halbeeg ee mug ah. Qaaciidada cufnaantu waa $\rho = m/V$.
- Cufnaanta walxaha leh qaabka waxaaa lagu heli karaa in la cabbiro cufkooda iyo muggooda.
- Haydaroomitir waa qalab lagu cabbiro cufnaanta dareereyaasha.
- Dhinacyada xaddiyada fisikeed waxay ina tusayaan, sida xaddigu uu xidhiidh ula leeyahay xaddi saleedyada. Qormo saynisku waa ji dku haboon si loo qoro ama muujiyo qiimeeyayaasha cabbirada si loogu dhigo qaab xisaabfalo xisaabeed. Horgaley aashu waa jibbaarada 10, ee ku qoran halbeegyada hortood.

Nakhtinka su'aalaha iyo masalooyinka

I. Ku qor "Run" haddii weedhu run tahay, "Been" haddii weedhu been tahay.

1. Hal mitirlabajibbaarani wuxuu la mid yahay toban kun oo sentimitir labajibbaaran (10,000 sm^2)
2. Dhululubada cabbiran waxaa loo isticmaalaa cabbirka mugga dareeraha.
3. Mugga walxaha qaab laawaha ah waxaa lagu go'aamiyaa ayadoo la isticmaalayo miisaanka.
4. Haydaromitir waa qalab ku salaysan in lagu cabbiro mugga dareeraha

II. Ka jawaab su'aalahan

1. Qeex tibxahan iyo weedhahan soo socda.
   b. Bed x. tibaaxaha dhinacyada
   t. mug kh. Qormo saynis
   j. cufnaan
2. Sharax sidaad u helikarto
   i) Bedka dusha b. laydi t. seddexagal
   ii) mugga adke qaablaawe ah
   iii) cufnaanta dareeraha
3. Waa maxay isticmaalka haydaromitir?
4. Sharax faa'iidada qormo saynis.
5. Waa maxay horgaley aasha loo isticmaalaa si loo qoro dhufsane yaasha tirooyinka?

III. Masalooyin laga shaqeynayo

1. Sanduuq ballaciisu yahay 30sm dhererkiisuna yahay 40sm, joogiisuna yahay 25sm. Raadi
   b. Bedka salalkiisa
   t. mugga sanduuqa
2. Marka lagurido 10 qadaadiic ah dhululubo heerka biyuhu waxay ko u kacaan 47ml ilaa 100ml waa maxay celceliska mugga senti kastaa?
3. Waa maxay bedka shaxan laydiyeed cabbirka dhinacyadiisu yihiin 27.3sm iyo 17.5sm?
4. Ku xisaabi – xisaabfaladan qormo-saynis (adigoo isticmaalaya aqoontaadii xisaabeed)
   b. $2.7 \times 10^2 N \div 3.6 \times 10^{-4} m^2$
   t. $3.9 \times 10^{-2} m - 2.3 \times 10^{-3} m$
5. U qor kuwan soo socda i) Qormo saynis
   ii) Horgaleyaasha
   a. 15,000,000,000 kg
   b. 0.00000189 m
   c. 0.000,000,000,000,000,000,0030 seken
   d. 6000,000,000,000,000,000,000,000 km

6. **Xisaabi kuwan soo socda**
   $(8.60 \times 10^{5}) \times (6.17 \times 10^{-2}) \div (1.79 \times 10^{-4})$. U qor jawaabtaad qormo saynis Adigoo kusoo ururinaya barta jajabtobanlaha dabadeed hal – god (isticmadal Aqoontaadii hore ee xisaabta).
7. **Xisaabi dhinacyada madoor soomaha cuf – isjiidadka G,halka**
   $F = \frac{Gm_1m_2}{r^2}$.
8. **Barta uu dhaco qurub maraya dhidibka x dushiisa waxaa ina siiya isle'egta $x = at^2 - bt^2$, halka t tahay aminta, Raadi qiimayaasha (dhinacyada) a iyo b.**
9. **Hubi jiritaan dhinacyada isle'egyadan soo socda**
   a. **$v = v_o t + \frac{1}{2}at^2$**
   b. **$v^2 = v^2_o + 2$ as, halka s ay tahay fogaanta ay socoto aminta t, v_o iyo v ay kala yihiin keynaanada bilowga iyo dhammaadka, "a" ay tahay karaar**

Cutubka 2aad

SOCODKA XARIIQ TOOSAN

Ujeedooyinka cutubka : Cutubkani marka uu dhammaado dabadeed waxaad awoodi doontaan in aad:

- ✓ Fahamtaan fikradaha la xidhiidha xoogga iyo socodka madoorsoome.
- ✓ Horumariyaan maareynta masalooylnka la xidhiidha socodka negi iyo socodka madoorsoome.
- ✓ Garataan xidhiidhka ka dhexeeya Dhammaan.
- ✓ Isticmaashaan wax kasta oo suurtogal ah oo ay kor ugu qaadi Karaan Aqoonta fikradaha Muhiimka ah ee Fisigiska .

Hordhac

Fasalka 7aad ee Fiisigiska waxaa ku soo baratay fikradaha Aasaasiga ee socodka, waxanan afarta nooc ee kala duwan ee socodka Waxaa kalood Ku soo baratay sida xaddiyada la soo dhiraandhiriyiyey looga soo saaro xaddiyada Aasaasiga ah

Walax socotaa inay Istaag to ayaa dabiici ah Aristootal (25ooB.C)

Cuttubkani wuxuu kuu soo jeedinayaa Fikradaha socodka (xaalada) halkaasoo aad ku fidin doonto Aqoontaadii hore iyo xirfadaha aad u leedahay xaalada socodka oo aad sii badiso

2.1 Xooggaga Fisigiska

Hawlgalka 2.1

- Casharadaadii fiisigiska ee fasalkaagii 7aad. Waxay sharaxayeen Fikradaha ‘xoog” Guud ahaan iyo Gaar ahaan “Xoogga” Fisigiska
- Tax noocyada Xoogga ee aad taqaano

Xooggu waa xaddi Fisigisah oo aad Muhiim u ah. Waxaa loo lsticmaalaa in uu sharaxo Ama Caddeeyo falgalada ka dhexeeya walxaha kala duwan ee dabiiciga ah. Tusaale ahaan, markaad laagto kubbad, kala jeexdid gobol warqad ah kor u qaadid Buugaaga qorista, ku dul-socotid sibidhka, xidhid Ama, furtid Albaabka, waxaad ku istic maashay xooggag.

Xoogga isliska iyo xoogga cuf-isjiidadku waa qaar ka mid ah xooggaga aan maalin kasta Nolol-maalmeedkeena ka hadalo Xoogga lslisku wuxuu kaa caawiyaa in aad socotid, xoogga cuf- isjiidadkuna wuxuu kaa caawiyaa Biyaha ka soo dhacaya Meesha sare ee u socda meesha hoose, haddii Kubbad Loo Laago hawada, dabadeed dib ayey u soo Noqon.

Waa maxay xooggu?

Xooggu waa riixida Ama jiidida loo Adeegsado walax. Halbeegga caalamiga ah ee xooggu waa (N) waxaana lagu Cabbiraa qalabka la yidhaa Niyuuton- mitir

Jaantuka 2.1 Niyuuton mitir

Su'aal Furan

Miyaad magacaabi kartaa waxyaalo Ka mid ah saameynta ay leey ihiin xooggagu?

Gaar ahaan fisigiska. Fikradaha Ama Macnaha xoog waxaa loo isticmaala si loogu caddeeyo Ama sharaxo sida Walaxi u bedesho keynaankeeda Ama u karaarto. Ma' aha suurtogal in xoogga loo caddeeyo Ama sharaxo sida aan u sharixi Ama caddaynkarno walxaha qaar ka mid ah sida tamaashiirta, Qalinka, liinta iwm. Waxaa kaliya oo aad sheegi kartaa waxa uu qabto Xooggu wuxuu leeyahay Dabeecadahan waaweyn ee soo socda laxaad, meel lagaga lsticmaalo iyo jiho, Hadaba xooggu waa xaddi leeb.

Noocyada Xooggaga

Fisigiska waxaa jira tiro xooggag ah oo kala duwan kuwaas oo aad u baahan tahay in aad barato kuwaasi waa

- Xoogga cuf – isjiidadka ,
- Xoogga isliska
- Xoogga Gariiratada,
- Xoogga Dukhaynta,

- Xoogga Birlab- danabeedka ,
- Xoogga Korontada ,
- Xoog Xudumeed,
- Xoogga Sabaynta.

Hawlgalka 2.2

Caddee Noocyada Xooggaga tixgali (qaado) Afartan dhacdooyin (xaaladood) ee soo socda:-

Xaalada 1aad. Laba ulood Ama Birood oo Birlab ahi way isa soo jiitaan Xaalada

2aad. Dhagaxu xagga sare ayuu ka soo dhacayaa wuxuuna ku dhacayaa dhulka Xaalada

3aad Riixida Ama jiidida miis la jiido sibidhka dushiisa

4aad Sanduuq kale le dul sibibixiyo (Riixo)

i) Waa maxay waxa salka u ah ee ay ku kala duwan yihiin?

ii) Miyaad ogtahay in xooggaga loogu Fali karo walxaha laba jid?

b) In labada walxood si duleed isu taabtaan.

t) Ayagoo labada walxood aanay istaaban.

Adigoo lsticmaalaya hawlgalka 2.2 Waxaad u kala saari kartaa xooggaga istaabashada iyo xoogga aan istaabshada ahayn**.**

Xoogga istaabta waa xooggag kuwaas oo adeegsado kaliya marka labada walxood istaabtaan sida Xoggaga isliska iyo riixida miis la riixo.

Tusaaleyaal kale oo xooggaga istaabashada ahi waa:

1. Xoogga loo adeegsado kala jiidida Ama isku-curjinta Gariirtada ,
2. Xoogga kor ujeeda ee miisku ku Adeegsado Buugga in uu dul-yaalo
3. Xoogga laftu u adeegsato muruqa in uu isku ururo waa Tusaale ka mid ah xoogaga lstaabashada Sheeg qaar kale oo xoogaga lstaabashada ah.

Xoogga aan taabashada ahayni waa xoogga walaxi ay ku lsticmaasho walax kale ayagoon istaaban sida xooggaga Birlab- danabeedka, xoogga Cuf- isjiidadka iyo xoogga korontada

Tusaaleyaasha ugu caansan Xoogga aan istaabashada ahayni waa

i) Cuf- isjiidadka (xoogga cuf- isjiidadka)

ii) Xoogga Birlab- danabeedka

iii) Xoogga korontada

Nakhtiimida Xeerarka Niyuutan ee Socodka

Hawlgalka 2.3

Kala dood saaxiibadaa seddex xeer ee socodka

Waxaad ku soo baratay seddexda xeer ee Niyuutan ee socodka fasalk a 7aad, sidaas darteed waa inaad xasuusataa in walax taagani aanay bedelin meesheed a haddii aanu xoog sababin inay badasho

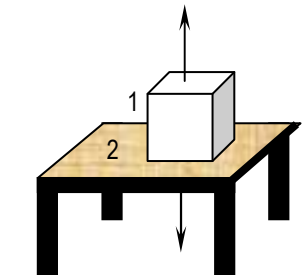
Xeerka koowaad ee Niyuutan wuxuu sheegaa in xoogga saafiga ah in loo adeegsadaa walax si loo kor dhiyo xawaaraheeda

Hoos loo dhigo xawaaraheeda Ama la badalo jihada ay u socotay Ama si loo bilaabo socodka ay lagama-maarmaan tahay.

Xeerka koowaad wuxuu sheegayaa in loo baahan yahay xoog si loo badalo keynaanka ama karaarka Niyuutan xeerkiisii koowaad waxaad ku soo aragtay in marka la leeyahay " masocoto" iyo marka la leeyahay " socod madoorsoome" ay la mid tahay in aanay jirin xoog falaya walaxdu

b) Buug kor loo hayo

Falcelin (walaxda 2aad waxay falaysaa walaxda 1aad)



Falid (walaxd 1aad walaxda 2aad)

t) Sanduuq dulyaal Miis

Jaantuska 2.2 Xooggaga falka iyo falcelinta

Hawlgalka 2.4

1. **Kor u hay buuggaaga daabaca sida ka muuqata jaantuska 2.2 (b)**
   - **Miyuu jiraa wax xoog ah oo falaya ama lagu Adeegsanayo Buuggaaga daabaca ee aad kor u haysa?**
   - **Miyuu jiraa wax xoog ah oo falaya Ama lagu adeegsanayo gacantaadu marka aad buugga kor u haysid?**
   - **Miyaad tixi kartaa Ama sheegi kartaa tirada xooggaga? Maxay yihiin Xooggagaasi?**

Marka aad Buugga daabaca ah kor ugu hayso baabacada xooggagu waxay u dhacaan lammaane laba walxood oo kasta xoogga lagu lsticmaalayo walaxda 1aad

Falkasta oo dhaca waxaajira falcelin la mid ah oo lid ku ah, xeerka 3aad ee niyuutan

ee ay sababto falka walaxda 2aad waxaa ku lammaan xoogga lagu falo walaxda 2aad ee ay sababto falcelin ta walaxda 1aad jaantuska 2.2 wuxuu sharaxayaa falka iyo falcelinada kala duwan ee xooggaga waa kuwee xooggaga falka iyo falcelinaha jaantuska 2.2 (b)? Fikradan waxaa sharaxay xeerka seddexaad ee Niyuutan Xeerkani wuxuu sheegayaa in xooggaga falka iyo falce lintu ay isku mid yihiin Laxaad ahaan ayna isku lid yihiin jiho ahaan

Hubinta (xaqiijinta) 2.1

1. Sideed u sharixi kar taa xooga fisikis ahaan?
2. Qeex ama sharax noocyada kala Duwan ee xoogagga Guud ahaan .
3. Waa maxay xoogga is taabashada iyo xoogagga aan is taa bashada lahayni?
4. Sharax Qodobada ka dambeeya xeerarka koowaad iyo labaad ee Niyuutan .
5. Sidee baad u sharixi odhaahda " socod majiro" iyo" xoogag dheelitiran" 'balanced forces'?

2.2 Socodka Xariiqeed

Socodku waa mid ka mid ah waxyaha ugu muhiimsan ee Aduunka inagu Wareegsan, maalinkasta waxaad u kala lugaysaa Gurigaaga iyo dugsigaaga waxaanad Aragtaa walxo soconaya oo agagaarkaaga ku wareegsan cutubkani waxaa kale oo aad ku sii baran doontaa waxyaalo ku saabsan celcliska xawaaraha, keynaan, karaar, socod madoorsoome iyo socodka karaar ka madoorsome ee xariiqda toosan waxaa la dhahaa hal-dhinacle miyaad xasuusataa wixii aad ku soo baratay fasalkii 7^{aad}

ee ku saabsanayd socodka Madoorsoome iyo socodka karaar Madoorsoome? (Qoraalkaagii dib ugu Noqo)

Hawlgalka 2.5

ii) Waa maxay socod?
iii) Sharax Noocyada socodka ee kala duwan.
iv) Waa maxay macnaheed (socod hal dhinacleoo sharax Astaamihiisa?
v) Qeex Tibxahan (weedhahan) soo socda.
- Xawaare celcelis.
- Keynaan celcelis
- Karaar.
- Socod madoorsoome.
- Socod karaar madoorsoome.

2.2.1 Socod Madoorsoome

Su'aal Furan

Maxay la micno tahay socod

Madoorsoome? Waa socod kaa soo walaxda socotaa ay socoto fogaan isle'eg muddo go'an oo lsku mid ah waxaa la dhahaa socod- madoorsoome socodka- madoorsome ee xariiqda toosan xawaaraha walaxda socotaa waa madoorsoome

Hawlgalka 2.6

Intee in le'eg ayey kugu qaadan in aad ku wareegto Garoonka kubbada cagta ee dugsigaaga? 5 miridh, 10 midhidh Ama in ka badan? Diwaan gali waqti loo baahan yahay in aad ku wareegto gaaroonka ugu yaraan seddex- jeer oo kala duwan

Intajeer	Fogaanta (s)	Waqtiga (t)	s/t
1			
2			
3			

Fogaanta ku wareegsan gaaroonka kubbadu wuxuu noqonayaa madoorsoome marka loo eego ficilo badan waqtigu waxa laga yaabaa in uu madoorsome noqon waayo. Marka qaarkood aad baad u socotaa mararka qaar koodna waxa laga yaabaa in aad orodo sidaas darteed waxa laga yaabaa in xawaarahagu aanu madoorsome noqon. Sidaa si la mid ah weeyi socodka walxuhu. Tusaale ahaan Baabuurka Ama socodku ma noqon doono madoorsome si aad u qeexdid Noocyada socod ee sidan oo kale ah Waxaan isticmaalaa Fikradaha xawaare celcelis

$$\text{Xawaare celcelis} = \frac{\text{wadarta fogaanta la socdaalay}}{\text{wadarta waqtiga ay ku qaadatay}}$$

$$v_{av} = \frac{s_T}{t_T}$$

Halbeega caalamiga ah ee xawaare celcelisku waa mitir sekenkiiba (m/s) kuwa kale ee aan caalamiga ahayn sida kii Loomitir saacadiiba (km/h) m/s waxaa loo lsticmaali karaa halbeega xawaaraha

Fikrada loo lsticmaalo in lagu qeexo xawaaraha kaasoo leh Jiho waxaa la dhahaa keynaan keynaanku wuxuu inoo sheegaa Dhakhsaha walaxi ugu socoto jiho lagu siiyey Keynaanku waa xaddi leeb wuxuu ku xidhan yahay Barabaxa u dhexeeya Bar- bilowga iyo Bar- dhammaad ka. Tusaale ahaan, haddii aad u kala lugeyso gurigaga iyo dugsiga dabadeedana aad ku soo Noqoto guriga Barabaxaagu waa Eber laak iin fogaanta aadku socdaashay ma'aha eber.

$$\textbf{Keynaan eeleelis} = \frac{\text{wadarta socdaalka}}{\text{Wadarta waqtiga}}$$

$$\vec{v}_{av} = \frac{\vec{s}}{t}$$

Qeybta 2.1 Waxaad ku soo Aragtay in, haddii aanu jirin xoog lagu falo walax, walaxdu ay taagnaan doonto, haddii ay ku socotay xawaare madoorsoome xariiq toosan ay sii wadi doonto socodkeedii madoorsoome

Guud ahaan, Socodka walxuhu wuu bilaabmaa wuuna baaba'aa walxuhu way kordhiyaan socodka, hoos bay u dhigaan Ama jihooyinka ayey Bedelaan Xaaladahan dhammaan Keynaanka ay walxuhu ku socdaan wuu isbedelaa. Sabaabaha isbedelada xaaladaha socod waa xoogaga lagu falay walxaha.

Walxuhu ma badalaan xaaladooda socod haddi aanay xoogag lagu falay Jirin. Xeerka Niyuutan ee labaad wuxuu Qeexayaa xidhiidhada xooga iyo socodka.

Tusaalaha 2.1

Bas ayaa wuxuu u kala safrayaa Addis Ababa iyo jijiga. Wuxuu ku socday 43km saacadii u horeysay saacadii labaadna 40km, saacadii seddexaadna 46 km socdaal kiisii waa maxay xawaare celcelisku?

SiiN	Waxa lagu weydiiyey	Furfuris
s_1= 43 km, t_1 = 1aac	**xawaare (v_{av}) =?**	$v_{av} = \frac{\text{wadarta fo gaanta}}{\text{wadarta wa qiga}}$
s_2= 40km, t_2 =1 hr		$v_{av} = \frac{129km}{3\,hr}$
s_3= 46 km, t_3 = 1 hr		
wadarta $S_T = S_1 + S_2 + S_3$ = 129 km		**v_{av} = 43 km /hr**
wadarta waqtiga $t_T = t_1 + t_2 + t_3$ = 3 hr		

Tusaalaha 2.2

Baabuur ayaa u socday 2.4km dhinaca bari 120 seken waa maxay celceliska keynaanku?

SiiN	waxalagu weydiiyey	Furfuris
s = 2.4 km Bari	$\vec{v}_{av}$ = ?	$\vec{v}_{av} = \frac{\text{Barabaxa}}{\text{waqtiga ay ku qaadatay}}$
= 2400 m, Bari		$\vec{v}_{av} = \frac{2400m}{120s}$ B*ari*
t = 120 seken		$\vec{v}_{av}$ = 20m/s, xagga Bari

2.2.2 Socod Karaar Madoorsoome

Keynaan ku waa xawaare jihaysan

Walax socodka ka bilow day taagni waxaa laga yaabaa in ay socodkeeda kordhiso, dhinto Ama Bedesho jihada socodka. Xaaladan oo kale keynaanada walxaha socdaa way bedelmaan taasoo ah waxaa la soo saaray karaar

Karaar waa saamiga lsbedelka keynaanka iyo Aminta .

$$\Rightarrow \quad \vec{a} = \frac{\vec{v}_f - \vec{v}_i}{t} \qquad \text{Karaar} = \frac{\text{lsbedelkakeynaanka}}{\text{Amintaayqaadatay}}$$

Halka V_f ay tahay keynaan dhammaadka ay ku qaadatay t_f, Vi ay tahay keynaan bilowga ay ku qaadatay ti halbeega caalamiga ah ee (SI) a waa ms^{-2} (m/s^2)

Haddii keynaan ka walaxdu uu isu bedelo si Isku mid ah, waqti Ama Amin isku mid ah, dabadeed waxaa la dhihi walaxdu waxay ku karaartay socod madoorsoome

Weedha socodka karaar madoorsome macnahiisu waa

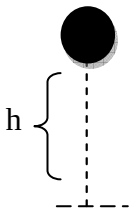
i. Laxaadka karaarku waa Madoorsoome (isma badalayo)
ii. Socodku wuxuu raacaa xariiqtoosan sida jihadu isma badasho, sidaa awgeed fogaanta iyo Barabaxa iyo xawaaraha iyo keynaanka Waxaa la isticmaali karaa ayadoo la isu bedelayo .

Tusaalaha 2.3

Baabuur ayaa asagoo taagan dhaqaaqay wuxuuna gaadhey xawaare dhan 20m/s muddo dhan 5 seken (ilbiriqsi) Waa maxay karaarka Baabuurku?

SiiN	waxa lagu wey diiyey	Furfuris
$v_i = 0$ $v_f = 20m/s$ $t = 5\ s$	$\vec{a} = ?$	$\vec{a} = \frac{v_f - v_i}{t} = \frac{20m/s - 0}{5\ s}$ $= \mathbf{4\ (m/s^2)}$

Walxo xagga sare ka soo dhacaya Iskood



Jaantuska 2.3 walax Iskeed u soo dhacaysa

Tusaalaha Dabiiciga ah ee ugu caansan socodka karaar madoorsoome waa Socodka walax iskeed xagga sare uga soo dhacaysa.

Iskeed hawada ugu soo dhacaysa Macnaheedu waa walax tasoo ku soo dhacaysa culeyskeed Dart ii's oo kaliya. Walxaha iskood u dhacaya ee aad haysataa

$\vec{v_i} = 0$

$\vec{a} = \vec{g} = 9.8m/s^2,\ \vec{v_f} = gt$

$s = \text{Jooga}\ (h)$

Hubinta (xaqiijinta) 2.2

1. Waa socod Noocee ah socodka hal- dhinaclaha ahi (xariiqeed)?
2. Waa maxay xawaare celcelisku?
3. Waa maxay Faraqa u dhexeeya xawaare iyo keynaanka socodka hal-dhinaclaha ahi (xariiqeed)
4. Waa maxay karaar?
5. Qor isle'egta socodka karaar madoor some.

2.3 Ku Muujinta Socodka Madoorsoome iyo Socodka Karaar Madoorsoome Adigoo Isticmaalaya Shaxo iyo Garaafyo.

Keynaan madoorsoome

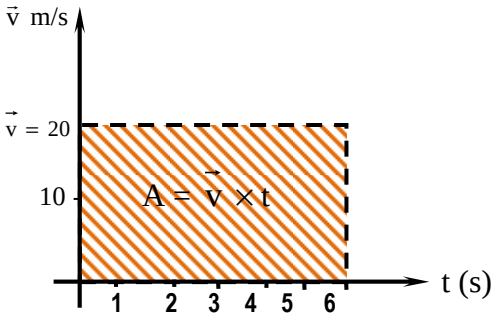
Marka walaxi ku socoto Barabax lsku mid ah waqti go'an oo lsku mid ah, dabadeed keynaanka Waxaa la dhahaa keynaan lsku mid ah ama keynaan madoorsoome

- Keynaan madoorsome waa keynaanka aan lsbedelin.
- Haddii keynaanku yahay madoorsome dabadeed keynaanada celceliska iyo ka bar cayimani waa isku mid.

Socodka leh keynaan madoorsoome (sida xawaaraha madoorsoome ee jihaysan) waxaa la dhahaa socod Madoorsoome. Socodka madoorsoome waxaa loogu Qeexi karaa Garaafyada $V \sim t$ iyo $S \sim t$

Garaafka socodka keynaan madoorsoome ee

Jaantuska 2.4 waxa laynagu siiyey Garaafka V~t, tiiraduna waa xariiqda jiifta, taasoo ina tuseysa in keynaanku aanu lsbedelayn Aminta markey korodhoba

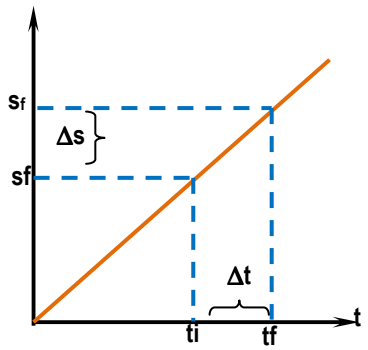


Jaantuska 2.4

Anagoo lsticmaaleyna

Qeexida $S = V \times t = 20m/s \times 6$ seken $= 120m$ laakiin jaantuska 2.4 Bedka (A) ee ku dhexjira tiiradu wuxuu la

Mid yahay $V \times t \Rightarrow 20m/s \times 6s = 120m$

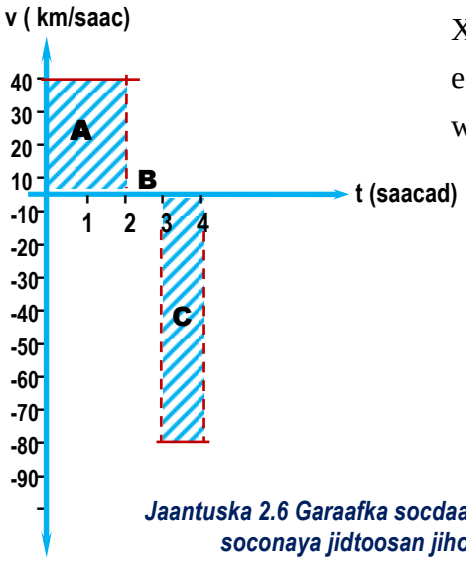


Jaantuska 2.5 Shaxanka socodka keynaan madoorsoome ee S~t

Keynaanka waqti go an oo lagu siiyey waxaa lagu heli Garaafka S~t ayadoo la Raadina yo tiirada Barabaxa Garaafka xoodan ee Bar go'an

Tiirada Garaafka ee Barkasta oo ka mid ah garaafka waxaa lagu helaa Ama ay la mid tahay $\frac{s_f - s_i}{t_f - t_i} = \frac{\Delta s}{\Delta t}$

Aan ku bilowno socodka keynaan madoorsoome aan Qaadano garaafka V~t ee jaantuska 2.6 Garaafkani wuxuu u taagan yahay keynaanka Baabuur ku safraya Jidtoosan jihada waqti labadii saacadood ee ugu horeeyey, baabuurku wuxuu ku socday Xawaare madoorsoome oo ah 40 km/saac Dabadeedna 1 saac ayuu key naankiisu Eber ahaa (wuu taagnaa) Dabadeedna ugu dambayntii wuxuu u dhaqaaqay jihada ka soo horjeeda jihadii keynaankii hore (kaynaan taban) oo dhan 80km/saac jihada koonfureed muddo dhan hal saac waa maxay warbixinta (macluumaadka) Garaafkani ina siinayaa?



Jaantuska 2.6 Garaafka socdaalka Baabuur ku soconaya jidtoosan jiho go'aan.

Xilligii uu ku jiray labadii saacadoodee ugu horeeyey (qeybta A ee garaafka) marka Xawaaruhu yahay 40 km/saac, Barabuxu wuxuu la mid yahay

$$\vec{s} = \vec{v} \times t$$

$$= 40 \text{ km/hr waqooyi} \times 2 \text{ saac}$$

$$= 80 \text{ km, waqooyi}$$

Garaafku ma sheegayo meesha Baabuurku ka bilaabayo safarka, laakiin wuxuu sheegayaa in meeshii uu joogay ay isbedeshay 80 km Muddo 2 saacadood oo socdaal ah

Sida aad ku arki kartid 80km waxay u taagan yihiin Bedka qaybta ku xidhan A

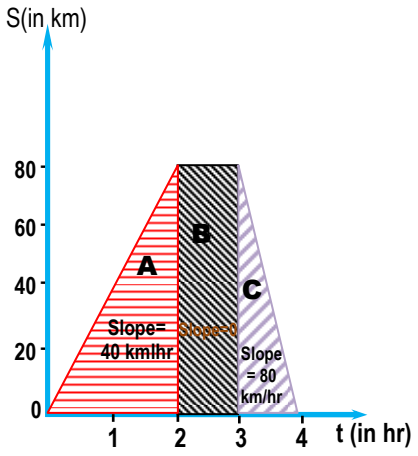
Intii lagu jiray saacadii seddexaad dhexdeedii (Qeybta B ee Garaafka) keynaanku waa Eber, Baabuur kuna ma badalin meeshii uu taagnaa, sidaa awgeed Bedka qeybta B waa eber. Intii lagu jiray saacadii seddexaad dhexdeedii (qeybta C ee garaafka) Keynaanku waa 80km/saacadiiba xagga koonfureed muddo 1 saac ah. Barabax c waa- 80km/ saa× 1saac Ama 80km koonfur – 80km waxay u taagan tahay Bedka qeybta c ee Garaafka

Wadarta Barabaxa 4- ta saacadood waa Eber, Fogaanta Baabuurku ku safaray, si kastaba ha ahaatee waa wadarta Barabaxyada Adigoo u tixgalinaya jiho lsku mid ah

$\Rightarrow$ (80km) + (80km) = 160km.

Garaafka jaantuska 2.6 ee waa Garaaf xariiq toosan, oo

Tiiradiisu $= \frac{\Delta\vec{s}}{\Delta t}$. laakiin inagoo Adeegsan ayna qeexida , $\vec{a} = \frac{\Delta\vec{v}}{\Delta t}$. Hadaba Tiiradu waxay la mid tahay karaarka garaafka $\vec{V} \approx t$



Jaantuska 2.7 " $\vec{s}$ " waxay kasoo horjeedaa "t" garaaf

Jaantuska 2.7 waa garaafka ee walaxda xagga sare, ee $\vec{V} \approx t$ ay ka muuqato jaantuska 2.6 Qeybta a ee garaafka, fogaantu waxay si isku mid ah isula Bedeshaa waqtiga Qeybta B- na, ma jiro wax isbedel ah oo ku dhacay fogaantu, ugu dambeyntii Qeybta C wuxuu u dhacayaa dhinaca hoose halkii uu uga dhici lahaa dhinaca sare, waayo keynaanka maadaama Barabaxa tabani uu la mid yahay Laxaad ahaan Barabaxa togan. Barabaxa saafiga ah ama Barabaxa guud waa Eber haddaba, waxaaan

aragnay in Barabaxa muddo (Amin) lagu siiyey lagu heli karo Raadinta la raadiyo Bedka in ta ku xidhan Garaafka xoodan ee keynaanka iyo Aminta ee waqtigaa lagu siiyey

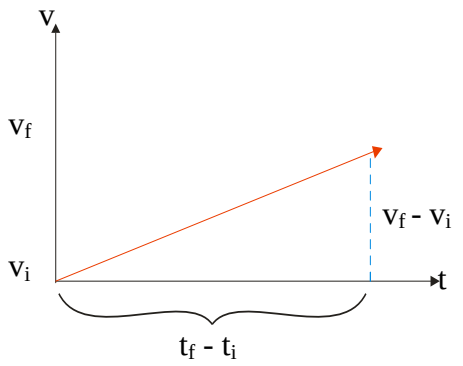
Socodka Karaar madoorsoome

Garaafka socodka karaar madoorsoome ee V~t waa Garaaf xariiq toosan jaantuska 2.8 wuxuu sharaxayaa garaaf ka socodka karaar- madoorsoome garaafka waxaad ku soo aragtay in

i. tiradu $= \frac{\Delta \vec{v}}{\Delta t} \Rightarrow$ tiro $= \vec{a}$ (karaarka)

ii. Bedka tirade ee ku dhex-jirta garaafka $\vec{v}$ ~t wuxuu la mid yahay Barabaxa walaxda

Bedka (A) Ku dhexjira Garaafka $= \frac{1}{2} \times \Delta t \times \Delta v$. Hadd II v = aΔt, daba deed fogaanta (s) $= \frac{1}{2} at^2$.



Jaantuska 2.8 Garaafka farqiga keynaanka ee V ~t

Hubinta (xaqiijinta) 2.3

1. Socodka madaamadeed ayaa lagu keydiyey shaxdan hoose

t (s)	1	2	3	
v (m/s)	10	20	30	

b) Waa maxay karaarka madaamadu?

t) Waa maxay keynaanka uu ku soconayaa Amin t = 10 se ken?

2. Baabuur taagan ayaa ku karaaray 20m/s Amin 5 seken ah.

b)waa maxay karaarka Baabuurku?

t) Haadii uu ku wado karaarkan Dhakhso intee le'eg ayuu ku socon doonaa

i) 2 seken ama ilbiriqsi ii) 10 Ilbiriqsi ?

3. Baabuur ayaa ka dhaqaaqey taagni wuxuuna gaadhay keynaankiisu 10m/s muddo 10 ilbiriqsi ah .

b) Sawir garaaf socodka Baabuurka ee V ~t?

t) Adigoo isticmaalaya Garaafka raadi:

i) tiirada Garaafka.

ii) Bedka garaafka V~t eek u xidhan (oodan) tirada iyo dhidibka -x

j) Maxay la mid yihiin tirade iyo bedka garaafka V~t siday isugu xigaan>?

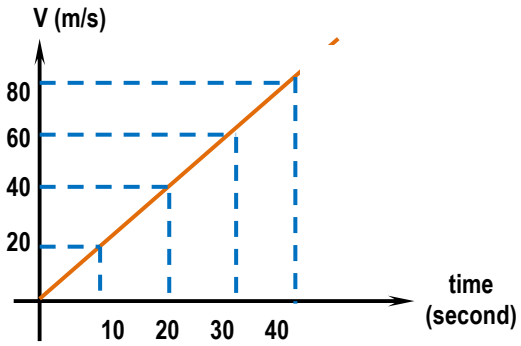
Soo koobbidda cutubka

Cutubkan waxaad ku soo barateen

- Marka laba walxood isku dhacaan isjiidanayaan midba midka kale, xoogag ayaa ka dhexsamaysma xoogu waa ka riixida Ama jiidida ee walxuhu iskufalaan.
- Xooggu wuxuu leeyahay Laxaad iyo jiho waxaana lagu cabbiraa Niyuutan.
- Xooggaga waxaa loo kala qeybiya a xooggaga taabashada iyo kuwa aan taabashada ahayn xeerka seddexaad ee Niyuutan wuxuu sheegayaa in walax taagani ay taagnaanayso Ama walax ku socota keynaan madoorsoome ay ku soconayso uun keynaankaas, haddii aan loo adeegsan xoog dibada kaga yimaada
- Odhaahda odhanaysa majiro socod iyo socod maddoorsoome waxay ahaanayaan kuwo aan lsbedelin haddii aan xoog lagu adeegsan socodka madoorsome ee xariiq toosani waxuu ku sharaxan yahay keynaanka madoorsome garaafka socodka madoorsoomee S~t waa garaaf xariiqda toosan.
- Bedka garaafka S~t waxay la mid tahay keynaanka socodka karaar madoorsoome ee xariiqda toosani wuxuuku sharaxan yahay Ama muujisanyahay isbedalka keynaanka. Garaafka socodka karaarku waa xariiq toosan
- Bedka garaafka V~t waxay la mid tahay karaarka Bedka garaafka V~t wuxuu la mid yahay fogaanta ta lagu safray Aminta t.

Nakhtiinka su'aalaha iyo masalooyinka

1. **Socodka Baabuurka Waxa lagu sawiray garaafka V~ t ee jaantuska 2.9**
   b) Waa maxay karaarka Baabuurku?
   t) Waa imisa fogaanta Baabuurku ku safray muddo dhan 65?



Jaantuska 2.9 (seken) garaafka V~t

2. **Waxaanu Fuuley Guriga Awoowgey Aabo Baaskiilkeyga oo xawaare dhan 6km/saac waxay ahayd meel siman muddo 5 miridh ah, waxaa ahaa halkaa Buur. Waxaan ku tagay dhakada buurta 2km/saac muddo 3 miridha ah Waxaan la kulmay saaxiibaday waanan istaagay si aan ula hadlo 5 miridh waxaan ku socday 2 km/saac muddo 4 miridh ah itaa aan gaadhayey guriga Awoowgey Abo sawir garaaf v~t ee socodkan**
3. **Fogaan intee dhan ayey Gaadheysaa saacadkasta?**
   b) Fogaan intee dhan ayey Gaadheysaan saacadkasta?
   t) Fogaan intee dhan ayey jaraysaa walaxdu saacad badh kasta (1/2) saac?
   j) Fogaan intee le'eg ayey jaraysaa 1/3 saacadeed oo kasta? Sawir garaafka s~t socodkiisa
4. **Aamina cabdllahi ayaa ku oroday 10m/s Intee in le'eg ayey ku qaadan in ay gaadho?**
   b) 1 m t) 5 m j) 20 m x) 100 m
5. **celceliska xawaaraha walaxi miyey waqtiga lagu siiyey Gaadhi kartaa xawaare Barta ugu sareeye ee mudadaa lagu siiyey?**
6. **Sawir garaafka xawaare Amineed adigoo qiyaasaya qiimey aasha Ama inta aad Dugisgaaga µ Socotey saaka. Tus sida loogu isticmaali karo Garaafkan in la Raadiyo Ama Goaamiyo fogaanta.**
7. **Baabuur u socday dhinaca waqooyi ayaa ku socalay 100km/saac ayaa wuxuu galay kale 20 seken Ama Ilbiriqsi wuxuu ku socday 120 km/saac xagga koonfureed sawir.**
   i) karaar- Amin (Garaafka),
   ii) Garaafka xawaare- Amin
   iii) Garaafka Barabax- Amin.

Cutubka 3aad

CADAADIS

Natijooyinka cutubka: **Cutuba kani markuu dhamaado waxaad awoodi doontaa in aad**

- ✓ Fahamto fikradaha laxidhiidha cadaadiska .
- ✓ Kobcisid xirfadahaaga laxidhidha masalooyinka cadaadiska .
- ✓ Ubogted xidhiidhka ka dhexeega dhammaan walxaha.
- ✓ Isticmaashid baaxada wayn ee suurtagalisa kor uqaadista aqoontaada fikrada ha muhimka ee fiisigiska.

Hordhac

Fiisigiska fasalkii 7aad waxaadku soobaraytay xooga iyo saamayntiisa. Maxasuusan kartaa saamaynta xooggaga. Cutubkan waxadku baran saamayn kale oo xoogu leeyahay waxaa layidhaa cadaadis marka u horeysa waain aad baratid fikrada cadaadiska ee looisticmaalo shayga adkaha. Markaan waxaad baran cadaadiska dareeraha, atmosfarka (Gibilka). Cabbirka cadaadiska Gibilka, Xeerka Baskal iyo ugu **danbaynta masalooyinka cadaadiska.**

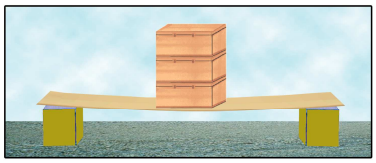
3.1 Qeexida iyo Halbeega Cadaadiska

Hawlgalka 3.1

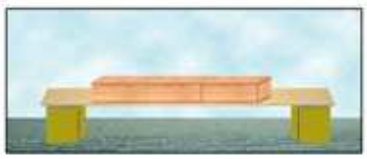
Ka ladood su' aalahan soosocda saaxiibadaa ama waalidkaa

1. **Waa maxay xoogu? Waa maxay Bedku?**
2. **Qeex saamaynta xooga ee halbeega bedka.**
3. **Saamayntan maxaa layidhaa**

Hawlgalka 31 waxa uu yahay FahanKaaga ku aadan faraqa udhaxeeya jooga iyo cadaadiska. Xoogu waa riixid ama jiidis oo badala qaabka walaxda lakiin cadaadisku marwalba waa xoog halbeega bedka isagoon badalin jihada laxaadka xooga waxaad helikartaa cadaadis kala duwan is lamarkaa adoo badalaya Jihada bedka xoogukufalmo. (eeg jan – 3.1)



b) baloogyo koruquman



t) baloogyo jiif uquman

Jaantuska . 1.1 Saamaynta bedka cadaadiska

Hawlgal 3.2 ufiirsashada saamaynta cadaadiska ee bedka

Qalabka loo bahanyahay balooga loox ama buuga, mastarad, iyo I.W.M

Jidka lamarayo: mastara du waxay u dhaxay saa la bada wal xood.

Meesha balooga loox, midmid usaar mastarada (Jan 3.1) balooga meeshisa kuceli

b. Joogahaan (Jan 3.10) midbamid buu usaaran ya hay waliba saamaynta culays ka ee baloogu waata mastarada aad ka arki doontid. Maxaad ka fahan tay

t. Jifahaan (Jan 3.1)

kujada xiga, saamayn ta isbar bardhiga culayska balooga dusha mastarada halkee aad logumarin mastarada? Qeex sababta

maxaad ku gabagabayn kalsooni da cadaadis ku saran bedka.

Hawlgalka 3.2 waxaad aragtay. Cadaadiska kufalmaya balooga loox dusha mastarada kutirsan bedka dusha balooga ee uhaysto.

Cadaadiska sareeya marku baloogu sijoogah uqumanya hay meeshu markaa sijifah uhabay san tahay.

cadaadis waa natijada dhacda marka xoogu qabto oogada. Cadaadisku waa caddadka xooga ku falmaya bed halbeegiiba . Summad cadaadisku waa 'P'

$$\text{Cadaadis} = \frac{\text{Xooga lagu qabtay}}{\text{Bedka}} \leftrightarrow P = \frac{F}{A}$$

Halbeega cadaadisku waa Niyuutan oo loo qaybiyey miter laba jibaaran ($N|m^2$) waxaa kaloo layidhaa baskal oo utaagan Pa.

Marka 1 pa = $1N/m^2$.

Halbeegyadkale ee an caalami ahayn, baar, milibar, iyo toor

1 milibar = 100P_a

1 bar = 100,000 P_a

1 toor = 1 mm Hg

= 0.1 cm Hg

1.01 bar = 1010 milbar

= 768 bar

= 101,000 P_a waxa

Layidha halbeeg

Gibilka cadaadiska

Sida qeexida cadaadis waxa laga fahmi marka cadaadisku kordho in xooguna kordhi.

Hawlgalka 3.2 waxaad ka fahantey cadaadisku in u ku salaysanyahay bedka dushiisa xooga lagu falay.

Su'aalo Furan

1. **Mata qaan maroodiga? Lu'ga hiisu waasidee? Mawayn yi hiin mise way yar yihiin?**
2. **Maxaa kudhici lahaa maroodiga hadii lugahiisu ay noqon lahaayeen kuwa yar - yar.**

Sida dabiciga waxaad ogtahay waxyaabaha saameye cadaadiska cagta marodigu waxay qaadan bed balaadhan marka usocodo culayskiisu aadbuu uwaynyahay waxay kufidi cagtisu bedwaasac ah. Sida cadaadiska ama xooga ee halbeegabedku waa yar yahay tani waxayku dhacdaa maroodigu ku socodo dhulJilicsan ee an ladagaynin (aan qusaynin) dhulka jilicdasan.

Jilicdasan

Hadii F tahay Nama N = kg. m/s^2 cabbirkisan kaladuwani[MLT^{-2}], iyo
Hadii a tahay m^2. Cabbiradisa dhinac [L^2]
sidaas darteed cabbirada dhankasta waa $\left[\frac{MLT^{-2}}{L^2}\right]$ = [ML^{-1}T^{-2}]

Su'aal Furan

Maqeex ikartaa sababta cagta taayiradiisu uwaawanyihiin baabuur takale? (bedka taagirada).

Tusaale 3.1

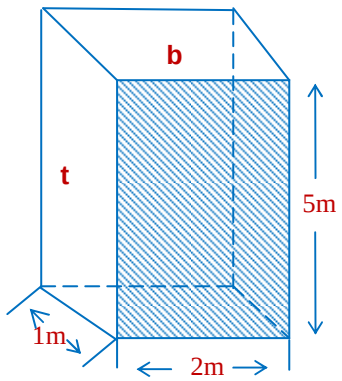
1. Xisaabi cadaadiska ku falmay barta intabadan daadinaysa inlagumusbaar iyo bedka 0.1 cm^2. Dubaha alwaaxa balooga xoogisuyahay 20N.

Siin	Waydin	Furfuris
F = 20N A = 0.1cm^2 = 0.0001m^2	P = ?	P = $F/A = \frac{20\ N}{0.00001 m^2}$ = 2,000, 000 N/m^2 or 2,000,000 pa

2. Waaimisa xooga lagu way diyey inuusoosaaro cadaadiska 20,000 N/m^2, markaa ogada bedkuwaa 2m^2?

Siin	Waydiin	Furfuris
P = 20,000 N/m^2 A = 2m^2	F = ?	P = $\frac{F}{A} \Rightarrow F = P \times A$ = 20,000 $\frac{N}{m^2} \times 2m^2$ $\Rightarrow$ F = 40,000N

3. baloog laydi ayaa cufkiisu yahay 50kg leyn dherer 2m, 1m dusha miiska. Waaimisa cadaadiska ku falmay culayska miiska (eeg Ja 3.2)



Jaantuska 3.2 Balooga dhinacyadiisu 1m × 2m × 5m

Siin	Waydiin
Cufka baloog = 50 kg cidhifyada = 2m×1m×5m g = 10 m/s^2	P_A = ?

Furfuris

Cutubka kowad, waad soobaratay sida loo xaliyo bedka ogawalba.

Bedka blooga ogadisa 'b' = 1m × 2m = 2m^2

Culayska baloogu W = $m_b \times g$ = 50kg × 10m/s^2 = 500N

Cadaadiska uguwayn ee ku Falmaya marka baloogu ku sugnaado cidhif yar ugu badnaantiisu waa $P_A = \frac{F}{A} = \frac{W}{A} = \frac{500N}{2m^2}$ 250 N/m^2. Sidokale marka ogada bedku uguwaynaan. IskhilaaF ka cadaadisku waxa uu noqon uguyaraan.

$P = \frac{F}{A} = \frac{W}{A}$ $P = \frac{500\ N}{10\ m^2}$ $P = 50\ N/m^2$

Hubin 3.1

1. Waa maxay cadaadis?
2. Waa maxay dhinacyada cadaadisku? Ka adooda halbeegyada cadaadiska?
3. Qeex sida cadaadisku u badalo saamayn ta bedka?

3.2 Dareeraha Cadaadiska

Si aad u fahantid cadaadiska dabiciga ee dareeraha, waa in aad xasu'satid dabeecadah dareeraha.

Hawlqalka3.3

Kaladood saaxibadaa

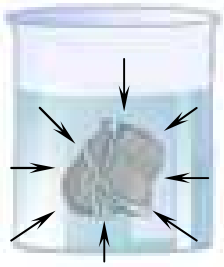
1. Faraqa udhexeega iyo waxay wadaagaan adkaha, dareeraha (qaab, mug, culays, Cufnaan. IWM)
2. Koonteenar caagah oo biyo kujiraan kuxisaabtan. Hadii laga mudo cidhifyo kala duwan maxaa ku dhicibiyaha? (Fii Jan 3.3)

Doodiinii hawlgalka 3.3 waxaad kaga hadasheen.

- Dareeruhu malaha qaab waxa u qaataa qaabka weelka ukujiro.
- Dareeuhu waxa u lee yahay mug, cuf iyo culays.
- Isbar bardhig molkuulada adkaha, kuwa dareeraha si isdabajooga oo madax banaan bayusocdaan

Cufnaanta adkuhu way ka wayntahy tan dareeraha. Hawlgaladkale way ka siman yihiin ee k u tusaya dareeraha cadaadiskiisu kufalmaya weelka jihadiiso dhan Jan 3.3 eeg marka caaga biyuhu ka bux samaan biyaha lagu dalooliyo markaa biyuhu waxay u dhaqaaqan jihooyinkoo dhan.

b. Caaga bilaastiga oo biyo ka buu xaan



t. cadaa diska biyuhu Jihoyin koo dhan waa is kumid

Jaantuska 3.3 Cadaadis ka biyahu waxa uudhacaa dhamaan jihooyinkoodhan.

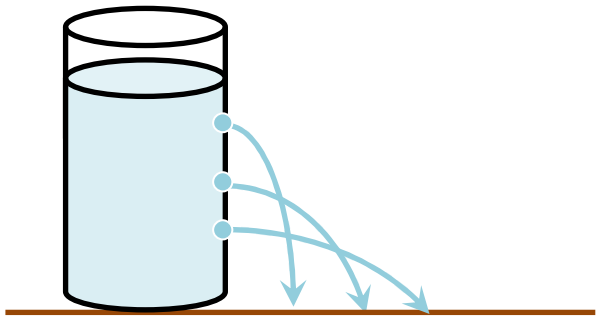
Hawlgalka 3.4

Ufiirso qaabka kala duwan iyo baaxada ukujiro qayb dareereah oo iskumidah.

i. **Muxu noqoncadaadiska dareeraha salka weelka kujira?**
ii. **Maleegyahay cadaadisku ama maku kala duwan yihiin koontenerka?**
iii. **Qaabka koontenerku saamayn makuleyahay cadaadiska?**

Jaantuska. 3.4 koontener qaabkala duwan leh dareerihisu waxay kujoogaan joog iskumidah

Jan3.5 saamayn ta ay ku leedahay sare cadaadis joogiisu yahay inta dareerah kujirta. Koonteenerku waxa u leeya hay sadex dalool 1,2 iyo 3. Dareeraha ka soo baxaya da loo ka 3 waxa u ku socon Fogaanta ugu dheermarka loo eego daloolka 1, tani waxay inatusi cadaadiska daloolka3 waxa u kawayn yahay 1 iyo 2 Hawlgalka 3.4 waxay kaa caawin in aad fahamto cadaadiska dareerahu inuku salaysan yahay qaabka weelka iyo salka bedka weelka



Jaantuska 3.5 Cadaadiska dareeraha doku salayn san joog

Taniwaa dareereha cadaadisku inuu ku salysan yahay

i) Joog(h) ilaa xaga sare ogada dareeraha
ii) Cufnaanta dareeraha. Aad ucufan cadaadis badan buu leyahay joog kastaba

Ufirso dareeraha cofnaantiisa (ρ) weelka (koontenerka). Joog su'gan (h), xooga ku falmaya dareeraha wu leeg yahay culayska dareeraha

Marka cadaadiska, $P = \frac{F}{A} = \frac{mg}{A}$, Halka M waa CuFka lakiin $m = \rho v$, aan isku darno labad su'aalod. Waxaan helaynaan

$P = \frac{F}{A} = \frac{mg}{A} = \frac{\rho Vg}{A}$,

Maadamo mugu soosaaro jooga iyo bedka ($V = Ah$) marka

$$\Rightarrow P = \frac{\rho Ahg}{A} \quad \Rightarrow P = \rho gh$$

Halka p = Cadaadiska dareeraha N/m^2

ρ = Cadaadiska cutnaanta kg/m^3

g = xoog cu F isjidadka m/s^2

h = Jooga (Jooga biyaha)

Waad xisaabi kartaa cadaadiska kufalmaya biyaha weelka, bada, badwayn dabaasha Iwm walxda dusheeda barkasto kamid ah biyaha uisticmaal su'aalaha cadaadiska $(P = F/A)$.

Hawlgalka 3.5

Iska I law cadaadiska hawada Raadi cadaadiska loo qaybiyo miter laba jabaaran. Joogu waa 10m, 100m, 1000m iyo salka badwaynta (2000m) uqaado cufnaanta badwayn ta 1039 kg/m3.

Cadaadiska ku haboon dareeraha negi:

1. Cadaadisku waxa u ku falmaa bar kasta oo dareeraha kamidah
2. Cadaadisku barkaste waa iskumid oo heer koodu is leegyahay dareerayaasha
3. Cadaadisku waxauu saamigalku yahay jooga (jooga hoose ee ogada) iyo cufnaanta dareeraha (ρ)
4. Xooga salka weelku waa cadaadis heerka badka weelka ($F = PA$). xeerkan waxaa lo isticmaalaa biyo xidheena da.

Tusaale3.2

1. Qaar koontenarada waa kuwo ka buuxa biyo cufnaan 1000 kg/m^3, Jooguna 50cm waaimasa cadaadiska ku Falmaya weelka. (uqaado g = 10 m/s^2)

Siin	Waydiin	Furfuris
$\rho = 1000kg/m^3$ h = 5cm = 0.5m g =10m/s^2	p = ?	P = ρgh P =1000kg/m^3×0.5m×10m/s^2 = 5000N/m^2 = 5000P_a

2. Biyo ayaa lagu shubay weel Joogisu yahay 2m. (xisaabi cadaadiska biyaha ee weelka. (uqaado g = 10 m/s^2, cufnaanta biyahana $\rho_\omega = 1000 kg/m^3$).

Siin	Waydiin	Furfuris
h = 2m, g =10m/s^2 ρ_ω= 1000kg/m^3	P = ?	P = ρgh =1000kg/m^3 × 10m/s^2 × 2m = 2 × 10^{4}N/m^2 = 2× 10$^4 p_a$

Hubin 3.2

1. Cadee waxayaabaha saameeya cadaadiska dareeraha?
2. Sharax side cadaadiska dareeruhu ugukala duwan yahay jooga.

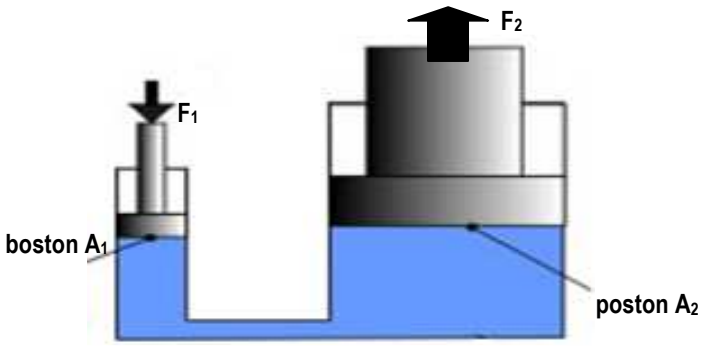
3.3 Xeerka Baskal

Hawlqalka 3.6

Cadaadisku dareeraha makadhex gud baa sabab?

Dareerahu wuu kadhex gud baa cadaadiskasta hooseya oo lagu qabto qaybkasta kamid ah? Astaantan dareeraha cadaadiska waxaa loo isticmaalaa haydhiroliga hoos urixa haydhiroliga Jabintisu waa inuu soo saaro xoog badan kuna soosaaro joogyar

Hay dhiro liga hoosurixa waxa uka kooban yahay dhululubo dhuuban, mid balaadhan labaduba waxay ka koobanyihiin dareere. (tusaale salid) iyo bostonka b & t (Jan. 3.6 eeg).



Jan 3.6 A Hydhiro lika hoos uriixa

Xooga laqabtay F_1 bostonka yar eeka gud baya badka A. sitoosah dusha dareeraha. Sida salida. Markaa cadaadiska $P_1 = \frac{F_1}{A_1}$. Cadaadiskan gud baya dhanka aan xaga salida dhululu bada wayn. Taaso ah bedka A_2, marka acadaadiska labada ka siman yahay.

$P_1 = P_2$ xaga $P_2 = \frac{F_2}{A_2}$. xooga lagu falo bostonka A_2 waa $P_2A_2 = F_2$ sidaa darted aadbay ugawayn yahay sidaas oo kale xeerka Baskal

Xisaab ahaan

$$P_1 = P_2$$
$$\Rightarrow \frac{F_1}{A_1} = \frac{F_2}{A_2}$$
$$\text{ama } F_2 = \frac{A_2}{A_1} \times F_1$$

Su'aalo Furan

Masheegi kartaa isticmaaloo kale oo haydhiroliga xeerkisa kamidah?

Dareeraha iyo gaaska ugudban waxaa layidhaa dareere (Fuludh) haddi cadaadis gudeeduuJiro meelbu kuhayaa dareere. Cadaadiska waxa u ugudbi barkasta darreah. Xeerkani waa xeerki Baskal.
Xeerka baaskal waxa uu dhigayaa cadaadiska la isticmaalayo dareeraha ugdbaya dhinac la'aanta bar kasta bostonka dareerihisa kamidaah

Xeerka baskal waxaa loo isticmaalaa aaladaha casriga (techolologic) taaso loo isticmaalo soo saarida xoogwayn sida hay dhirolik hoos urixa

Eeg Jan. 3.6 mujinayaa shaqada xeerka Baskal ee hay dhiro liga.

Tusale 3.3

1. Haydhirolicka hoos urixa bostonka yar waxau lahaa bed $8cm^2$ sido kale bostonka waynina bedkisu $400cm^2$ hadii laguisticmaalo 20N xoogdhan bostonka yar waa imisa xooga Bostonka wayni.

Siin	Waydiin	Furfuris
$A_1 = 8cm^2$	$F_2 = ?$	$\frac{F_1}{A_1} = \frac{F_2}{A_2} \Rightarrow F_2 = \frac{A_2 \times F_1}{A_1}$
$A_2 = 400cm^2$		$= \frac{0.04m^2 \times 20N}{0.0008m^2}$
$F_1 = 20N$		$= 1000N$

2. Bedkuimisa ayuunoqon bostonka wayn ee haydhiroliga hadii u qaado culays dhan 20,000N xooga 200N lagu isticmaalo dusha bostonka yar bed $1cm^2$?

Siin	Waydiin	Furfuris
$F_1 = 200N$	$A_2 = ?$	$\frac{F_1}{A_1} = \frac{F_2}{A_2}$
$F_2 = 20{,}000N$		$\Rightarrow A_2 = \frac{F_2}{F_1} \times A_1$
$A_1 = 1cm^2$		$= \frac{20{,}000N}{200N} \times 1$
		$= 100cm^2$

3. Haydhirolika hoos uriixa boston kiisa yar bedkiisu waa $6cm^2$ halka bostonka wayni kayahay bedkiisu $300cm^2$. Haddi lagu isticmaalo xoog dhan 30N bostonka yar. Intee ku qaadikaraa culayskan?

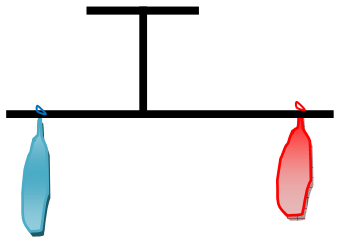
Siin	Waydiin	Furfuris
$A_1 = 6cm^2$	$F_2 = ?$	$\frac{F_1}{A_1} = \frac{F_2}{A_2}$
$A_2 = 300cm^2$		$\Rightarrow F_2 = \frac{F_1}{A1} \times A_2$
$F_1 = 30N$		$= \frac{30N}{6cm^2} \times 300cm^2$
		$= 1500N$

Hubin 3.3

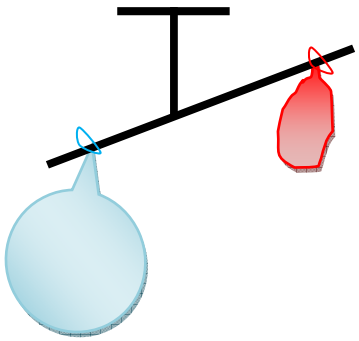
1. **Qeex xeerka Baskal?**
2. **Sawir hydhirolik hoosurixa sharax Faidadiisa.**

3.4 Cadaadiska Gibilka

Dhulka waxaa ku xeeran cufa cimilada weyn oo layidhaa **Atmosfarka (Gibilka).** Xoog cufisjidadku wuxuu ku falmaa hawada. Eeg Jan 3.7 I isticmaalaynaa biibibalaadhan oo culus. Kawayn tan madhan si daas darted hawduwaxay leedahay culays. Culayska lagu falayo cadaadiska walaxda laga helo oogada dhulka cadaadiska waxaa layidhaa cadaadiska Gibilka.

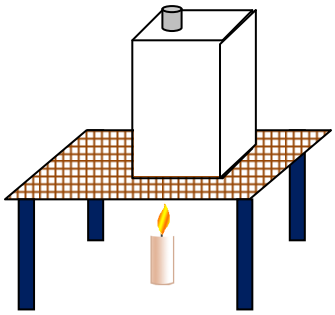


b. Laba bibi oo Faaruqah

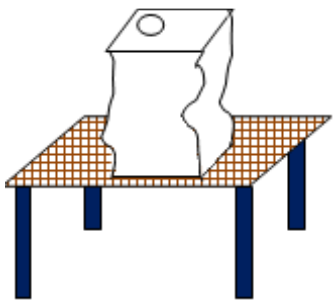


t. bibimid howo kabuxdo

Jaantuska 3.7 Hawdu waxay lee dahay culays



b. Biyo kulul kujira



t. biyaha qabaw

Jaantuska 3.8 Tijaabo kadisah

Hawlgalka3.7 tijaabokadisah

Siaad u fahan to saameyn ta cadaadiska Gibilka (Jan 3.8)
Qalabka loobahan yahay tanag, tandhala da lagu furo, biyo yar, isha kulka, (shamac)

Dariiqada **1. Biyo yar oo ku jira dhalo daqiiqado gudaheeda buu ku hagaajin**
2. Tanag balaadhan waxaa ka tagaya isha kulka.
3. Biyo hoose ga oo qabow umi baxuna gudaha ayuukujiraa, fadhiisin biyaha iyo cadadis hoose uku umi baxay.

Warbixin gaaban kaqor waxaad kafahan tay adoo ka jawaabaya kuwan sosocda;

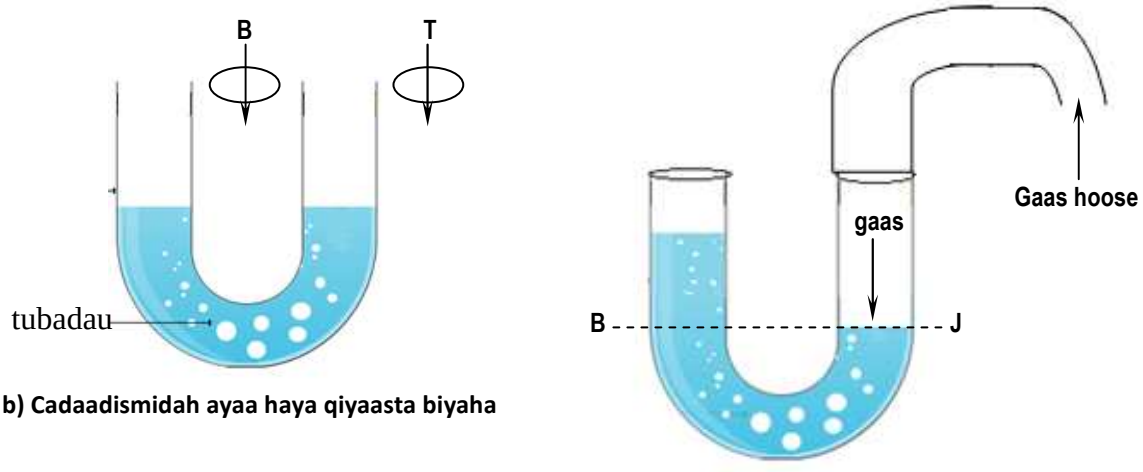
1. **Maxaa kudhacay tanaga burburay?**
2. **Waxay farqa kulku iyo fadhisinta tanaga**
3. **Maxaa isbadalay cufka, muga, cufnaanta, heerkulka? Kee baa siyaa da? Beebee hoos udhaca.**

Hawlgalka 3.7 waxaad arki inay is ku gay nayaan eray ahaan eeg Jan 3.8 b tani waa cadaadiska Gibika.

Hawlgalka 3.8 Tijabada u

qalabka loobaahan yahay tubo 'u' ah, weel biyo kujiaan tubo caag ah

Dariiqada: **1. Biyaha cadiga waxa lagu shubi tubada 'u' qiyaas siman .**
2. Waxa laistaabsin tubada iyo 'u' da hawo hoosaysa marka qiyaas ta biya ha hoosaysa .
i. Maxaadka dareemi qiyaas ta siman iyo habkay isguxigaan?
ii. Qiyaastoo du shasiman tahay saxibkaa way di mid lamid ah in u qabto, handiwaan galiyo waxa usoobaxa qiyaasta biyaha
iii. **Sharax farqiiga udhe xeeya**



Jaantuska 3.9 Tijaaba da dhunta 'u'

Hawlgalka 3.8 qiyaasta biyuhu waa iskumid intaanad dhunta ‘u’ galin (Jan 3.9 b)

Sababtu waa, cadaadis iskumidah baa ku falmaya dhinaca BiyoT. Lakiin hawadu waxay ka hoosaysaa tubadmidka midah

B. Qiyaas ta biyahuwaxay iskabadalayaan cidhifka kaleislaacadaadis ku dhaco bart J waxay noqon markaa iskumid cadaadiska ka hooseysa hawdan lasinayo cadaadiska waxay taageeri udubka dareeraha ee kubada .

Su’aalFuran

Qeex sababta biyahu afkaaga uyimaadaan markaa tubada soonugaysid?

Cadaadiska hawadu waakala duwan yahay meel ilaa meel haddi aanu kor usocono (ufuulno) buurta ama tuubo diiran nuugid tusaale. Cadaadiska hawada waxaa kudhici inu yaraado markaan korubaxnaba. Qaybkasta kamidah hawada ka saraysa dhulka hoos baa u socadaadin qaybaha kale. Marka cadaadisku waxa u kubadan dhulka.

Cadaadiska Gibilku waa saamiga xooga ee bedka halbeegiiba ku falma ogada culays ahaan, Gibilka kasareeya cogada. Waxaa sababa culayska gibilka ka sareeya barta cabbirka ca daadiska hoosana bedka waxaa yareeya cufka Atmosfarka ee ka sareeya bartiisa . Si doo kale qimaynta usiyaadayo waxay yartehay cufka dusha atmosfarka marka cadaadisku hoosbu udhici dhanka jooga bada xaga sare cadaadiska.

Su’aalo Furan

Sharax sida daree rayaashu ugu sawir maan istirinjada dhun teeda marka larabo in u soo saaro.

Haddii aan ukacno xaga sare (samada) aan gaadho meel kabax san cadaadiska atmos forka wa xaa la yidhaa istratosfar (stratosphere) cadaadisku hoos buu udhacaa ilaa u gaadho zero (0) Joog tani way ku culus tahay dhanka hawada ama hawad kasaraysa.

Hubin 3.4

1. **Hawada inagu xeerani cadaadis masamaysaa? Qee xo tusaale kabixi**
2. **Waa maxay cadaadiska Gibilku?**
3. **Muxu qabtaa oo ugumuhimsan tijaabada du qayn ta ee tanagu?**
4. **Qeex sida cadaadiska gibilku ubadalo jooga.**

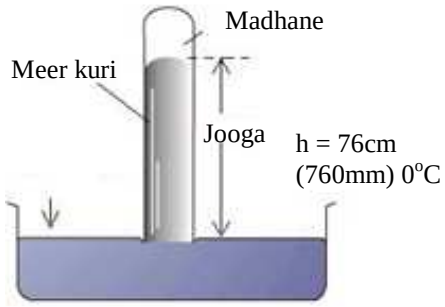
3.5 Cabbirka Cadaadiska Gibilka

I laa hada waxaad so a ragtay sugnaasha ha cadaadiska hawada ilaabada waa intee in leeg buu ca daa disku adagya hay. Si aad u ogaatid cadaadis adag waxaan u baa hanahay in aan cabbirno.

Cadaadiska Gibilku waa cabbirka loo isticmaalo qalabka baro.mitir. Waxaa jira baro mitiro kala duwan laakin wa xaan kahad leynaa oo kaliya merrkuri baaro miter.
Manomitier waxa qalabka loo isticmaalo in lagu cabbidro cadaadiska hawda.

Su'aalo Furan

Sharax Faraqa u dhe xeeya cadaadiska hawda iyo cadaadiska Giblika.



b. Qaab ka meerkuri baro meter **t. meerkuri baro miter**

Jaantuska 3.10 Meerkuri baro mitier

Meerkuri Baaro mitir: Waa tuunbo dhalo ah 80cm dherer le'eg nadiifah qalalan meerkuri leh. Meerkuridu waa ku rogantahay ogadeeda (Jan 3.10a) Qiiyaasta meerkuridu dhunteeda waxaa jira meelo madhan (madhane_ xaga sare). Waxa laygu maga caabaa meerkuribaar. Dhidibka meerkuri tubada waxa taageera cadaadiska Gibilka. P_A. ku Falmaya ogada meerkuri da bada (weelka) Furan. Sugnaasha ha Jooga meerkurida waxay ku salay san tahay cadaadiska Gibilka. Sidaas darted cadaadiska waxaa lagu cabbiray Jooga meerkuridu samayso.

Cadaadiska atmosfeerka Jooga bada 76cm Hg. Taniwaa cadaadiska atmosfeerku inuleeg yahay salka dhidibka meerkuriga 76cm Joog. Marrarka qaar ca daadis ka Gibliku waxaa lagu cadeyaa torr halk 1 torr = 1mm meerkuri si aad uraadisid qiimaha cadaadiska ee halbeega waxaan uisticmaalaynaa

$p = \rho gh$ halka $g = 10 m/s^2$,

$\rho = 1.36 \times 10^4 kg/m^3$, ($\rho$ meerkur))

$h = 0.76$ m,

Marka 76 cm Hg = 1×10^5 N/m^2 = 1×10^5 p_a.

Heerka Gibilka cadaadisku waxaa looqaataa 75mm Jooga dhidibka meerkuri Jooga bada heerka cadaadis kan waxa lagu qeexa dhidibka cagta meerkuri 76mm Joog oo leeg

1.01×10^5Pa = 1 stander

Halbeeg kale oo loo isticmaalo cadaadiska cimilada milibar (mb). 1mb = 100 Pa.

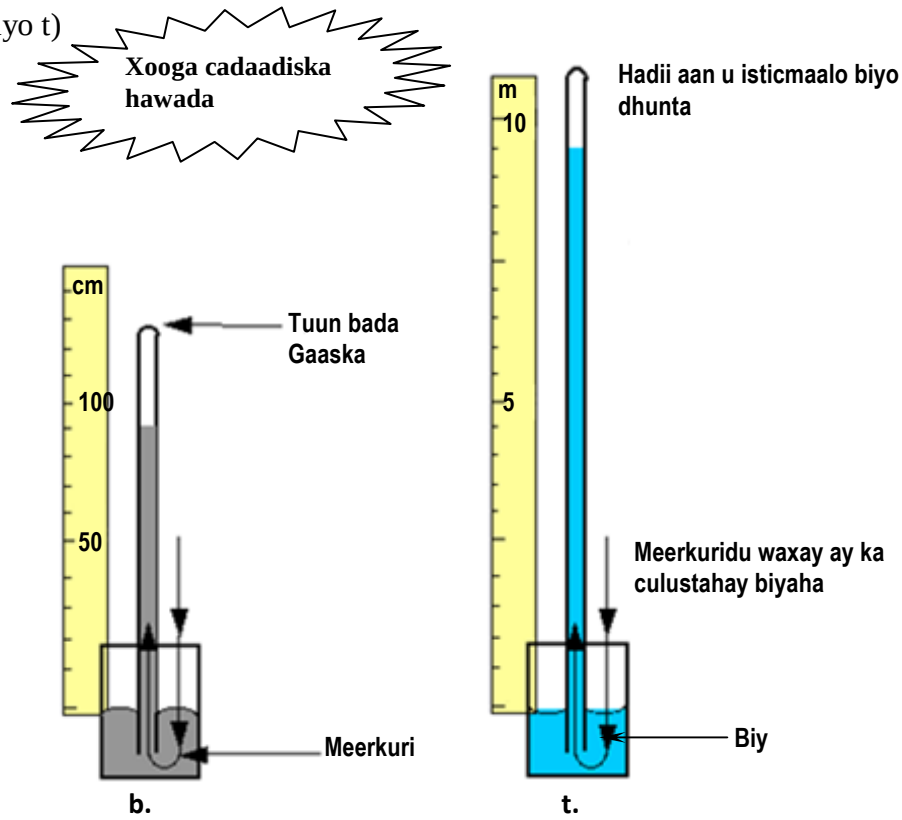
Farqiga udhexeeya xidhidhada cadaadiska atmosfeerka
1mmilibar = 100 Pa
1 bar = 100,000 Pa
1 toor = 1mm Hg
= 0.1mm Hg
1.o1 bar = 1010 mb
= 760 torr
= 101, 000 Pa tan wax a layidhaa S.A.P

Hawlgal 3.9

1. Sharax maxay dadku uisticmaali waayen baaro mitirka biyaha intay isticmaalayaan meerkurida baaromitirka?
2. Tax ugu yaraan 3 Faaidodara oo loo isticmaalo baaro mitir ka
3. Waamaxay Faaiiada ugu muhim san ee lo isticmaalo meerkuri baaro mitier.

Ka sooqaad inaa nu isticmaalayno baaro mitier qiyaastisa cadaadiska Gibilka 76cm Hg. Taa macnaheedu waa cadaadiska atmosfeerka taageera 75cm dhidibka meerkuri aynu xisaabino Jooga biyaha baaro mitirka kaaso cadaadiska taagera.

Kasoo qaad biyo h_m iyo h_w waa jooga meerkurigiyo biyaha taageera cadaadiska atmosfarka sijoogota ah (Jan 3.1 iyo t)



Jaantuska 3.11 Kalabaxa meerkurida iyo biyaha baromiter

Atmosfeerka waxa uu ku falmaa cadaadis labad baro mitier dushooda sida ay umeelaysan yihiin sida muhimka ugutahay jooga biyuhu uleegyahay 75cm Hg waa 1034cm ama 10.34m taasiwaa dhidibka kor uqaada 10.34m tubada dhexdiisa. Taniwaa isticmaalka baro mitier lagu waydiyay waxaan haysanaa tuunbo dherer 10m meerkuri baro mitier aad buu uyaryahay dhanka baaxa da marka kor lagu qaado 75cm.

Gudahaan, meerkuriguwaa xulashada kogida baromitier kuwan muhimka ee sosocda

1. Waa cufanyahay sidas darted kaliya marka loo eego dhidibkayar waa loo baahan yahay
2. Waa fududyahay isticmaalka
3. Fadhiisan maayo qabow kasta
4. Inyar baa umibaxa kulunta

Tusaale 3.4

1. Waa imisa cadaadis torr agagaar ka atmosfoorka cadaadiska 64cm Hg.

Siin	Waydiin	Furfuris
P= 64 cm –Hg	P 'torr' =?	Madaamu 1cm =10mm, P = 64 cm Hg = 640 mm-Hg. lakiin 1mm Hg = 1 torr, markaa 640mm- Hg = 640 torr

2. Bedka sugan ee cadaadiska atmosferku 820 toor ubadal baskal, bar, iyo milibar.

Siin	Waydiin
P (in torr) = 820 torr	i) P(in Pascal)= ? ii) P (in bar) =? iii) P (in millibar) = ?

Furfuris

i) 760 torr = 101,000 pa

820 torr =?

$\Rightarrow$P(in pa) = $\frac{101{,}000\text{Pa} \times 820\cancel{\text{torr}}}{760\text{torr}}$

108,9$\cancel{3}$3.68Pa=

ii) Hadii

760 torr = 1.01 bars marka

820 torr = ?

$\Rightarrow$ P (bar)

$= \frac{1.01\text{ bar} \times 820\text{ torr}}{760\text{ torr}}$

= 1.08 bar

iii) Marka 1bar

= 1000 millibar

$\Rightarrow$P (milbar) =

1.08 × 1000 milibar

= 1080 milibar

Hubin 3.5

1. Qeex sida atmosfarik cadaadis kiisuyahay cabbirka dhidibka daree reha lataagero.
2. Kala dood halbeega cadaadiska atmosfarka.
3. Waa maxay baro mitier lagu akhrinayo heerka atmosfeerka cadaadiska.

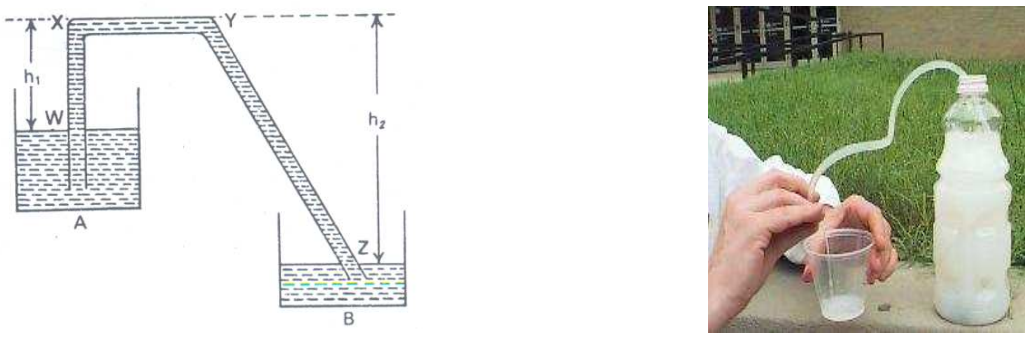
3.6 Habka Cadaadiska Hawada

Qalabayo badan baa loo isticmaalaa cadaadiska atmosfarka sayfon waa dhuunta banbada , istirinjada waa teknolojiga logu isticmaalo cadaadiska atmosfarka.

1. Sayfoon

Waa aqoonta logu isticmaalo cadaadiska atmosfarka.

Say foonwaa qalabka gudbinta dareeraha qiyaasta sare ilaa tan hoose qay bin la'aan dhareeraha oodhan bara bixiya weelka.



b. t.

Jaantuska 3.12 Sayfoon

Sayfoonwaa tuunbo ama dhuun gudbisa biyaha (dareerekale) meel sare barta sare una soodejisa meelaha hoose sayfonkuwaa awooda biyuhu ay ku fuu'laan waxajoojinaya. Taniwaxay yeeshaa kaladuwanaasho iyo xiso. Sido kale mid faaido wayn leh. Say fonka waxa loo isticmaalaa beeraha siuu'udha qaajiyo biyaha ukasoo qaado kaydka geeyana meelaha hoose. Waxa kale loisticmaalaa kasoo saaride baabuurta booyadaha ee uqaaday baabuurka dibadiisa. Iskutijaabi sidaad ufahmilahayd isticmaalka say foonka ee deegaankiina.

Su'aalo fu'ran

Tijaabada say fonka

1. **Hadii laba haamood oo qiyaastoodu kala duwan tahay ee biyaha say fonka. Natiijadu maxay noqon. Wakhtidheer kadib?**
2. **Maxaa dhici hadii aad dalacdid tubada (koruqaadid)?**

Xaaladaha shaqo ee say foonka

i) Say Foonku kumashaqeeyo madhanaha
ii) Say foonka tubad waa in uu ka buuxo dareere.
iii) Jooga qo toma 'h_1' barta sare 'x' lanta gaaban ee qiyaasta dareera ha weelka. Waa inay kagaraato baromitierka jooga dareeraha (Jan 3.12 a)

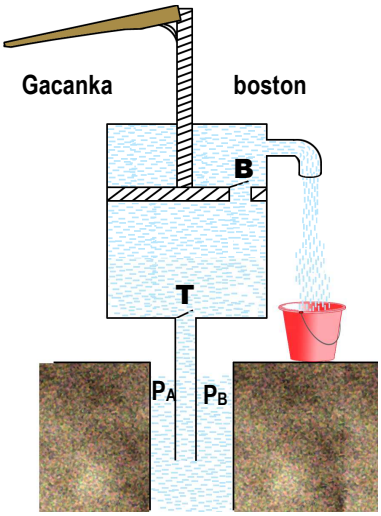
iv) Qiyaasta dareeraha weelk u kayimid dareerahani waa inuu ka sareeyo kuwso kale.

v) Hadii lafuro awaan laant yz (Jan 3.12b) qiyaasta hoose ee daree raha A. say fonkuna wiish yahay. Siuu u gudbiyo dareera tartiib

2. Bamka midigta (Bamka Biyaha)

Bamka midigtu waa qalab sibalaadhan oo kala duwan looga faaidaysto wadankeena. Waxa laga yaabaa inaad ka la socotay telfeshinka (TV). Marka dadka reer baadiyaha Itoobiya ay isticmaalayaan bamkan biyaha ee ceelasha gunta dheer. Taniwaa mid aad muhiim uah Jan 3.13.

Bamka midigta waxau leeyahay labafaaido. Mid waa boston kamidna gunta socelinya (gun ta socelinaysa)



b. Qaab dhismeedka bamka midigta

t. bamka midigta oo falkujira

Jaantuska 3.13 Bamka midigta

Si uu'ubilaabo bamku hawsha, Gacanku waa in uu kor iyo hoos uwareegaa sida qiyaasta 'T' way xidhantaa biyuhuna waxa usoo raaci dhuunta "B" marka gacanku koruwareego, qiyaasta 'B' way xidhmi, barta qiyaasta 'T' ayka Furmi biyuhuna korbay uriix mayaan dhunta gudaheeda qiyaasta "B" cadaadiska atmosforka lawareeji gacanka koriyo hoos sijoogto ah buu'ugu saaraa afka.

Hawlgalka 3.10 Haw Imashruceed ka rikibida bamkagamceed

Qalabka loobaahan ya hay bam botubeed, baaldi biyood iyo dhuumo la isku xiro. Jidka lamarago

i. **Booqo biyo soo saare dhaqameed xaruntiisa taa sooku shaqaynaysa bambo midig**
ii. **Baro qaabdhis meedka bambad biyaha iyo siday ushaqayso.**
iii. **Rikib bam bo midiged ku gaar ah isticmaalaya tusmoyinka qalabka.**
iv. **Qeex sida bamboo midigeda lo gu tsticmaalo bulshada dhexdeeda.**

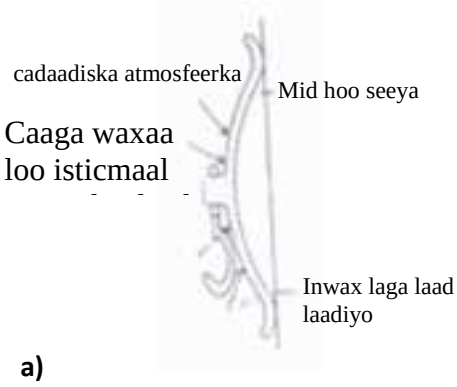
3. Sariinji (syringe)

waad taqaaney sariinjiga caruurnimadii waadku ciyaari jirtay sariinjiga waxaa isticmaala dhakhtarka iyo kalkaaliyayaasha siay ugu turqaan. Waxay kakoobantahay cabbir sugan. Bostan wax lagu shubo dhuntani waxay celin iyado lagu riixo dareeraha. Waxa u dib ugu soocelin bostonka. Taniwaxay yareen cadaadiska hawada ee dhuunta. Xooga cadaadiska atmosfarka dareeraha kor bu uqaadi. Hoos uriixda bostanka waxa udhaqaajin dareeraha kana saari naaska.

Jaantuska 3.14

4. Caaga wax nuuga (rubber sucker)

isticmaalka ugu fudud ee ugu waanaagsan cadaadiska atmosferka waxaa weeyi goobo muqaaleed caag koob ah waxaana lagu magacaabaa nuuge (jaqe) caaga nuugaha waxaa loo istic maalaa insawirada lagu dhajiyo korka tukaanada, muraayadaha baaburta (Jan 3.15 b) waxa laga yaabaa in aadka fahamte nuugahan ee muraayadaha tay siyada laga laad laadiyo sawirada markad usosocotid iskuulka, marka qoyaan unugo siu usameego hawo wanaagnsan ukudabolo kusaley naya sinaasha ogada.



a)

Koobku waa Fidsan yahay hawo nadifah o'ka baxsan nuguda. Markaa cadaadiska atmosferka aaa kuhya ogada

Caaggaga nugayaasha ahi waxa loo isticmaalaa, alawaadaha, qusaya in la iska daayo diyaar u ah qalabkooda tasoobalooga biyuhu socoda (Jan 3.15b) dhuntayar ee wax lagu cabo (eeg jan 3.16) usha qaynaya kaalmayta cadaadiska. Markaad hawda kunugtid dhunta cabbitanka yar, eed afkaaga ku haysid waa madhane.

b)

Jaantuska 3.15 Caaga nuuga

Cadaadiska atmosforka ee ogadu Juuska (sharaabka) ee kujira koobka xoog dhuunta ku soomari Juusku. Waxad hawada nugtaba waxa afkaaga soogaadhi Juus kii

Jaantuska 3.16 Dhun ta cabbitaan ka lagu nugo ama lagu cabo.

Hubin 3.6

1. Magacaw faaidoyinka saxarada cadaadiska atmosfeerka (Gibilka)
2. Qeex sida say foonka, bambada, sariinjida, caaga waxa nuga waxqabadkooda.

Soo Koobbidda cutubka

Cutubkan waxaad ku soo baratay

- Cadaadisku waa saamiga xooga ee bed halbeegiba. P=F/A. Halbeegisu waa N/m^2 ama Pa. hal baskal oo cadaadis waa xooga hal niyuu tan kufalma bedka laba jibaaranaha (miter laba jibaaran)

  i.e 1 pa = $1N/m^{2`}$
- Cadaadiska adkahu waxa ukusalaysan yahay bedka halka xoogukufalo. Cadaadiska dareeruhu waanegi. Ja hooyinkoodhan u falma. Cadaadiska dareeru hu waxau ku salaysan ya hay jooga dareeraha iyo cufnaan ta dareeraha (P=ρgh)
- Xeerka baskal waxa ulee yahay "cadaadiska isticmaalka meelku hayntiisu gudubka dareeraha jiho la'aan tisuwaa meelwalba dareeraha ka midah" isticmaalka ni waa hydhiro lika hoose rixa.

  taniwaa $\frac{F_1}{A_1} = \frac{F_2}{A_2}$
- Hawada inagu xeersan inaga waxay lee dahay culays iyo cadaa disk u fal maya ogada dhulka. Cadaadiska atmosferku waa 76cm meerkuri (Hg)

  760 mm Hg = 1 atm; Halka 1 atm = 1.01×10^5 pa
- Cadaadiska atmosfarka waxa uu ka cayaaraa door muhiim ah qalabya da bambada, biyaha say fonkaiyo caaga waxa nuga. Waxay iyagu qabtaan Abuurista cadaadiska kordhintiisa a iyo yareyntiisa dareere.

Nakhtiinka su'aalaha iyo masalooyinka

I. Meelaha banaan erayga ama weedhaku haboon gali.

1. Halbeega cadaadisku waa _____.
2. Labada ugu muhimsan saamaynta cadaadiska dareere ahaan ___iyo ___.
3. Qalabka lagu cabbiro cadaadiska atmosfarku waa _____.
4. Cabbirka cadaadiska atmosfeerku waxa u eeg yahay ____ Pa ama _____cm Hg.

II. Jawaab gaaban kabixi

1. Waa maxay cadaadisku?
2. Saamayn ta cadaadisku saleysan yahay waamaxay?
3. Waa maxay hab xisaabeedka aad uisticmaalaysid xalinta cadaadiska dareeraha jooga? Talaaboyinkiis sharax
4. Cadee xeerka uu ku shaqeeyo haydroliga aado ku salay naya xeerarka baskal.
5. Qor qaybaha looisticmaalo cadaadiska gibilka?
6. Sawir bamka midigeed oo waliba sharax siduu ushaqeeyo?

III. xali masaloyinka soosocde

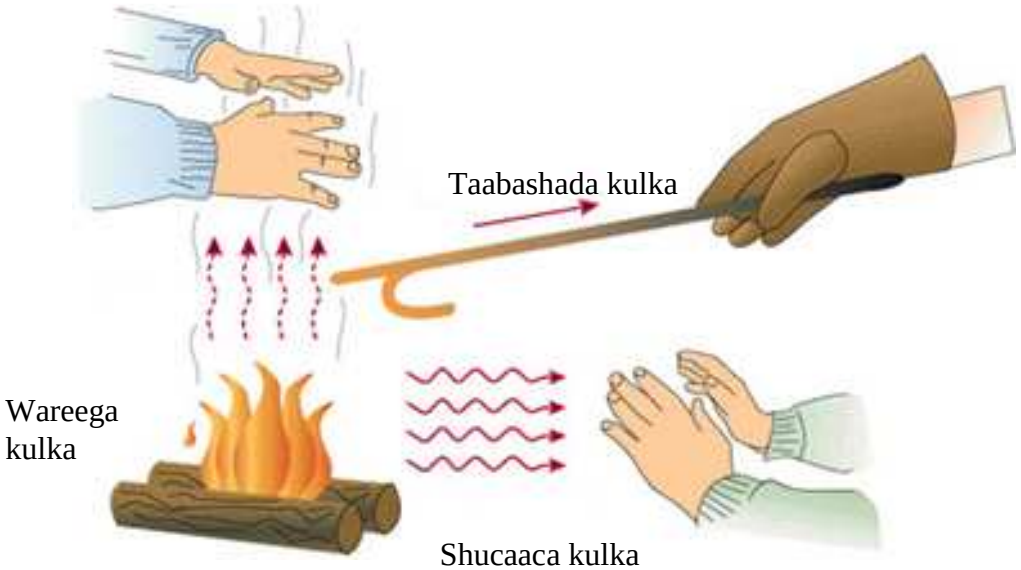
1. Sanduuq birah culayskiisu 20N neg ku ahaa 1m iyo 0.6m dhinacyada dusha sibidhka. Cadaadis intee leg baa lagu falay birtan saduuqah eedultaal dusha sibidhka? (uqaado g = 10m/s^2).
2. Haan leydiah oodhinceedu yahay 50cm iyo 30cm. 00 ka buuxa biyo Joogisuyahay 0.5cm cadaadis intee baa lagufalay? (ρ_w =1000 kg/m^3, g = 10m/s^2)
3. Cadaadis intee in le'eg baa ku falmay barta kubadu abaartay bedka 1mm^2. Lagu riixay xooga warqada 24N?
4. Kasoo qaad saynisyahanku rikibay baromitir dareerah bilaabmay laba labka cufka meerkuri. markaa waa imisajooga dareeraha qiyaasta cadaadiska?
5. Haan dh ululubo ah ayaa joogeedu yahay 32cm ayaa laga buuxiyay salid, haddii cadaadiska ku falmayo salka weel ku yahay 2550 pa, mar kaa waa imisa cufnaanta saliidu?

Cutubka 4aad

TAMARTA KULKA

Ujeedooy inka cutubkan: cutubkani marka uu dhamaado ardaydu waxay awoodi doonaan inay

- ✓ Fahman fikradaha laxidhiidha kulka tamarta.
- ✓ Kobciyaan xirfadaha masalooyinka laxidhidha tamarta kulka.
- ✓ Barataan (gartaan) xidhidhka kadhexeeya dhamaan walxaha .
- ✓ Isticmaa laan xadka weyn ee suuro galinay horumarinta aqoonta fikradaha waaweyn ee fisigiska .



Hordhac

Fasalka 7aad ka fisigiska waxaad ku soo baratay Heerkulka iyo kulka, sidoo kale waxaad soo baratey farqiga udhexeeya heerkullka iyo kulka; si faah faahsan waxaad usoo baratey cabbirka heerkulka noocyada heerkulka iyo saameynta uu heerkulka ku leeyahay walxaha. Cutubkana waxaan kubaran doontaan habka uu ugudbo kulku. Xadiga kulka ee ay walxuhu lumiyaan ama ay helaan.

Markaynu gudubka tamarta kulka baraneyno waxaynubaraneynaa saddexda uu kulku ku gudbo kuwaas, ookala ah. **Taabasho**, **wareega** iyo **shucaac** kuwan oo aad kubaran doontid hawlgalo kala duwan kuwaas oo kaa caawindoona habka gu dubka kulka.

Shaxanka kamuuqata bogga hore ee cutubka wuxuu ina tusayaa hababke kala duwan ee ay walaxdu kulka kaga hesho danab ololaya.

Sharaxaad maka bixin kar taa habab kala duwan ee uu shaxan ku inatusayo. Markeynu ka hadleyno xadiga kulka. Waxay nu baraneynaa sida loo xisaabiyo tamarta ay walaxdu lumisay iyo tamar ta ay walaxdu heshay iyo xidhidhka ka dhexeeya xadiga kulka iyo farqiga heerkulka iyo walaxda samey sankeeda. Waxaa kale oo ay baraneynaa fikrada “kul qaadka kii loo gramkiiba”

Hawlgalka 4.1 Lafalanqee saaxiibadaa qodobadan soo socda:-

i) Waa maxay heerkulka side buu ula xidhii dhaa kulka
ii) Sharax xidhiidhka ka dhexeeya kulka lyo tamarta moolikyuulada walxda.
iii)Kulku miyuu gudbi karaa? Side bay walxuhu kulka uga helaan ilaha kulka?

4.1 Gudubka Kulka

- **Heerkulka waa cabbirka kuleylka ama qabawga walaxda.**
- **Waa cabbirka celceliska tamarta socodka molikuyulda.**
- **Waa tusaha jihada kulku usocdo**
- **Halbeega caalamiga ah ee heerkulkuna waa:- (keluin) (k^o)**
- **Qalaska lagu cabbiro heerkulkuna waa Heerkulbeeg.**
- **Kulku waa nooc kamida tamarta**

Tamarta kulkuna waxay sitoos ah ulaxidhiidhaa tamarta socod ka moolikiyuulada.

Tamarta socod ee atamyada iyo moolukuyuulada maatar ku waxay ina siyaa tamar kul.

Gudubka danab ku waa dhaqaaqa ama socodka tamarta kulkes oo ka soco neysa dhinaca walaxda kulul una so coneysa dhinaca walaxda qabaw.
Gudub ka kulku wuxuu dhacaa marka uu jiro faraq heerkulka udhex eeya laba walxood ama laba qaybood oo isku walax ah.
Socodka kulku wuu Joogsanayaa marka Heerkulka walax kastaa iskumid noqdo. Hadaba waxaa jira saddex Jid, oo kulku ugu gudbo walax ilaa walax kale. Kuwaas oo ah Taabashada wareega iyo shucaaca.

i. Taabashada

Hawlgalka 4.2 Adigoo fiirinaya guluubka kulka ee Taabashada

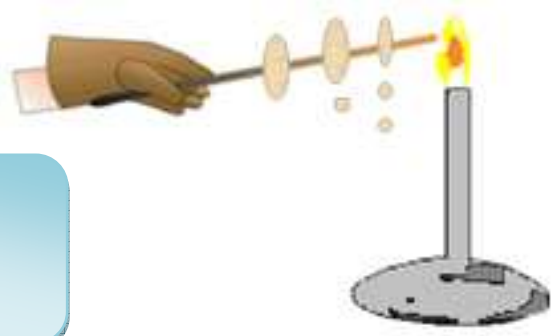
Qababka loo baa hanyahay: **ul bir ah il kulgudbiye (shamac) (xaydh) iyo biinka waraaqaha**

Habka laraacayo: **mar mari biiran ka waxaat de xay dhe kadibna ku wareeji usha bir ah side ka muugata (Jan 4.1)**

i. **Mudo yar kadib, xaydha kudhow shamacu way dhalaaleysaa, biinkuna way daadenayaan.**
ii. **Sidee buu kulku uga dhaqaaqey shamaca oo un ugaadhey usha bir**
iii. **Maxaan unaqaa habkan uu kulkana ugudbaya.**

Tamarta kulku waxay ugudbikartaa habka **Taabashda** iyadoo ka gudbeysa walax. Una gudbeysa walax kale.

Taabashadu **Waa midka mida hababka uu kulku ugudbo isagoo kagudbaya walaxda kulul una gudbiya walaxda qabaw.**



Jaantuske 4.1 Taabash kulka ee birta.

Duqayska **Taabashada** ee udhexeeya qurubyada dariska ah badanaa waxaa lagu arkaa walxaha adkaha ah laakin wuxuu dhici karaa marka qalabkasta uu taabto ilaha kulka.

Marka aad kor uqaadid koob kulul oo biyo ah, gacantaadu way kululaaneysaa sababtuna waa Taabashada ka imanaysa biyaha kulul.

Hawlgalka 4.3 Kala sooc qalabyadan adigoo ukala soocaya gudbiya yaal iyo magud biya yasha kulka,

Qalabke loo baa hanyahay: **Qalab lamidah qalabki aad kusoo aragtey Hawl galkii. 4.2 iyo qalabyo kale oo kaladuwan**

Sida: **maarta, birta, naxaasta, looxa, muraayade caaga etc.**

habka laraacayo: **isticmaal habkii aad ku aragtay hawlgalka 4.2 adig,oo uadeegsanaya qalabyo kala duwan.**

Buuxi shaxdan hoos kuqoran

Qalabka	Gudbiye fiican	magudbiye
Maarta		
Birta		
Loox		
Muraayad		

Heerka uu kulku kudhexmaro walxaha maater ka, ah ee kala duwan, qalabka qaarkood. Waxay noqdaan gudbiyayaal fiican oo kulka ugudbiya walxaha kale. Tusaale ahaan biruhu waa gudbiyayaal fiican, laakin looxu ma, aha gudbiye birtu way kulu laataa marke cidhif keeda la taabsiiyo kuleylka. Gudbiyaashe danabku waa gudbiyayaasha kulka.

Taabashadu waxay kufican tahay adkaha laakiin kuma fiicna hawada, maxaa yeelay atamada iyo meoikiyunlade isma hays taan. Maadaama oo atamade adkuhu aad isugu dhaw yihiin, adkayaasha gudb in ta kulka way kaga fiican yishiin. Dareerahiyo hawadaba. Tan macnaheedu waa marka ay istaab taan laba qalab oo adkayaal ahi waxay isu gudbinayaan kulka.

Qalabka uu kulku dhex mari karo ayaa layidhaahdaa kulgudbiye sida Birta, maarta iyo birahakale.
Qalabka uuna kulku dhexmarin kareyn na waxaa layidhaah daa magudbiyeyaal
Sida:- Dhogorta, looxa, muraayada I.W.M

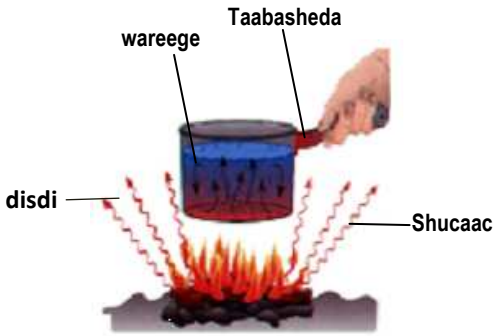
Siday udhacdaa taabashadu

Siday udhacdaa **Taabashadu**.kulku wuxuu usocdaa qaybta kulul ayay katagta waxayna usocdaa qeybta qabaw ee walaxda, marka la kuleyliyo walaxda molokuyuuladu ugu danbeyn way uumi baxayaan maadaama oo uu heer kulku kordhay. Hadaba iskaabashada ay istaa banayeen aayer moolikuyuula dariska ahi ayaa sababa in tamarta socodku ugudubto si isku xidhiidh iyadoo kagudbaysa qurubyo una qudbaysa kuwo kale. Ilaa inta ay ka gaadheyso qeybta qabaw.

Sidaa darted tamarta kulku waxay ugudub taa iyada ooay moolukuyuulade ka tagayaa meeshe heerkulka sare leh una gudbiya meesha heerkulka hoose leh.

Habka loo dhimikaro lumintakulka

kulku wuxuu ufiicanyahay nolol maal meedkeena.
Haddiin ay cimiladu tahay qabaw, waxaan xidhanaa dhar inagaceliyaa kulka oojidhkeena ka ilaaliya hawad qabaw. Tuseele ahaan waxaan xidhanaa koofiyad, galoofyada gacmaha jaakeet shuraabaad I.W.M.
Si aan jidhkeena uga ilaalino qabawga.



Jaantuska 4.2 Kuleylinta

Hawligalka 4.4 Shaqo ficil ahaan

i. Disdi duldhig dabka miyaad taabankar taa disdida daqiiqado kadib? Sabab?
ii. Maxaad u may laynaysaa haddi dhegta disdu kasamay san tahay loox ama caag?
iii. Sharax sababta ay dadku ay guryaha udhigtaan kaarbeed yadaiyo rooga?
iv. Haddii cagahaaga adigoon gashaney kabo aad socotid sibidhka maxaa kugu dhacaya ama maxaad dareemay saa?

Hawlga kii 4.4 iyo Jaantuska 4.2 waxaan ku soo aragney in marka disdi ladul dhigo dab, in disda salkeedu, Lakulmaya kulay faraban, kadibna kulku uu soconaya qeybta kale ee disdida iyada oo heerkul aad u kordhayo oo uu wadagaadhayo dhamaan disdida. Sidaa si lamid ah haddii ku joogsetid roog kulul, kul wuxuu usoo gudbiyaa cagtaada haddii aad ku istaagtid sibidh qabawna kul fara badan ayaa kagudbaya lug taada waxaanad dareemaysaa qabow.

Gacanta laqabsada distiyada birta ah badanaa waxay ka sameysan yihiin loox ama caaga si uu kaagadifaaco kulka gubashada ee gacantaada sid kamuuqata Jaantnska 4.3

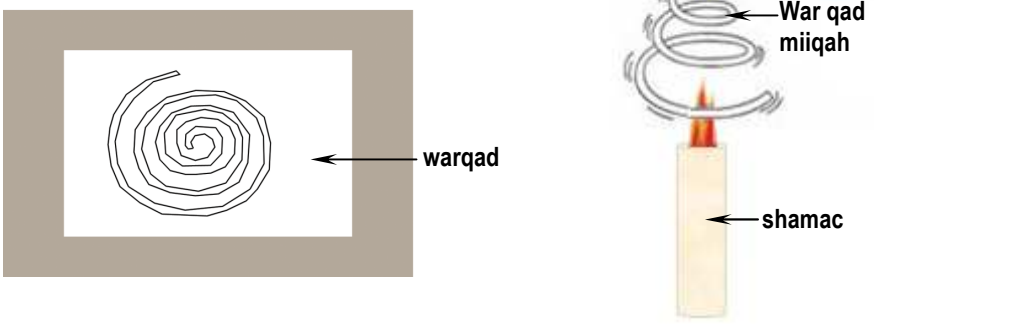
Jaantuska 4.3 Waa tusaalaha gudbiyaha iyo magudbiyaha

Kaarbeetka iyo roogaga sidoo kale waxaa loo isticmaalaa si ay udhimaan lumida kulka. **Taabasho** ahaan.

Hawlgalka 4.5

Sideebay qoys kiinu ku ilaaliyaan kulka cuntada ama cabitaanka ee gurigiina? Kala dood suaalahan waalidka.

ii. Wareega kulka



Jaantuska 4.4.Fiiri habka uu kulku ugudbo ee wareega kulka

Hawlgalke 4.6 Fiirinta kulka hawada eekorugalaya

Qalabka: **Warqad, manqas iyo musbaar.**

Habka laraacay: **Warqada u Jar sidherer wareega (sida Jaantuska 4.(a))**

i. **Sudh warqada aad sida wareega ah ujartay adigoo dhex marinaya xadhig ama musbaar badhtankiisa.**
ii. **Hoos Dhig shamaca ololaya warqada wareega ugo, an, (sida Jaantuska 4.4(b))**
iii. **Fiiri oo sharaxaad kabixi waxa kudhacaya war qada?**
iv. **Sharax waxa sababaya inuu wareego?**

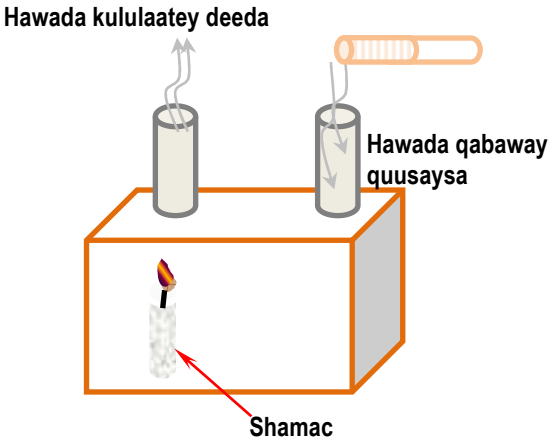
Hawlgalka 4.7 Fiirinta wareega hawada

Qalabka looga baahan yahay: kabadh hal dhinac lagaga da boolay bac

i. Ilkul
ii. Laba tunbo oo ka samey san warqad.
iii. Warqade qiiqa

Habka laraacayo: isugu xidh qalabka sida ka muuqada Jaantuska 4.5 fiiri, oo sharax waxa kudhacay qiiqa.

- Sharax habka wareega kulka.



Jaantuska 4.5 Wareega hawada ama (sanduuq qiiqaya)

Jaantuska 4.4 iyo 4.5 hawadu waxay kulka ka heleysaa shamac gubanaya. Hawada kululaatey kor ayey ubaxaysaa sababtoo wayka cufnaan fududahay hawada kuwareegsan hawada qabaw way culus tahay waxayna u kacdaa hoos waxayna badeshaa hawada kulul meesheeda. Hawada qabow waxay soo noqotaa iyadoo kulul. Hadaba Jaantuska 4.4 iyo jan 4.5 waxay ina tusayaan Gudubka kulka ee wareega hawada.

Gudubka kulku uu ka gudbayo meel ilaa meelkale ee socodka caadiga ah ee qurubyadu ku dhexmarayaan dhex yaalada ayaa layidhaah:- wareega kulka.
Wareega kulku wuxuu ka dhax dhecaan asal ahaan dareerayaasha (neefa ama dareeraha). Wuxuuna sababaa fidida qurubyada dareeraha marka la kululeeyo. Marka ay qurubyadu fidaan cufnaantiisu way yaraataa. Sidaas darted qeybta aad ufududaataa way baxdaa, dareera qabowna wuxuu bedalee booskii dareeraha kulul, waxayna helaan kul. Wareege kulku wuxuu ku socdaa dhexyaal. Wareega kulku wuxuu kadhex dhacaa kaliya dareeraha iyo hawada.

Gudbida kulka ee wareega ah waxaa loo adeegsadaa guryaha, warshadaha iyo guud ahaan, ba

1. Qaboojiyaha, **kulayliyaha** iyo baylinta biyaha waxaa loo isticmaalaa wareega kulka.
2. Dhulka iyo neefsiga badu sidoo kale waxay kushaqeeyaan wareega kulka. Dabayshu waxay ka soo kacdaa bada waxay na usoo baxdaa xagadhulka. Wakhtiga habeen kii. Dabayshu sidookale waxay kasoo kac daa xaga dhulka waxayna usoo kacdaa xaga bada maxaa yeeley waxaa kaladuwan heerkulka
3. Biibiida kamuuqata Jaantuska 4.6 waxaa loo isticmaala wareega kulka.

Jaantuska 4.6 Biibii waxaa loo isticmaalaa wareega kulka

iii. Shucaaca

Hawlgalka 4.8

***Wade falanqeeyaa*: i) Sidee buu kulku ka imanaya ca-ceedu ku soo gaadhayaa dhulka.**
ii) Sidee buu ilayska cadceedu isugu badalaa kul marka uu dhulka soo gaadho?
iii) Maxaa loo yaqaanaa kul gudub ka noocan ahi

Kulka ugudbaye shucaac ahaan waxaa loo yaqaanaa. Kulka shucaaca. Kulka shucaaca waxaa qaada hirarka birlab danabawga ee loo yaqaan **firidhka hirarka**. Kanina maaha mid umuuqan kara indhaha bani, aadamka.

Dhamaan walxuhu waxay soo daayaan kul shucaac. Tusaale ahaan, haddii walaxdu ka kulu shahay wax yaabaha kuwareegsan, markaasna waxay sii daynaysaa (kulka shucaac waxayna lumineysaa kul way na qaboobeysaa. Kulka ka imanay kuleyliyaha korontada iyo kulka ka, iminaya dhuxul gubaneysa. Waxay kusoo gaadhaan waxyaabaha kuwareegsan. Shucaac ahaan. Tusaale ahaan marka aynu agfadhinsatid, dabka waxay nu daree may naa diirimaad. Hadaba Taabashada iyo wereega kulkuba halka kama suurto galayaan. Maadaama oo ay hawadu tahay gudbiye daciifah, hawada diiranna waxay ukacdaa kor,

Kulku dabku wuxuu kusoo gaadhaa jidhkeena shucaac ahaan, kulku wuxuu ugudbi karaa shucaac ahaan isagaoo dhexmaraya duludaatiga madhanaha ah ama qalab dhaxyaalkaah
Shucaacu waa qudublka kullk, ee meel ilaa meelkale, isgoon ubaahneyn qalab uudhexmaro kulku cadceeda dhulka wuxuu ku soo gaadhaa habka shucaaca; kulku waxa uu ku gudbikaraa shucaac dulu laatigamadhanah ah nooca oogada walaxda ayaa waxay sameysaa sida deg dege ah ee walexdu ukululaato hadi ogadu tahay raf oo ay tahay mid madaw. Waa sidaaye fiican, wuuna kuhakadaa shucaacu.
Halka walaxda dhalaalaeysa ee aadudhalaala ee leh oogo siman waa soodaaye daciifah, wuuna nuugaa shucaaca kulka

Hawlgalka 4.9 Wadafalanaqeeya su, aalahan soosocda.

- **Maxaad utaqaanaa tibxahan. Qeex, oo tusaale kabixi, nuuge kulka, Noqodka kulka, iyo soo daynta kulka.**

Hawlgalka 4.10 Fiiri qalabka ugu fiican ah ee shucaaca kulka

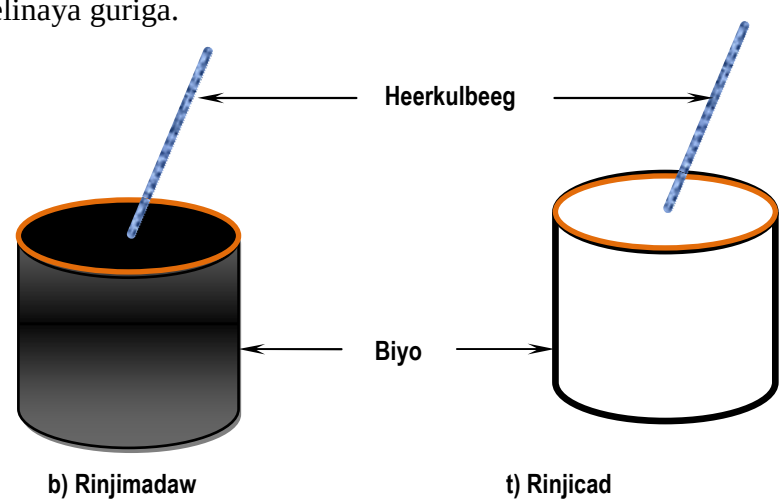
***Qalabka loobaahanyahay:* Laba daasadood oo isku midah, oo mid cadaan lagu buufiyey mida kalena, madaw, Heerkul beeg, ileyska cadceeda**

***Habka laraacayo:* Ka buuxi labad daasadood. Xadi iskumida oo biyo ah**

- **Dhex dhiga Heerkulbeega daasad walba oo udaa cadceeda laba daasadoodba**
- **Cabbir heerkulka biyaha ee labada daasadood oo qor natiijada kasoobaxda.**
- **Sawir garaafka heerkulka iyo Aminta.**
- **Bedelka aminta sida ka muuqada Jaantnska 4.7**
- **Sawir garaafka heerkulka iyo aminta ee labade daasa dood.**
- **Qalab kee (daasadee baa) kul badan nuugay sa**

Shucaaca kulka waxaa lagu ilaaliyaa dhismaha guryaha, kuleylinta dharka qaar kamida, falaasada tusaale, dhismayaasha guryuhu aadbay uqabawyihiin, gaar ahaan qalabka lagu sibdhiyo gidaarka, iyo saqafka sare kulku wuxuu siinayaa diirimaad guriga, guriguna wuu nuugayaakulka waana nuuge fiican islamar kaana wuxuu kuleylkii kusoo celinaya guriga.

Dad ka ku nool meelaha kulul waxay xidhaan dhar cadcad oo celiya shucaaca kulka maxaa yeelay dharka cadcad waa nuugayaal daciifa.



Jaantuska 4.7 Fiirinta nuugaha fiican ee shucaaca kulka

Xaqiijin 4.1

1. Xaladee ayuu kulku walax ka tagaa oo uu, utagaa walax kale?
2. Sheeg saddexde hab, ee, uu kulku ugudbo?
3. Kala saar farqiga udhexeeya habka taabashada kulqudbinta iyo habka wareega eekulgudbin.
4. Sharax gudbiyayaasha iyo magudbiyayaasha kulka
5. Sidee buu shucaaca kulka ee ka imanaya cad – ceedu ku soo gaadhaa dhulka?

4.2 Xadiga Kulka

Fikradaha ugu muhiimsan ee aan qaybtan ku baraneynaa waa xadiga kulka iyo kulqaadka kiilogaraam ee walxaha.

hawlalka 4.11

Qalabka loo baahanyahay: ilkul, laba kubadoo oo bir, ah, mid yar iyo mid weyn. Bir qotonto'ah, xabag, iyo baaldi biyo ah.

i. Dhig laba kubadood biyaha dhexdooda
ii. Kulayli biyaha ilaa intey biyuhu ka karayaan.
iii. Soo qaado qurub weyn iyo qurubyar oo bir, ah biyaha kar karaya oo dhexdhig xabagta.
iv. Qurubyadii kee bay xabag badani kumilantay
v. Walaxdeebaaleh xadiga kulkeedu badan yahay?
vi. Taasi maxay ina tusay saa.

Marka ay walaxi qabawdo waxay lumisay tamar kul. Marka walaxda lakulayliyana waxay qaadatey tamar kul. Walaxda kulku wuxuu ka soo gaadhaa ilo kala duwan.

Dhab ahaantii ma cabbiri karno wadarta xadiga kulka ee ay walaxdu leedahay. Laakiin waxaan cabbirkarnaa, tamar intee le,eg bay qaadatey ama lumisay, Hadaba side baynu u cabbiraynaa xaddiga kulka ah ee ay walaxdu lumisay ama ay qaadatey?

Kulqaadka kiilogaraam kiiba

Xadiga kulka ee tamar ee loo baahan yahay inuu ku kaco heerkulka 1kg oo cuf ah oo walax, 1^oc ayaa layidhaah daa kulqaadka kiiloo garaam kiiba ee walaxda.

Shaxda 4.1 waxay inoo sheegay saa kulqaadka kiiloogaraamkiiba ee dareerayaasha iyo biraha halbeega kulqaadka kiilogaraamkiiba waa:- Joule/kg c^o = (J/kgc^o)

Tusaale: 1 kg oo almuuniyamah ayaa wuxuu ubaahan yahay kultamareed dhan 900J oo uu farqiga heer kulkeeduyahay 27c^o. laa 28c^o. Haddii Heerkulka almuuniyam ka soo dhaco 28c^o ilee 27c^o, oo uu soo saaro tamar dhan 900J. Sidaas darted qaacidada guud ee lagu xisaabiyo Tamarta kulka. Waa:-

Tamarta kulku = cufka × kulqaadke kiiloo garaa mkiiba × farqiga Heerkulka

$Q = m \times c \times (T_2 - T_1)$ Halka:

Q = xadiga kulka

m = cufka walaxda

c = Kulqaadka kiiloo garam

($\Delta T = T_2 - T_1$) Farqiga Heerkul ka

Shaxda 4.1 kulqaadka kiilogaraamka walxaha qaarkood	
Walxaha	c (ee J/kg0c)
• Biyaha	4200
• Biyomilix leh	3000
• Alumuuniyam	900
• Birta	480
• Maarta	385
• Naxaas	130

Sida shaxda 4.1 waxaan ogsoonahay in kulqaadka kiiloogaraam kiib ee adkayaa, sha ay aad uyartahay kulqaadka kiiloo garaamka dareerayaasha. Tusaale ahaan biyuhu waxay ubaahan yihiim shan laabka in ta kulka ah ee uu ubaahan yahay cufka almuuniyamku.

Tusaale 4.2

1. Kul intee le,eg ayaa looga baahan yahay Hadii heerkulka bir cufkeedu yahay 500g yahay, 50°c ilaa 250°c (c = 480 Jk/kgc°).

Siin	Weydiin	Furfuris
m=500g = 1/2 kg	Q = ?	Q = mc ΔT
T_i = 50 °C		= 0.5kg × 480J/kg °C ×200 °C
T_f = 250 °C		= 48,000J
c = 480J/kg °C		= 48 kJ

2. Waa imisa kulka ay lumisay maarleh cuf dhan 2000g. marka la qaboojiyo 100°C ilaa 40 °C? c = 385 J/kg °C?

Siin	Weydiin	Furfuris
m = 2000g=2kg	Q = ?	Q = mc ΔT
T_i = 100 ^{0}C		= 2kg ×385J/kg °C× −60^{0}C
T_f = 40 ^{0}C		= - 46,200 J
C = 385 J/kg °C		

Xusuus: Calaamada tabani waxay sheegay saa luminta kulka.

3. 200g oo maar ah ayaa laqaboojiyey 100 °c ilaa 0°c, Hadaba kul intee dhan ayey lumisay maartani? (C = 385jkgc°)

Siin	Weydiin	Furfuris
m = 0.2kg	Q = ?	Q = mc ΔT
T_i = 100 °C		ΔT = T_f - T_i
T_f = 0 °C		= 0 °C – 100 °C
C = 400 J/kg °C		= – 100 °C
		Q = 0.2kg ×385J/kg °C×(-100 °C)
		= - 7700 J

Xaqiijin 4.2

1. Waamaxay kulku?
2. Goormaan odhan karnaa walaxdu kulbey qaadetey.
3. Sheeg xaddiyada kulqaadashada iyo kulbixintu ku xidhan yihiin
4. Qor is le, egta xadiga kulka ee walax?
5. Qeex kulqaadka kiilogaramkiiba

Soo koobbidda cutubka

Cutubka waxaad kusoo baratay

- Kulku waa nooc tamarta kamida kaasoo halbeeggiisu yahay joule (J). marka heerkulku uu yahay cabbirka kuleylka iyo qabowga walaxda. Kulku wuxuu ka gudbaa walaxda heerkulka sare leh wuxuuna ugudbaa walaxda heerkulka hoose. Sadexda hab ee uu kulku ku gudbo waa:-
  i) Taabashada kulka
  ii) Wareega kulka
  iii) Shucaaca kulka
- Kul gudbiyayaashu waa qalabka ogolaada inuu kulku dhaxmaro. Magudbiyayaasha kulkuna waa qalabka aan ogolayn inuu kulku dhexmaro.
- Xadiga kulka ee ay walaxdu lumiso ama qaadato waa saamigalka aasaasiga ee cufka walaxda, Heerkulkeeda, iyo walaxda qaabkeeda. Xadiga kulkana waxaa lagu raadiyaa $Q = mc\,\Delta T$
- Kulqaadka kiilogaramkiiba ee walax waakulka ay walaxdu ubaahan tahay inay kor ugu kacdo heerkulka I kg ee $1^{o}c$. Halbeege caalamiga ah ee K.Q.K. waa $Jkg^{o}c$ ama jkgk Biyaha ayaa ugu K.Q.K badan dhamaan dareereyaasha

Nakhtiinka su'aalaha iyo masalooyinka

I. Kubuuxi meesha banaan ereyga ku haboon .

1. _____ Waa cabbirka celceliska tamar socod ee qurubyada walaxda
2. _____ Waa halbeega caalamige ah tamarta kulka
3. _____ Waa gudubka kulka ee ay laba walxood istaabanayaan
4. Qalabka aan uogolaanin kulku inuu dhex maro ayaa layidhaa hdaai_____.
5. _____ Waa kulka ay walaxdu ubaahan tahay 1kg cuf ah (1°C)

II. Kajawaab su'aalahan

1. Sharax habka wareega uu kulku ugudbo.
2. Tusaale kabixi gudbiyaasha kulka iyo magudbiye yaash.
3. Sheeg saddex hab ee kulku ku gudbo.
4. Qeex kulqaadk kiilogaraamka.
5. u qeex ereyo ahaan qaaciidadan ($Q = mc\,\Delta t$)

III. Kashaqee

1. Haddii heerkulka walax cufkeedu yahay 0.5kg ayaa $15^{o}c$ ilaa $20^{o}c$. Waa imisa kulka ay qaadatey walaxdu (haddii c = 400 j/kg).
2. Waa imisa xadiga kulka ee ay walaxi u baahantahey haddii cufkeedu dhan yahay 2kg, heerkulkeeduna yahay $20^{o}c$? (c = $4200Jk^{o}c$)
3. Haddii xadiga kulka ee almuuniyam cufkeedu yahay 3kg yahay 5400J. Waa imisa heerkulku? (haddii = $900\ j/kg^{o}c$).

Cuttubka 5aad

DANABKA IYO BIRLABDANABOWGA

Ujeedooyinka cutubka: Cutubkani marka uu dhammaado ka dib waxaad awoodi doontaa in aad:

- ✓ Fahamtid Fikradaha la xidhiidha Danabka iyo Birlabdanabowga xidhiidha Danabka iyo Birlabdanabowga.
- ✓ Koru qaadid xirfadaha xallinta Masalooyinka ee la xidhiidha Danabka iyo Birlabdanadeedka
- ✓ Ku Dhiiranaashaha xidhiidhka ka dhexeeya walxaha Dhammaan
- ✓ Isticmaashid waxyaalo badan oo suurtogal ah in aad ku kordhisid Aqoonta fikradaha ugu muhiimsan ee fisigiska

Hordhac

Waxaad Ku soo baratay Danabka iyo Birlabdanabeedka Fisikiskii Fasalka 7aad Waxaad ku bara doontaa waxyaalo badan oo ku saabsan cinwaankan Fasalkan iyo cutubkan. Xidhiidhka ka dhexeeya korontada iyo Birlabdanabeedka. Iyo isticmaalkeeda dhaqaale ee Dalkeena iyo horumarinta Bulshada ayaa lagu baran doonaa.

5.1 Samaynta Qulqulka Korontada, Duubiga Mareegta iyo Fooltejka

Hawgalka 5.1

Kala Dood waayo – Aragnimooyinkan soo socda saaxiibadaa iyo waalidkaaga :

b) Sidey u wareegtaa qulqulka Danabku?

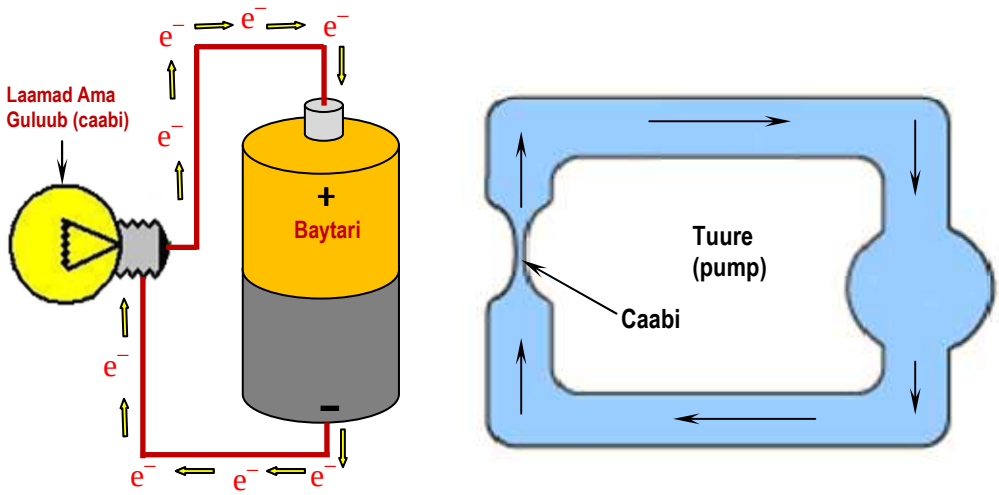
t) Waa maxay shaqada fooltejku (Dhagax)?

j) Waa maxay mareegta Danabku?

x) Caddee isku – mid ahaanshahooda iyo kala duwanaanshaha Biyo dhex-qulqulaya qasabad iyo elektaroono dhex qulqulaya xadhiga dabka? (jaantuska 5.1)

Saari doonaa socodka Danabyada Ama qulqulka Danabka. Qulqulka danabka ee Mareegta Danabku wuxuu aad ugu eg yahay qulqulka Biyaha ee dhexmaraya meel xidhan (Fiir jantuska 5.1). A wood

qeeybiyaha (dhagaxa) waxuu ku began yahay taangiga Biyaha, caabiguna wuxuu ku began yahay qeybta qasabada ee dhuuban. Cadaadiska ka soo baxaya tuuraha (pump) xagiisa sare waxuu aad ugu eg yahay foolteyjka dhinac dhammaadka awood qeybiyaha ee (+) ah. Qulqulka Danabku wuxuu ku began yahay saamiga biyaha ah ee maraya.



Jaantuska 5.1: Isbarbar-dhiga Biyo maraya qasabad – dhexdeed iyo elektaroonada maraya xadhiga dabka dhexdiisa.

Si aan u horumarino faham laysku halayn karo Ama waxtar leh oo ku saabsan Danabka, Duubiga mareegta iyo foolteyjka. Haddaan u qaadano Bani – aadamka sidii oo " xadhig- danab- Bani- aadameed" waxay noqon hawlgal xiiso leh.

Samaynta Socodka Danabka ee Gudbiyaha

Jaantuska 5.2 Samaynta socodka danabka ee gudbiyaha

Ardayda Fasalka oo dhammi waxay u noqon muunad (Tusaale) socodka Danabyada ee Gudbiyaha dhex maraya. Aan kaga Bilowno Ardayda dhinac jiiftaxa (xagga hore ilaa xagga dambe) si ay u noqdaan xadhig dabka oo kale. Sanduuqa yaala Fasalka xaggiisa hore waxuu metelayaa Beytarigii (dhagaxa Dabka) sanduuqa waxaa dhinac lagaga ranjiyeeyey calaamada tabnaanta, ka soo qaad in sanduuqa ay ku jiraan 100 dhagax oo yar- yar oo leh xajmiga fataatiiraha. Waxaa lagu qori karaa xarafka "e" iyaga waxayna u taagan yihiin elektaroon. Ardaydu waxay istaagi sanduuqa agtiisa, waxayna ka riixi dhammaantood sanduuqa dhinaca calaamada taban Ama laga jarayda leh. Ardaydaasi waa muunad (Tusaale) u taagan xoogga dhaqaajinta Danabka (Emf). Emf –ku waa tamar keydka taasoo qabata shaqada ayadoo kala saaraysa Danabyada si ay ugu samayso in ay u safraan meel kale. Baytariga (Dhagaxa), tamar keyd is dheeridu waxay ka timaadaa Falka kiimikaad taas oo kala qeybisa Danabyada, u riixdana elektaroonada dhinaca taban. Tamarkeyd is – dheeridu waxay noqon kartaa mid uu dhaaliyo matoor.

Ama unuga foolta si loo bilaabo qulqulka Ardayda ugu xigta “Baytarigu” waxay heli elektaroonka dhagaxa Tamar keyd is – dheerida qofku waxay ka gudbi dhagaxa elektaroonka ee gacanta qofka ku jira waxayna u gudbi qofka kale. Ardayga ugu horeeya elektaroonku waxuu uga gudbi ardayda isdaba – joogta. Habkani uu socon ilaa “ Dadka – xadhiga) Ama dadka xadhiga laydhka noqday ay ku soo celiyaan dhinacii tognaa ee elektaroon ku yaaley. Tamar keyd isdheeridu si degdeg ah ayey ugu riix daa elektaroonada Ayadoo ka soo riixaysa dhinaca togan una riiaysa dhinaca taban. Halkan waxan ka soo qaadeynaa in gudbiyaha ay elektaroono xor ahi ka buuxaan. Marka hal elektaroon ka yimaado dhinaca tabanaha ah ba isla markiiba elektaroon kale ayaa soo gala dhinaca togan ee baytariga (dhagaxa). Tusaalaha (Dab – gudbin bani – aadameedeka) ee socodka elektaroonada gudbiye wuxuu u dhacaa sida Mareegta Danabka.

Dhaqan ahaan (Dabeecad), qulgulku waxuu u dhacaa qalqulka Danabka togan, xilliyadii qarniyadii hore ee qulqulka qeexdiisa la yaqaanay waxba lagama Aqoon elektaroonada.
Saynisyahanadu waxay ogaadeen in Danabka togani uu Dhex maro xadhiga –Dabka, laakiin may garanayn. Waa in aad ogaataa in qulqulku yahay socoka Danabka taban. Inagoo eegayna Dabeecada heeda (dhaqan ka), Waxaan u qaadaneynaa qulqulka Danabka socodka Danabka tagan ee ka yimaada dhinaca togan ee Beytariga (Dhagaxa) . Waa inaad ku qanacsan tahay in kaalinta Tamar keyd – isdheeridu ay tahay kala soocida Danabyada iyo kaalin tahay Abuure Danab xoojiye.

Tusaale (muunad) Mareeg Danab Furan

Samaynta mareeg furan

Ardayda is haysata laga bilaabo dhinaca taban ilaa dhinaca togan waa marinka socodka elektaroonada Marinkan waxaa lagu magacaabaa Mareegta Danabka. Mareegtu wey xidhan tahay haddii aanay jirin meel ay safka ardaydu kala go’an tahay Ama furantahay. (Fiiri jaantuska 5.3)

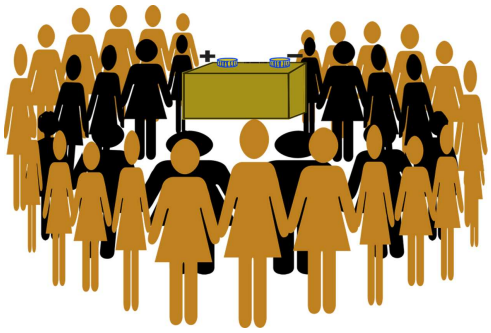
Jaantuska 5.3 Mareeg Danab xidhan

Mareegtu wey Furan tahay haddii ay jirto meel safka ardaydu ka kala furantahay. Ama aanu iska haysan (Fiiri jaantuska 5.4

Jaantuska 5.4: Tusaale Mareeg Danab Furan

Tusaale xadhko Dhumuc wayn

Hadda aan tixgalino Ama qaadano xadhig – danabeed Bani- aadamka. halkii aan ka isticmaali Lahayn hal-jiiftax (Fiiri Jaantuska 5.5)



Jaantuska 5.5 Tusaale xadhig Danabeed Dhumuc badan

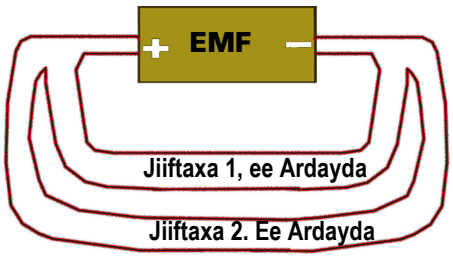
Elektaroonada uu riixayo EMF – ku ee inuu uriixayo dhinac taban waxaa gudbinaya laba Arday markiiba. Halkan elektaroonadu waxay u gudbaan si ka dhakhso badan sidii ay ugu gudbayeen halka jiiftax. Haysashada la haysto xadhig – Danabeed dhumucda Badan waxay la micno tahay haysasho la haysto Dhaqso badida socodka elektaroonada ee mareegta

Mareegaha Danabka

Mareegta Danabku waa marin Dhammaystiran (xidhan) oo ay marto qulqulka Danabku. Waxay ka koobnaan kartaa walxo kala duwan sida Isha tamar keyd isdheerida (Foolteyjko), Furaha ujo Guluubka iwm. Waad Muujin kartaa Mareeg kasta oo Adag (kakan) Adigoo isticmaalaya summado. Heerka summadaha Danabka ee loo isticmaalo si loogu sawiro Jaantusyada mareegta Danabka.

Tusaale (Namuunad) Mareegta Barbarada ah

Marka xigta, aan qaadano Ama tixgalino labada jiiftax ee Ardayda si aan ugu kala jebino laba qeybood, si aan u samayno laba marin labada jiiftax ee ardaydu waxay ka helayaan elektaroonada dhinaca taban, waxayna u gudbinayaan Dhinaca togan ee EMF-ka. Tusaalahani wuxuu sharaxayaa in elektaroonada ay riixayaa EMF – ku ee ay soo riixayaan dhinaca tabani waxuu leeyaha laba Doorasho oo uu ku safro / qulqulo ka asoo dhex maraya gudbiyaha, marlabaad elektaroonadani waxay ku darsamaan Dhinac togan (Fiiri jaantuska 5.6)



Jaantuska 5.6 Mareegta Barbarada ah

Hubinta (xaqiijinta) 5.1

1. Qeex sida qulqulka Danabku u dhexmaro Gudbiyaha? (u isticmaa/ Beni – aadam ka xadhiga – Danabka)
2. Sheeg kaalinta uu kaga jiro xoogga Danab – dhaqaajiyuhu qulqulka Danabka?
3. Sawir
   b) mareeg Danab – xidhan
   t) mareeg- Danab. Furan, Dabadeedna sharax Faraqooda u dhexeeya

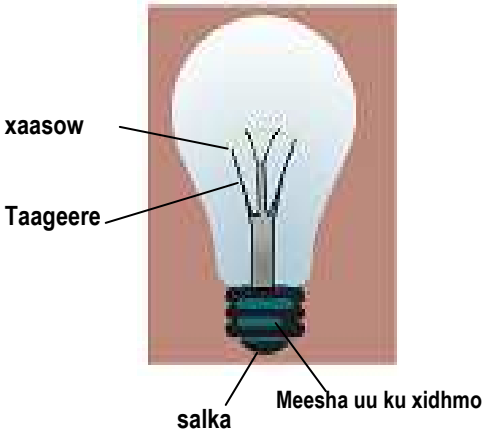
5.2 Sameynta Iftiinka Guluubka ee Korontada

Hawlgalka 5.2

Baadh waxa Iftiinka Guluubku ee korontada

1. **Qaado Guluub gubtay**
2. **Baro qeybaha (Deris) Guluubka caddie xaasawdu, meesha uu ku xidhmo, halka u sareysa iyo qeybta haysta**
3. **Sawir jaantuska Guluubka kuna muuji qeybihiisa**
4. **Sharax Muhimada xaasowda dhuudhuuban.**
5. **Goormaad dhihi kartaa Guluubku wuu Gubtay? Ama ma Guban?**

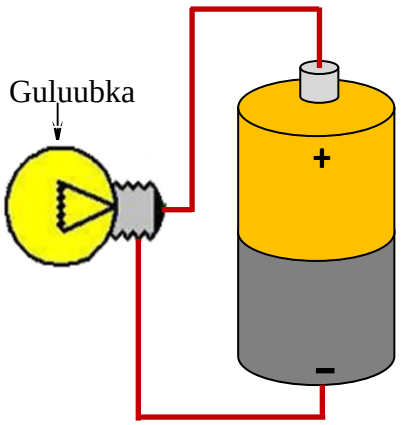
xaasowdu waxay ka Samaysan yihiin walax Bir ah oo la dhaho Taangisten. Taangistan waxay leedahay meesha ugu sareeysa ee dhalaalka Biraha. Xaasawdu aad ayey ugu dhuu dhuuban tahay kuwa koruhaya. Guluubka dhexdiisa xaasawdu waxay ku xidhan tahay taageeraha koruhaya. Mid ka mid ah taageeruhu wuxuu ku xidhan yahay Boolka ama dabada Guluubka ka kalena waxuu ku xidhan yahay salka. Guluubka shaqeynayaa wuxuu Sameeyaa Mareeg dhammaystiran marka lagu xidho Baytari (dhagax) (Fiiri Jaantuska 5.7)



Jaantuska 5.7 Iftiinka guluubka ee korontada

Sameynta Fuyuus

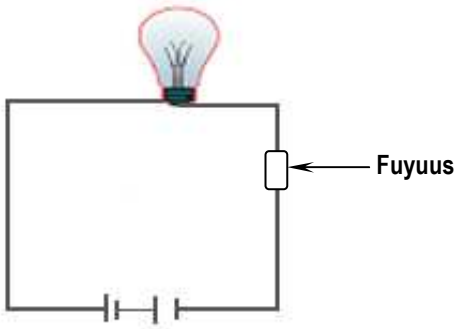
- Dhis mareeg Danab Adigoo isticmaalaya Guluub, Baytari 12 v ah, Fure, xadhig laysugu xidho iyo xadhko kala duwan, ku buuran iyo ku aad u dhuuban.
- Meelo Banaan u yeel mareegta si aad u geliso xadhko kala duwan
- Guluubku wuu shidmaa marka Furaha xadhkaha dhumucdoodu kala duwan tahay ka buuran kuwa dhuudhuuban laysu xidho.
- Marka xadhiga – Dabka ee dhuuban lageliyo meesha banana wuu kaahi, wuuna kululaan, Markan Guluubku wuu Bakhtiyi



Jaantuska 5.8 Samaynta qulqulka Mareegta ee Gulubka dhexdiisa.

- Xadhiga – Dabka oo ka samaysan Birta Alooy (Alloy) taas oo heerka dhalaalideedu hooseeyo waxaa la dhahaa fuyuus, Fuyuusku wuu dhalaalaa, wuxuuna kala jabiyaa Ama kala furaa mareegta marka qulqul caadiah Dhexmaro.

Fuyuusku Mareegta waxuu ka dhigaa mid Furan (aan dhamaystirnayn Marka qulqulka Danabka dhexmaray aa sareeyo.

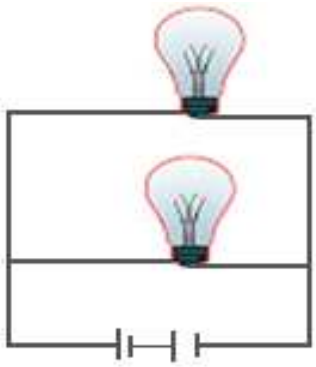


Jaantuska 5.9 Sameynta Fuyuuska

Hawlgalka 5.3

Dhisida Mareegta Barbarada ah (Fiiri jaan 5.10)

1. **Maxaa ku dhici caddaanka Iftiinka marka labada Guluuba Shidan yihiin?**
2. **Maxaa ku dhici cadaanka Iftiinka marka Guluubyada mid laga saaro?**
3. **Maxay u dhacday in caddaanku kala duwanaado?**



Jaantuska 5.10 Mareeg Barbaro ah

Hubinta (xaqiijinta) 5.2

1. **Waa maxay saameynta ay ku leedahay qul qulka Danabku isticmaalka Guluubka?**
2. **Sawir Dhismaha Guluubka Iftiinka ee dhabta ah, kala sheeg Ama magacow qeybihiisana?**
3. **Qeex Muhimada Fuyuuska**

5.3 Xidhiidhka Ka Dhexeeya Qu Lqulka, Tamarkeyd – Isdheerida Iyo Caabiga

Fasalkii 7aad waxaad ku soo baratay sida loo soo saaro Danabka korontada iyo sida uu u qeybiyaan Gudbiyeyaashu. Marka tamar– keyd is– dheerida (foolteyj) lagu isticmaalo Gudbiyaha elektaroonada xorta ah ee Gudbiyuhu wax aybilaabaan socod. Tusaale ahaan hadda Baytari (dhagax) lagu xidho lab

ada cidhif ee xadhig Danab oo Gudbiye ah, habku Gudbinta qurubyada Danabka dhacada ayadoo cidhifka tagaysa tagaysana a cidhifka kale. Qaabkan socodka qurubyada Danabka ayaa la dhahaa sida loo sameeyo qulqulka Danabka.

Qulqulka Danabku waa saamigalka socodka Danabku kaga gudbo Bedka Dusha Gudbiyaha lagu siiyey

qulqulka Danabku = $\frac{\text{socodka Danabka}}{\text{Waqtiga ay ku qaadato}}$

Summad ahaan $I = \frac{Q}{t}$, halka

I ay tahay qulqulka Danabka,

Q – na walxaha saldanabaysan t - waqtiga ay ku qaadatay

Danabku waa xaddi Foolwaa

Su'aal Furan.

- Miyaad xasuusan tahay halbeega qulqulka Danabka?

  Magacow,

  halbeega qulqulka Danabku waa Ambiyeer(Ampere) (A)

  Waxaana loogu magac daray Saynisyahan Faransiis ah oo la dhaho Andre Marie Ampere

$$1\ \text{Ambiyeer} = \frac{1\ \text{Kuulam}}{1\ \text{Seken}}\ ; \qquad 1A = \frac{1C}{1\ s} = 1\ C/s$$

Halkii Ambiyeer waxuu la mid yahay hal kuulam oo danab ah oo dhaqaaqa sekenkiiba; qulqulka Danabka ee hal ambiyeer waxaa la heli marka Danab hal kuulam (6.25×10^{18} elektaroon) ayaa dhex maraan (dhaafaan) Gudbiyaha hal seken. Qul qulka Danabka waxaa kale oo lagu cabbiri karaa halbeeg kale oo la mid ah sida mili – ambiyeer iyo maykro-Ambiyeere

1mili Ambiyeer = 0.001A = 10^{-3}A

1 Maykro -Ambiyeer = 0.000,001A = 10^{-6}A

Tusaalaha Ka Shaqeysan ee 5.1

1. Waa maxay qulqulka madoorsoome ee la gudbiyaa marka Danab dhan 120c dhex maro gudbi yaha muddo dhan 1 daqiiqo?

siin	Waxa la rabo	Furturis
Q = 120C t = 1miridh = 60 seken	I = ?	$I = \frac{Q}{t}$ $= \frac{120c}{60s}$ = 2C/s = 2A

Sidaas darteed, qul qulku waa 2C/S = 2A

2. haddii qulqul dhan 90 mA uu dhexmaro muddo 150s ah, dabadeed waa maxay Danabka la gudbiyey?

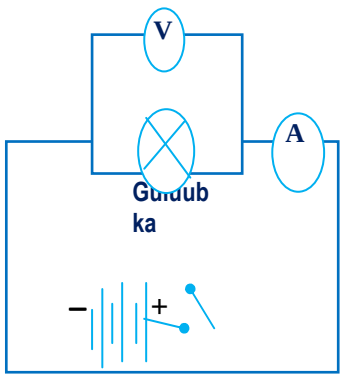
siin	Waxa la rabo	Furfuris
I = 90mA = 0.09A t = 150s	Q = ?	$I = \frac{Q}{t}$, dabadeed Q = It Q = (0.09A) (150s) = (0.09 C/s) (150s) = 13.5C

Danabka Gudbay waa = 13.5C

Foolteyj (Tamar keyd is dheeri)

Foolteyjku waa cabbirka awooda shaqo lagu qabto waa xaddi foolwaa. Waxaa loo qaadan karaa “Tamarta Riixida” Ama “ cadaadis” ka dhex dhacaya mareegta Danabka. Ma’ aha xoog. Foolteyjwaa qeybiye, qeybiya Ilaha xoogga mootinta Danabka (EMF)

Sida Baytariga (Dhagax), Matoorka Ama unugga Footofoltayk (photovoltaic call) EMF- ka waxaa loo isticmaalaa in uu kala sooco mareegta Danabka iyo in uu abuuro xoojinta Danabka.



Jaantuska : 5.11Shaxda Mareegta ee xeerka ohm

xidhiidhka ka dhexeey a qulqulka iyo Foolteyjka

Hawlgalka 5.4

Baadhitaan ku Saabsan xidhiidhka ka dhexeeya qulqulka iyo foolteyjka.

Qalabka loo baahan yahay:- 4 Baytari (dhagax) (1.5v midkastaa), foolteyi, cabire, ambiyeer cabbire, Fure iyo xadhko Dana b oo isku xidhan.

jidka la marayo:

i) Isugu xidh walxaha la doortay sida ka muuqata jaantuska 5.11

ii) Ku xidh marka hore hal baytari (dhagax) dabadeed akhri foolteyj cabbiraha iyo qul qul – cabbiraha.

iii) Ku celi jidka xagga sare markasta laba Baytari (dhagax), seddex baytari (dhagax) iyo Afar baytari (Dhagax) oo unugaga engegan ah si taxane ah.

iv) Ku Buuxi shax da hoose mitirada ay sheegaan.

v) Xisaabi Saamiga foolteyjka (v) iyo qulqulka (I) markasta.

Tirada unugyada ee isugu xidhan taxanaha	1	2	3	4
Tamarkeyd is dheerida (V)				
Qulqulka (I) (A)				
Saamiga $\frac{V}{I}$				

vi) Sawir Garaafka V ~ I.

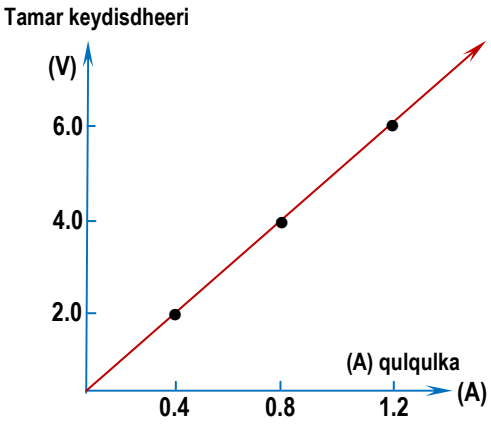
vii) Isbarbar –dhig Saamiga tiirada Garaafka (Jaantuska 5.12)

- **Maxaad Aragtaa**
- **Sidee ayuu qulqulku u Kordhaa Ama hoos ugu dhacaa, haddii la kordhiyo Ama la yareeyo Foolteyjka (Tamar keyd isdheerida)?**

Qul qulka Hawlgalka 5.4 wuu kordhaa marka uu kordho. tamarkeyd is dheeridu; sidoo kale wuu yaraadaa marka ay yaraato tamar is dheeridu?

Ninka layidhaahdo “George Simon Ohm” oo ahaa Fisigisyahan Jarmal ah ayaa cabbiray qulqulka danabka ee dhex maraya gudbiye loo adeegsaday ama kagudbayso tamar isdheeri kala duwani.

Tana Waxaa lagu agaaday xeerka ohm:-



Jaantuska 5.12 Garaa fka Tamar keyd isdheerida iyo qul qulka.

Xeerka Ohm Wuuxu Sheegayaa:

" Qulqulka dhexsocoda birgudbiye ah heerkul Joogto ah, Wuxuu saamigal too san ku yahay Tamarkeyd isdheerida udhexaysa labada cidhif".

Xisaab ahaan Waxaa loo qeexi karaa xeerka Ohm Sidan:-

: $\frac{\text{Tamarkeyd isdheerida}}{qulqulka}$ = madoorsoome

Waa saamigalnimada madoorsoo maha ee astaan gaarka u ah qudbiyaha birta ah Madoor Soo mahana Waxaa loo yaqaa caabiga qudbiyaha.

Waa maxay caabigu?

Caabiga Waxaa loo qeexaa inuu yahay Lidka qulqulka danabka ee dhexmaraya gudbiyaha. Sida Kamuuqata Hawlgalka 5.4

Cabiga gudbiyahana waxaa loo qeexaa inuu yahay Tamarkeyd isdheerida iyo qulqulka.

Calaamad ahaana waa sidan. $R = \frac{V}{I}$ marka

V= fooltejka (V)

I = qulqulka (A)

R = Caabiga (Ω)

Halbeega Caalamiga ee caabiguna waa ohm (Ω)

$$1\ \text{ohm} = \frac{1\ \text{volt}}{1\ \text{amp}}$$

Shaxan mareegta caabigu waxaa u taagan Calaamadahan:

Xeerka ohm wuxuu sax kuyahay kaliya xaalado gaara ah. Wuxuu sax ku yahay biraha gudbiyaha ah ee herkulka madoorsome.

Tusaale 5.2

1. Waa imise caabiga laambad qulqulka danabkeedu yahay 0.5A, , marka lagu xidho 2V oo baytariah?

Siin	Weydiin	Fur-furis
V = 2V	R = ?	$R = \frac{V}{I}$
I = 0.5A		$R = \frac{2V}{0.5A} = 4\Omega$
∴ caabiga guluubku = 4Ω		

2. Waa imisa qulqul dhex maraya marka 10 Ω oo caabiah lagu xidho 2V oo barytariah?

Siin	Weydiin	Fur-Furis
R = 10 Ω	I = ?	V = IR
V = 2V		$I = V/R = \frac{2v}{10\Omega}$
		I = 0.2A

3. Caabi dhan 200Ω ayaa lagu xidhay qulqul danab dhan 1.15A, Waa imisa tamar keyd isdheeridoodu?

Siin	Weydiin	Fur-Furis
R = 200Ω	V = ?	V = IR
I = 1.15A.		V = 1.15A × 200Ω
		V = 230V

∴ Sidaas darted tamarkeyd isdheeridu = 230V

Xaqiijin 5.3

1. Qeex Weedhahan soo Socda
   b) Qulqulka danabka
   t) Foolteyj (tamar keyd is'dheeri)
   c) Ambiyeer
   d) Caabiga
2. Waa maxay magaca kale ee loo yaqaan foolteejka?
3. Sheeg xeerka ohm
4. Buuxi, Halbeegyada iyo calaamada. Xadiyado sal leh ee shaxda hoose ku qoran.

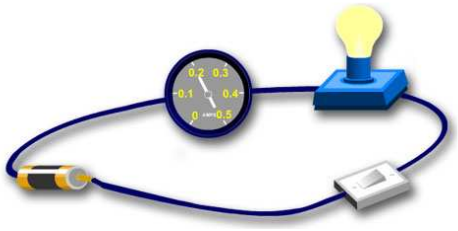
Tiro	Xaddi Saleedka	Sumada	Calaamada Halbeega
1	Qulqulka danabka		
2	Tamar keyd isdheerida		
3	Caabiga		

5.4 Cabbirida, Qulqulka Danabka, Tamar Keydisdheerida, Iyo Caabiga

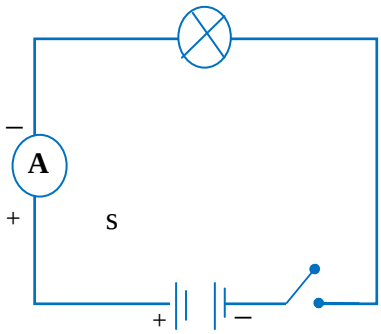
Waxaad ogsoontahay in xadiyada danabeed ay ugu muhiimsan yihiin qulqulka, Tamarkeyd isdheerida, iyo caabigu. Hadaba Waad cabbiri kartaa xadiyadan adigoo mareegta danabka u adeegsanaya qalabyo kala duwan.

Cabbir qulqulka danabka adigoo ku cabbiraya (Ammeter) (qalabka lagu cabbir qulqulka)

Qulqulka danabka ee mareegta Waxaa lagu cabbiraa qalabka loo yaqaano: (Ammeter).



b) Shaxanka mareegta dul ahaan



t) Shaxanka calaamada Mareegta

Jaantuska 5.13 Kuxidhida (Ammeterka)

Adigoo isticmaalaya (Ammeterka)

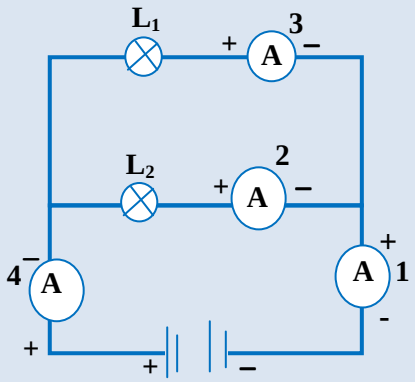
- Isugu xidh sitaxane ah caabiga ama Sida ka muuqata Jaantuska 5.13.
- Waligaa ha isugu xidhin si is waydaar ah cidhifyada baytariga adigoon haysan ugu yaraan caabi (ceeliyaha danabka) oo u xidhan si taxane ah.
- Ha isugu xidhin caabiyada si bar- baro ah.

Hawlgalka 5.5

Cabbirida qulqulka danabka mereeg u xidhan si bar-baro ah (Jaan 5.14)

Qalabka loo baahanyahay:- Ammeter, 2 guluub iyo 6v oo baytiri ah .

1. **Ku xidh ammeterka meesha (1), si aad u cabbirtid qulqulka ka imanaya baytariga.**
2. **Ku xidh ammeterka si, aad cabbirtid qulqulka qeyb kasta (meela ha (2) iyo (3)).**
3. **Maxaad kugabagabeyn lahayd qulqulka meelaha (1), (2) iyo (3)**
4. **Qeyb tee baa mareegtan bar-barada ah leh qulqulka ugu badan? Sabab?**



Jaantuska 5.14 Cabbirka qulqulka mareeqta bar - barada

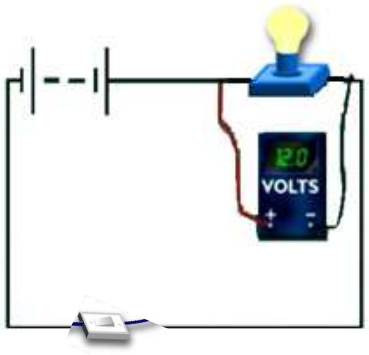
Wadarta qulqulada ee mareegta Barbarada ahi waxay lamid tahay qulqulka ka imanaya baytariga.

Cabbirada Tamar Keyd isdheerida oo lagu cabbirayo (Voltmeter) (Tamarkeyd cabbire).

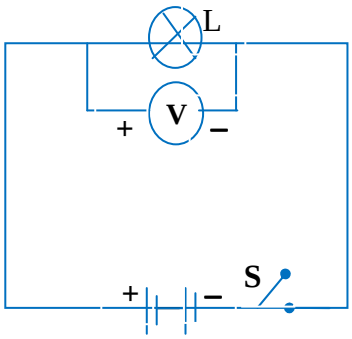
Tamarkeyd is dheerida ka gudbaysa laba barood oo kasta oo mareegta ka mid.ah Waxaa lagu cabbiraa qalabka loo yaqaano (Voltmeter) (Tamar keyd cabbire).

Adigoo isticmaalaya voltmeter:

- Isugu xidh si bar-baro ah caabiyda si aad u cabbirto Tamar keyd isdheerida ka gudbeysa caabiga.
- Isugu xidh sibar –baro, baytariga ama unug kuwaas oo aad dooneysid inaad tamar keyd isdheeri diisa cabbirtid. Sida ka muuqata Jaantuska 5.15.
- Waligaa ha isugu xidhin si taxane'ah ilaha caabiyada ama Tamarkeydisdheerida.



b) Shaxanka ka mareegta dul, ahaan.



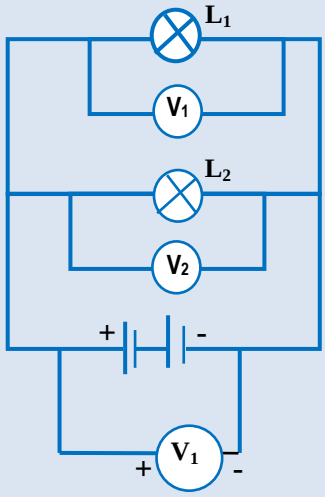
t) Shaxanka mareegta calaamada ahaan

Jaantuska 5.14 Isku xidhka voltmeterka

Hawlgalka 5.6 Cabbirida tamar keyd isdheerida mareegta bar-barada ah sida ka muuqadata (Jan 5.16)

Qalabka loo baahan yahay:- fooltimitir, 2 Guluub iyo 6V oo baytairi ah.

1. Isuguxidh fooltimitirka iyo baytariga si, gudub, ah, kadibna diwaanga liakhrintiisa.
2. Isuguxidh, fooltimitirka iyo guluub kasta si gudub, ah ee mareegta bar-barada ah kadibna, kala sooc, diwaan galinta akhrintooda.
3. Isbar-bardhig Tamar keydisdheerida ka gudbaysa guluub kasta.



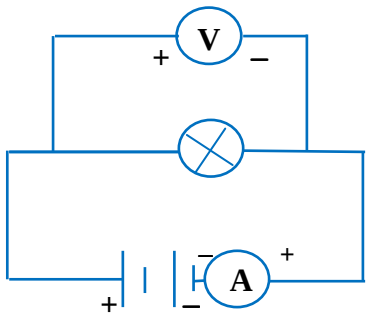
Jaantuska 5.16 Cabbirada Tamar keydisdheerida ee mareegta bar-barada ah

Tamarkeyd isdheerida kagudbaysa guluubka oo kamida mareegta bar- barada ahi waa iskumid.

Foltimitir, iyo ammitir waa kuwa loo adeegsado saameynta birlab danabeedka qulqulka danab. Marka la isticmaa layo qalabkan, waa in cidhifkooda toganaha ah (+) lagu xidhaa cidhifka tabanha ah ee isha mootiyaha xooga danabka. Sidoo kale cidhifyadooda tabanaha ah (-), la gu xidhaa cidhifyada tabanaha ah (-) ee isha mootiyaha xooga danabka. Sida ka muusqata Jaantuska 5.13 iyo Jan 5.15

Cabbirada caabiga iyadoo lagu cabbirayo Fooltimitir iyo ammitir.

Caabiga guluub waxaa la cabbiri karaa iyadoo la isticmaalayo iskudarka Foltmitir ammitir iyo xeerka ohom. Xeerka ohom Waad ku cabiri kartaa. Caabiga guluubka. (Fiiri:- Jaan 5.17)



Jaantuska 5.17. Cabbirida Caabiga guluubka

Hawlgalka 5.7

Cabbirida Caabiga guluubka

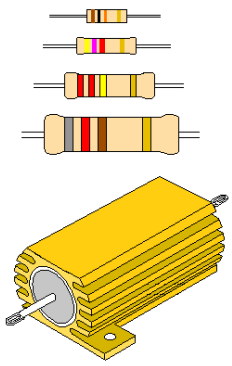
Qalabka loo baahanyahay: **guluubyo kaladuwan ammittir, Foltimitir, 6V baytari; xadhkaha oo iskuxidhan.**

Habka laraacayo:

1. **Iskuxidh ammitirka, fooltimitir, guluubka, baytariga iyo xadhkaha isku xidhan sida ka muuqada. (Jantuska 5.17)**
2. **Cabbir qulqulka mareegta oo diwaan gali akhriskiisa.**
3. **Cabbir tamar keyd is dheerida ka gudbaysa guluubka adigoo isticmaalaya Fooltimitrika oo diwaan gali akhriskiisa.**
4. **Xisaabi saamiga tamar isdheerida iyo qul qulka danab, adigoo isticmaalaya xeerka ohom.**

Saamiga tamar isdheerida iyo qulqulka danab ee guluubku wuxuu ina siinayaa caabiga guluubka xaasawda. Guluubyada kala duwani waxay leeyihiin caabiyo kala duwan.

Caabiyadu waa qalab danabeed ka sameysan caabiye qulqulka danabka. Hadaba waxaa Jira caabiyo fara badan oo danab caabiyaal ah, Tusaale ahaan raadiyawga, tilifishinka. Badanaa caabiyadu waxay ka sameysan yihiin xadhig danabeed leh dherer. (Fiiri, Jaantuska: 5.18).



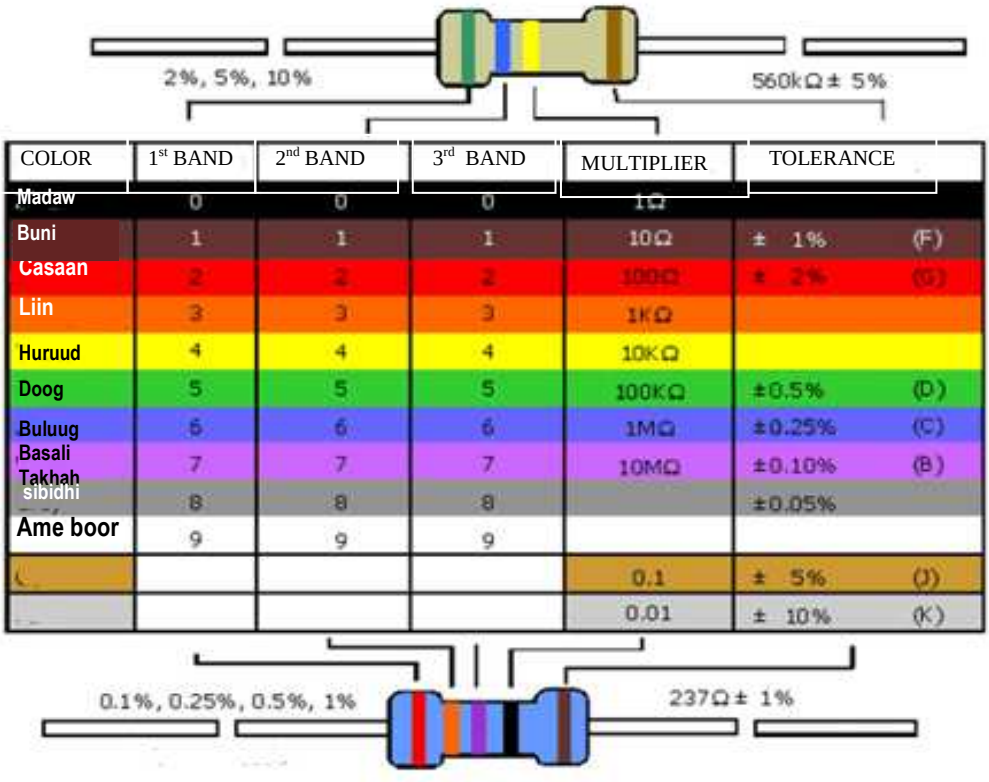
Jaantuska 5.18. caabiyada

Midab ku calaamadaynta caabiyada

Midabada lagu calaamadiyo caabiyada qiimaha caabiga wakhtigyada qaarkood, waxa loo isticmaalaa inuu ina tusiyo. Calaamad midab sida ka muugata (Jaantuska 5.19) Kaas oo in a tusaya midabada calaamadaha ah ee lagu calaamadiyey, caabiga.

Qiimaha caabinta caabiga waxaa la inagu siiyey xaga sare Jaantuska 5.19, Waxaana lagu xisaabiyey, sidan:-

Cagaarku waa 5, buluugu Waa 6, huruudu waa 10kΩ, sidaas darted caabinta caabigu Waa 560kΩ (560,000Ω). Sidaas silamidah, Waxaad radisaa caabinta caabiyaha ee la inagu siiyey shaxdan hoose.

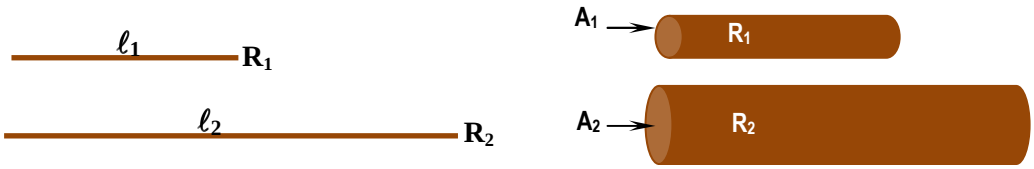


COLOR	1st BAND	2nd BAND	3rd BAND	MULTIPLIER	TOLERANCE	
Madaw	0	0	0	1Ω		
Buni	1	1	1	10Ω	± 1%	(F)
Casaan	2	2	2	100Ω	± 2%	(G)
Liin	3	3	3	1KΩ		
Huruud	4	4	4	10KΩ		
Doog	5	5	5	100KΩ	±0.5%	(D)
Buluug	6	6	6	1MΩ	±0.25%	(C)
Basali	7	7	7	10MΩ	±0.10%	(B)
Takhah sibidhi	8	8	8		±0.05%	
Ame boor	9	9	9			
				0.1	± 5%	(J)
				0.01	± 10%	(K)

Jaantuska 5.19 Midabku calaamadeynta caabiyada

Xaddiyada saameynta ku leh caabiga Gudbiyeyaasha

Caabiga gadbiyuhu wuxuu ku xidhan yahay walaxda Asalkeeda (waxay, ka Samaysan tahay), dhererka iyo Bedkeeda (Bedka uu kagudbayo). Marka heerkulku Madoorsoome yahay. Xaddiyadan soo socdaa waxay Saamayn ku leeyihiin caabiga Gudbiyaha



b) dherer *t) Bedka - gudbiyaha*

Jaantuska 5.20 Xaddiyada Saameynta kuleh caabiga

i) **dhererka: Caabiga gudbiyuhu Wuxuu Saamigal quman Ku yahay dhererka Gudbiyaha (xadhiga Dabka). Tani waxay tahay haddii la dheereeyo xadhiga caabigu wuu badan, haddii xadhiga la gaabiyana, caabigu wuu yaraan Asagoo Ku xidhan walaxda lagu Siiyey iyo Bedka Dusha uu ka gudbayo.**

Xidhiidhkan waxaa la sharixi Karaa ayadoo la isticmaalayo isku – dhaca elektaroonada xorta ah ee Gudbiyaha dhexdiisa.

Marka dhererka gudbiyahu kordhoba, Tirada isku dhaca kaas oo ay Sameeyaan elektaroona ku safraya Gudbiyaha dhexdiisu sidoo kale way kordhaan. Haddaba, qulqulku aayar ayuu socdaa xadhkaha danabka ee dhaadheer dhexdooda. Kuwa gaagaabana Ama xadhkaha Dabka ee Gaagaabana gudubku wuu Degdegaa (jaantuska 5.20 (b))

ii) ***Bedka- Dusha Gudbiyaha: caabiga Gudbiye wuxuu Saamigal rogaal ah ku yahay Bedkiisa: sida:- Bedka Dusha Gudbiyuhu waxay ina tustaa Dhumucda Gudbiyaha. Xadhiga Dabku haddii uu dhumuc weyn yahay Bedka- Dushiisu way balaadhantahay. Haddii Bedka Dusha Gudbiyuhu yaraato caabiga xadhiga Gudbiyaha ahi wuu kordhaa. Caabiga xadhiga Gudbiyaha ahi wuu yaraadaa marka Bedka – Dusha Gudbiyuhu korodho (Jaantuska: 5.20 (t))***

Waxaad Barbar – dhigi kartaa xidhiidhkan ka xadhid – Danabeedka Bani – aadamka ee aad ku soo baratay geybta 5.1

Guryaheena xadhkaha Dabka ee Buuran Ama dhumucda leh waxaa loo isticmaalaa Dhalaalinta Biraha Danabka iyo makiinadaha Alxanka. Halka xadhkaha Dabka ee dhuudhuuban looga isticmaalo Guluubyada Korontada, Raadiyowga Ama idaacada, telefishanka, Bahalaha Moobaylada lagu dabeeyo iwm.

iii) ***Waxaay ka Sameysan yihiin walxaha Gudbiyeyaasha ahi: waxay ka Samaysan yihiin Wuxu Go'aamiyaa Ama saamayn ku leeyahay caabiga Gudbiyaha: sida Walxo Gudbintoodu kala duwan tahay waxay leeyihiin Awood kala duwan oo ay ku gudbiyaan qulqulada korontada.***

iv)Heerkulka: Caabiga gudbiyuhu Wuxuu ku xidhan yahay heerkulkiisa. Marka heerkulka gudbiyuhu Kordhoba, caabigiisu wuu kordhaa, in kastoo xeerkii ohm uu ogolaa inay run ku tahay walxaha heerkulkoodu aanu isbedelin.

Hubinta (xaqiijinta) 5.4

1. **Qeex sida loogu xidho Amitirka (qulqul cabire)iyo fooltmitir (Tamar keyd – isdheeri cabbire) mareegta?**
2. **Sawir jaantuska mareegta Adigoo isticmaalaya Summadaha amitirka iyo fooltimitirka.**
3. **Sharax sidaa aad ugu cabbiri Karto caabiga Amitir iyoo fooltmitir.**
4. **Qeex midab ku astaynta caabiyada.**
5. **Waa maxay xaddiya Ama waxyaalaha Saameynta ku leh caabiga gudbiyaha.**

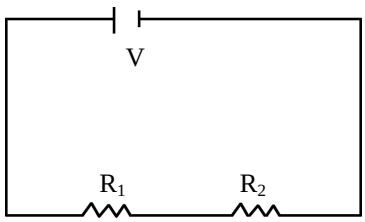
5.5 Qaaciidooyinka Lagu Xisaabiyo Isugeynta Caabiyada Ee Taxanaha Iyo Barbarada Ah

Hawlgalka 5.8

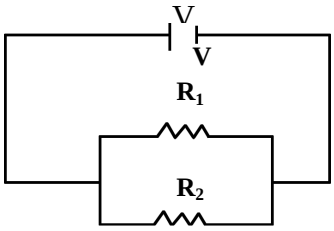
- **Sharax waxa ay la micno tahay Guluubyo isugu xidhan sitaxane iyo Barbaro ah?**
- **Sidee ayuu Guluubka Iftiinka ee Gurigiinu u xidhan yahay?**
- **Miyaad shidi kartaa Ama Bakhtiin karaa Guluubyada Gurigiina oo dhan adigoo isticmaalaya hal Fure oo kaliya? Sharax side.**

Caabiyada Danabka Guryaheena intooda badani waa maxsuulka hab mareego oo laysu geeyey. Xeerka ohm wuxuu isticmaalaa si uu u helo qulqulka mareegta Ama qeyb ka mid ah mareegta. Marka gudbiyeyaasha laysku xidho si ay u sameeyaan Mareeg, Waxa laga yaabaa in dhammaantood ay isu xidhan yihiin sida:- silsilada sida ka Muuqata (jaantuska 5.21 (b)) Ama waxa laga yaabaa in qaar isugu xidhan yihiin Barbaro sida ka muuqata (jaantuska 5.21 (t)). Sida ay u habaysan yihiin qeybaha Mareegtu waxay saameyn ku leedahay socodku qulqulka ee dhexmaraya mareegta. Aasaas ahaan waxaa jira laba nooc oo Mareegood. Waxayna yihiin Mareegta taxan iyo Mareegta Barbarada ah.

- Jaantuska 5.21 (b) caabiyada R_1 iyo R_2 waxay isugu xidhan yihiin si taxane ah.
- Jaantuska 5.21 (t) caabiyada R_1 iyo R_2 waxay isugu xidhan yihiin Barbaro.



b) Isu kidhnaanta Taxaanaha ah ee R_1 iyo R_2



t) isu xidhnaanta Barbarada ahee R_1 iyo R_2

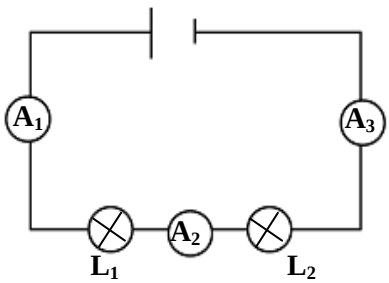
Jaantuska 5.21 Isku – xidhida caabiyada

Caabiyada Mareegta taxanaha ah

Mareegta aan lahayn wax qeybo ah waxaa la dhahaa Mareegta taxanaha ah. Caabiyada midba midka kale ayuu ku daba xidhan yahay.

Marka caabiyadu isugu xidhan yihiin si taxane ah, qulqulku wuxuu u dhexmaraa caabiga mid-mid.
Jaantuska 5.22 wuxuu ina tusayaa laba Guluub oo isugu xidhan si taxane ah.

Qulqulka dhexmaraya caabikastaa waa isku mid mareegta taxanaha ah. Taas macnaheedu waa jaantuska 5.22 amitirada A_1, A_2 iyo A_3 waxay sheegayaan qulqul isku mid ah.



Jaanstuska 5.22 Qqulqulka mareegta taxanaha ahi waa isku mid.

Hawlgalka 5.9

Si loo tuso in qulqulka mareegta taxanaha ahi isku mid yahay:-

Qalabka loo baahan yahay: 2 toosh mitir, Amitir, laba guluub oo Kuwaa ilayska ah, xadhig isku xidha iyo laba baytari ama dhagax (1.5v midkastaa).

Jidka la marayo: **1. Isku – xidh Guluubyada iyo fooltmitirka sida ka muuqata shaxan ka 5.23**

2. **Ayadoo la dhigayo amitirka meelo kala duwan (sida b, t iyo j) qaado qiimayaasha qulqulada.**
3. **Qaado qiimayaasha foolteyjka ee u kala gudbaya Guluubka L_1 iyo Guluubka L_2 ee (jaantuska 5.23).**

- Qiimaha qulqulku ma isku midbaa? Mise wuu kala duwan yahy?

- isbarbar – dhig tamar – keydisdheerida ka gudbaysa foolteyjka Guluub kasta iyo wadarta foolteyja.

Haddii aad u samaysid hawlgalka 5.9 si sax ah. Dabadeed waxaad heli doontaa maxsuulada soo socda ee muhiimka ah.

1. Qulqulka maraya caabi kasta ama guluub kastaa ee mareeg taxane ahi waa isku mid sida:$I_1 = I_2 = I$
2. Mareegta taxanaha ah wadarta foolteyjyada ee maraya caabiye kastaa waxay la mid yihiin wadarta foolteyjka sida:$V= V_1 + V_2$

Inagoo ku saleyneyna labada isie'eg ee xagga sare iyo qeexida caabiga ee xeerka oom, waad xisaabin (Raadi) kartaa caabiga isu – dhiganka ee isu – taga caabiyada taxanaha ah.

Maadaama $V = V_1 + V_2$ iyo $R_1 = \frac{V}{I}$

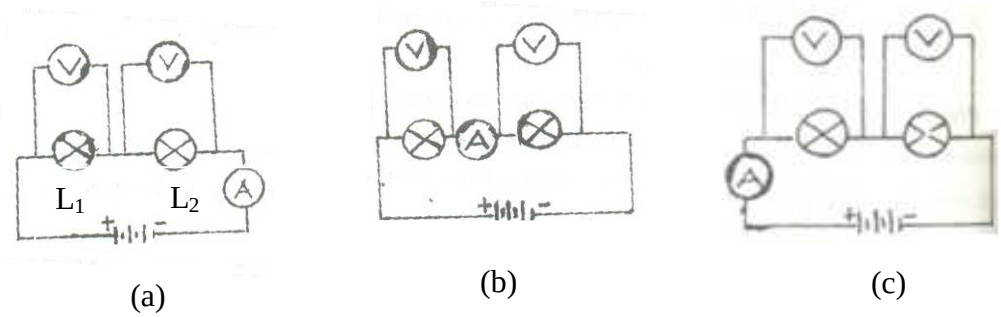
Dabadeed $V_1 = R_1 I$ iyo $V_2 = R_2 I$

$V = R_1 I + R_2 I$

$= I(R_1 + R_2)$

$\Rightarrow IRt = I(R_1 + R_2)$

$$R_t = R_1 + R_2$$



(a) (b) (c)

Jaantuska 5.23 Cabbirida qulqulka danabka ee mareegta taxanaha ah

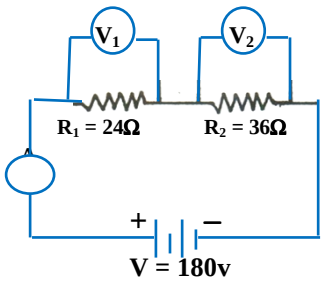
Mareegta taxanaha ah, wadarta caabigu (isu – dhiganka caabigu) waxuu la mid yahay wadarta caabiyada caabi kasta tani macnaheedu waa, laba caabiye waxaa lagu bedeli karaa hal caabi isu – dhigan.

Tusaalaha laga shaqeeyey ee 5.3

1. laba caabi oo awoodood tahay 6Ω ayaa midkasta waxaa si taxane ah loogu xidhay baytari kaasoo soo saara 36V mareegtan Raadi
   b) Wadarta caabiga
   t) Qulqulka maraya mareegta

Siin	Waydiin	FurFuris
$R_1 = R_2 = 6\Omega$ $V = 36V$	b) $R_t = ?$ t) $I = ?$	b) mareegta taxanaha ah, $R_t = R_1 + R_2$, $\Rightarrow R_t = (6+6)\Omega = 12\Omega$ $\therefore$ sidaas darted isu – dhiganka caabigu waa12Ω t) Markaan ueegno xeerka oom $I = 3A$ $\therefore$ Sidaas darted qulqulka dhexmaraya mareegtu waa 3A

2. Jaantuska mareegta ee ka muuqata shaxanka 5.24 Raaeli;



1. Wadarta caabiga
2. Amitirku waxa uu sheegayo
3. Fooltmitirku wuxuu sheegayo

Jaantuska 5.2; Caabiyo xidhan si taxane ah.

Jaantuska5.24 waxaan ku aragnaa in $R_1=24\Omega$, $R_2= 36V$ iyo $V=180V$ ay yihiin taxane hadaba

b) Wadarta caabigu waa $R_t = R_1+R_2 = 24\Omega + 36\Omega = 60\Omega$

t) Amitirku wuxuu sheegayaa in qulqulku uu la mid yahay qulqulka I ee dhexmaraya

$$\text{mareegt } I = \frac{V}{R} = \frac{180V}{60\Omega} = 3A$$

j) Fooltmitirka ka gudbaya R_1 wuxuu la mid yahay $V_1=IR_1= (3A)(24\Omega)=72V$

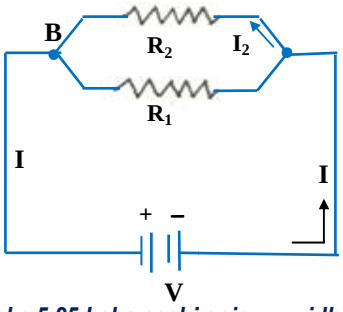
$V_2=I_2R_2=(3A)(36\Omega)=108V$

Caabiyada Mareegta Barbarada ah

Mareegta taasoo u kala qaybsan laba ama in ka badan oo qeybood waxaa la dhahaa mareeg barbaro ah, tusaale ahaan laba caabiye waxaa la dhahaa waxay isugu xidhan yihiin Barbaro marka ay isu garab yaalaan dhinac dhinac ee labadooda dhinac ee isu – beeganina ay isu xidhan yihiin.

Jaantuska 5.25 wuxuu ina tusayaa laba caabi oo isugu xidhan Barbaro

Shaxanka 5.25 wadarta qulqulka (I) waxay u qeybsantaa I_1 iyo I_2 bar kulanka A. iyo I_1 iyo I2 waxay isaga xidhmaan barta B si ay inoo siiyaan mar labaad wadarta qulqulka taasoo ah $I = I_1+1_2$



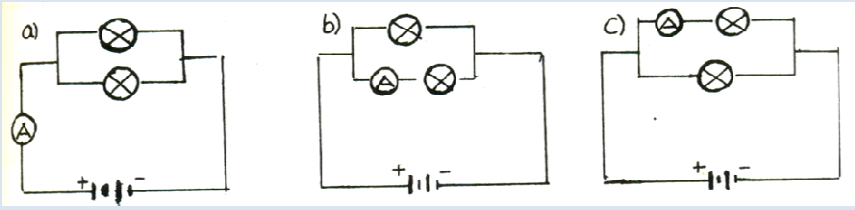
Jaantuska 5.25 Laba caabi ooisugu xidhan barbaro

Hawlgalka 5.10 Si loo cabbiro qulqulka qeybkasta oo ka mid ah qeybaha caabiga barbarada ah

Qalabka loo baaha yahay: laba unug oo 1.5V ah, xadhig isu xidha, laba Guluubyada la shito ah iyo Amitir.

Jidka la Raacayo:

1. Isugu xidh Guluubyada si Barbaro ah
2. Qor waxa uu sheegayo Amitirku (qalabka lagu cabiro qulqulka) meelaha kala duwan sida ka muuqata. Jaantuska 5.26
3. Isbarbar – dhig wadar qulqulka iyo wadarta qulqulada dhexmaraya labada Guluub miyey la mid tahay wadarta Guud ee qulqulka?



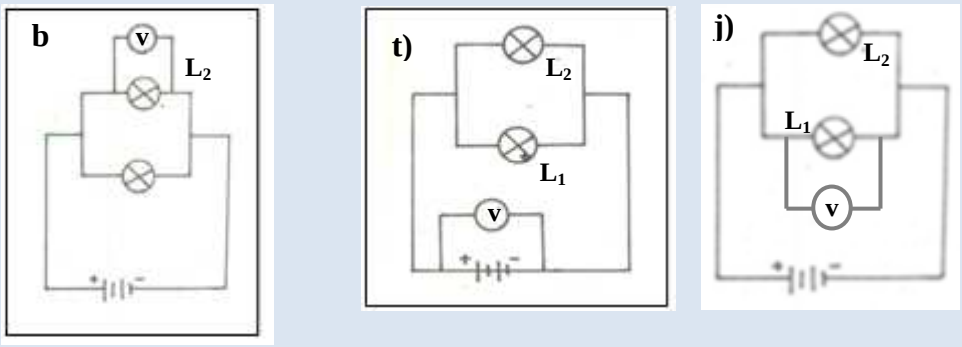
Jaantuska 5.26 Cabbirida qulqulka mareegta Barbarada ah

Hawlgalka 5.11 si loo cabbiro Foolteyjka ka gudbaya caabi kaste

Qalabka loo baahan yahay: laba unug oo ah 1.5V midkiiba, xaalhkaha Dabka oo isku – xidha labad Guluub ee ilayska iyo fooltmitir.

Jidka la marayo: 1. Isugu xidh guluubyada si barbaro ah.

2. Dhig fooltmitirka meelkasta oo caabi ah mareeg kasta sida ka muuqata jaantuska 5.27
3. Qor waxa uu sheegayo fooltmitirku dabadeedna Barbar dhig foolteyjka guud ee unugyada.
   - Ma isku midbaa foolteyjka maraya caabi kasta?
   - Foolteyjka maraya caabi kastaa ma la midbaa, wadarta Guud ee foolteyjka unugyada?



Jaantuska 5.27 Cabbirida foolteyjka mareegta barbarada ah

Haddii hawlgalka 5.10 iyo 5.11 loo qabto si sax ah, dabadeed waxaad heli doontaa maxsuuladan soo socda.

1. Wadarta qulqulada dhex maraya labada Guluub waxay la mid tahay wadarta guud ee qulqulka, taasi waa $I= I_1+I_2$
2. Foolteyjka ka gudbaya guluub kastaa wuxuu la mid yahay foolteyjka guud ee la siinayo, taasi waa
   $V = V_1=V_2$
3. Adigoo isticmaalaya xeerka ohm iyo isle' egyada sare waxaad heli kartaa xidhiidhka muhiimka ah ee ku saabsan wadaarta Guud ee caabiga laba caabiye oo isugu xidhan Barbaro.

Haddii $I = I_1 + I_2$ iyo $I = \frac{V}{R_t}$ (xeerka oom)

Halka $I_1 = \frac{V_1}{R_1}$ iyo $I_2 = \frac{V_2}{R_2}$ dabadeed;

$\Rightarrow I = \frac{V}{R_t} = \frac{V_1}{R_1} + \frac{V_2}{R_2}$ laakiin $V_1=V_2=V$

Hadaba $\frac{V}{R_t} = V\left(\frac{1}{R_1}+\frac{1}{R_2}\right)$

Ama $\boxed{\frac{1}{R_t} = \frac{1}{R_1}+\frac{1}{R_2}}$

Wadarta caabiga labada caabiye ee R_1 iyo R_2 ee isugu xidhan Barbaradu wey ka yar yihiin ta caabiya caabi kasta. Isugu xidhida laysugu xidho caabiyada Barbaro waxay yaraysaa caabi isudhiganka waxayan kordhisaa wadarta qulqulka, isticmaal qaababkan la fududeeyey ee soo socda si aad u hesho caabi isudhiganka R_t

$$R_t = \frac{R_1R_2}{R_1+R_2}$$

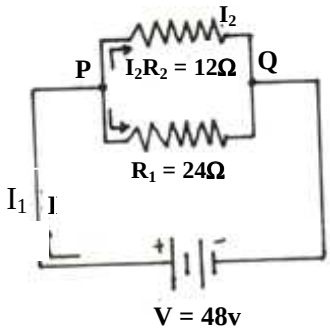
Qaaciidadani kaliya waxaa lagaga shaqeyn karaa kaliya caabiyada barbarada ah waxaanad isticmaali kartaa hab – xisaabeed ka isu geynta jajabyada si loo helo qiimaha R_t.

Tusaalaha laga shaqeeyey ee 5.4

1. Laba caabi oo caabigoodu kala yahay 9Ω iyo 18Ω ayaa laysugu xidhay Barbaro ayadoo la dhexmarinayo qeybiye 24V ah. Mareegtan Raadi.
   b) Wadarta caabiga t) wadarta qulqulka

Siin	Waydiin	Furfuris
R_1= 9Ω R_2 = 18Ω V= 24V	a) R_t = ? b) I = ?	b) Anagoo adeegsaneyn a isleegta sare $\frac{1}{R_t} = \frac{1}{R_1} + \frac{1}{R_2} = \frac{1}{9\Omega} + \frac{1}{18\Omega}$ $R_t = \frac{9\Omega \times 18\Omega}{9\Omega + 18\Omega} = \frac{162\Omega^2}{27\Omega} = 6\Omega$ ∴ R_t = 6Ω t) xeerka ohm ee sare waxaan ku heysanaa. $I = \frac{V}{R} = \frac{24v}{6\Omega} = 4A$ Taasi waxaa weeyi ; I = 4A

2. laba caabi oo caabigoodu kala yahay 12Ω iyo 24Ω ayaa laysugu xidhay si barbaro ah baytari (dhagax) awoodiisu tahay 48V. (fiiri jaantuska 5.28). mareegtan Raadi.
   b) Caabiga guud
   t) Qulqulka Guud
   j) qulqulada I_1, I_2 iyo I.
   x) isbarbar dhig wadarta I_1 iyo I_2 ta I



Jaantuska 5.28 Caabiyada Barbarada ah.

Siin	Waydiin
R_1= 9Ω R_2= 12Ω V = 48V	a) R_t =? b) I = ? c) I_1 = ?, I_2 = ? d) I = I_1 + I_2 =?

Furfuris

b) Caabi isudhiganka isu geynta barbarada ahi waa

$\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2}$ Hadaba, $\frac{1}{R} = \frac{1}{12\Omega} + \frac{1}{24\Omega}$

$\frac{1}{R} = \frac{2+1}{24\Omega} = \frac{3}{24\Omega} = \frac{1}{8\Omega}$

$$\frac{1}{R} = \frac{1}{8\Omega}$$

∴ sidaadarted caabi isudhiganku waa $R = 8\Omega$

t) Anagoo isticmaalayna xeerka ohm, $I = \frac{V}{R_t}$

$$I = \frac{48V}{8\Omega} = 6A$$

$$I = 6A$$

j) Caabiyada isugu xidhan Barbarada

$$V_1 = V_2 = V$$

Haddaba $I_1 = \frac{V}{R_1} = \frac{48V}{24\Omega} = 2A$

$$I_2 = \frac{V}{R_2} = \frac{48V}{12\Omega} = 4A$$

x) $I = I_1 + I_2 = 2A + 4A = 6A$

Qulqulka guud waa (I = 6A) wadart qulqulada caabi kasta

Tamarta Iyo Awooda Mareegta Danabka

Caabiyo danab ama koronto oo farabadan guryaheena waxaan u isticmaalaa in aan ugu badalno tamarta danabka qaab tamaro kale. Tusaale ahaan tooshka waxaa loo isticmaalaa in uu tamarta danabka u badalo ilays, kuleyliyeyaasha danabku, tamarta danabka ayey u badalaan kul xaddi ama qiyaasta tamarta ah ee laga soo qaato caabiyada danabku waxay ku xidhan yihiin muddada la isticmaalayey intay le'eg tahay. Hadaba, waxaa la doorbiday in laga hadlo qiyaasta tamarta ah ee gudbaysa sekenkiiba. Tamarta gudbaysa seken kiiba (ilbiriqsigii) waxaa loo yaqaanaa awood.

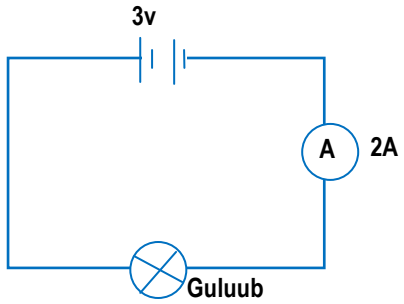
$$\text{Awood} = \frac{\text{Tamarta Gudubtay}}{\text{waqtiga ay kuqaadatay}}$$

$$P = \frac{E}{t},\ E = Pt$$

Su'aal furan

Awooda danabku miyey ku xidhan tahay fooltayjka iyo qulqulka?

Ka fikir Baytari awoodiisu tahay 3V oo lagu xidhay Guluub sida ka muuqata jaantuska 5.29 qulqulka mareegta dhexmarayaa waa 2A. tan macnaheedu waa 2 kuulam danab ah ayaa dhexmaraya guluubka ilbiriqsigiiba (sekenkiiba). Hadda foolteyjku (Tamerkeyd isdheeridu) waa 3V. tan macnaheedu waa in halkii kuulamba uu gudbinayo 3J sida ay ku dhexmarayso guluubka.



Jaantuska 5.29 Awoodu waxay ku xidhan tahay toolteyjka iyo qulqulka

Maadaama 1V uu la mid yahay tamarta loo isticmaalay si loo dhaqaajiyo 1c oo danab ah oo isaga gudb aya cidhifyada.

Haddii ay jiraan ilbiriqsigiiba 2c, oo kuulam kastaa Gudbinayo 3J, imisa juul ayaa Gudbi Ilbiriqsi kasta? Jawaabtu waa 6J/s, sidoo kale Awoodu waa 6J/s ama 6w.

Halbeega awooda danab (korontadu) waa watt una taagan w halka 1W = 1J/s.

Awooda danabku waa taranta foolteyjka iyo qulqulka

$$P = IV$$

Adigoo isticmaalaya xeerka ohm V = IR, halka P aan u qori karo R ahaan, V, iyo I .

$$P = I^2R \text{ Halka } (V= IR)$$

$$P = \frac{V^2}{R} \text{ where } (I= \frac{V}{R})$$

Tusaalaha ka shaqeysan ee 5.5

1. Guluub ay aa isticmaalay 1,500j oo tamar ah 25 Ilbiriqsi (seken) waa imisa awoodu?

Siin	Waydiin	Furfuris
E = 1500J	P = ?	$P = \frac{E}{t}$
t= 25second		$P = \frac{1500J}{25s} = 60W$
sidaa darted awooda guluubku waa P = 60 W		

2. Guluubka korontada ayaa waxaa ku qornaa 220V, 60W.
   b) maxay yihiin tirooyinkan macnahoodu?
   t) waa maxay qulqulka danabka ee uu soo saarayaa guluubku marka lagu xidhiidhiyo 220V?
   j) Waa maxay caabiga xaasawda guluubku?

Furfuris

b) 220v waa foolteyjka ka gudbayo taasoo guluubk u inuu ku xidhantahay ay tahay, tan macnaheedu waa 220J oo tamar ah ayaa gudbaya markasta oohal – kuulam oo Danab ahi maroba (dhaafoba).
60w waa awooda danabka (korontada). Waxay la micno tahay 60J oo tamarta danabka ah ayaa loo bedeli doonaa ileys ilbiriqsi kasbaba marka lagu xidho qeybiye 220V ah (ame Baytadri).

t) Si loo xisaabiyo Ama raadiyo qulqulka danabka ee guluubka dhexdiisa

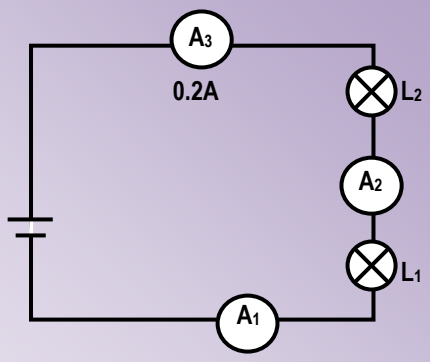
$$P = IV,\ I = P/V = \frac{60W}{220V} \Rightarrow I = 0.27A$$

j) Caabiga guluubka

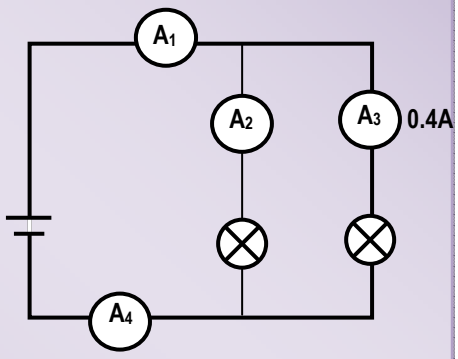
$$P = \frac{V^2}{R} \Rightarrow R= \frac{V^2}{P} = \frac{220V \times 220V}{60W} = 806.6\ \Omega$$

Hubinta (xaqijinta) 5.5

1. Qor Faa'iidada iyo waxyeelooyinka guluubyada isugu xidhan
   b) si taxane ah t) si barbaro ah
2. b) ku sawir jaantuska 5.30 Buuggaaga qoraalka, magacowna habka ay isugu xidhan yihiin guluubyadu kana jaw aab su'aalaha t iyo j
   t) Haddii A_3 sheegayso 0.2A, maxay sheeegayaan labada Amitir eekale?
   j) Haddii guluubyada midka mid ah laga saaro, sharax waxa ku dhici doona guluubyada kale.
3. Ku sawira jaantuska 5.31 Buuggiina qoraalka, dabadeed ka jawaaba su aalahan soo socda
   b) Magacow habka ay isugu xidhan yihiin guluubyadu.
   t) Haddii guuubyadu ay isku mid yihiin oo A_3 ay sheegayso 0.4A, ku tus jaantuskaaga waxa amitirada kale sheegayaan
   j) Haddii Guluubka ku xiga A_3 laga saaro, maxaa ku dhici guluubyada kale?
   x) Muxuu akhrin Ama sheegi karaa amitirka A_4?
4. Qeex caabiyada iskugu idhan taxanaha iyo barbarada Adigoo sawiraya Jaantuskooda
5. Maxaa ku dhici caabiga labada caabi marka ay isugu xidhan yihiin b) taxane t) Barbaro
6. Ku qeex awooda korontada Adigoo u qeexaya qulqul iyo foolteyj ahaan.



Jaantuska 3.30 Akhrina Ametirka ee mareegta taxanaha ah



Jaantuska 5.31 Akhrinta Amitirka mareegta barbarada ah.

5.6 Birlab - Danabow

Xidhiidhka isa soo jiidasho ee ka dhexeeya kornotada danabka iyo birlabta waxaa la yidhaa Birlab danabow qeytan waxaad ku baran doontaa saameynta ay ku leedahay Birlab – danabeedku qulqulka danabka iyo isticmaalkooda. Si kastaba ha abaatee waxaad u baahan tahay inaad nakhtiinto astaamihii birlab danabeedka.

Hawlgika 5.12

Kala dood su'aalahan saaxiibadaa (nakhtiin fiisigiskii fasalkaagii 7aad ee birlab danabeed)

1. Waa maxay badada birlab danabeedku? Sidee u muujin kartaa badada birlab danabeedka?
2. Sawir, qeexna xariiqyada badada birlab – danabeedka ee ku wareegsan gobolka birlabta ah.
3. Jiheeye waa maxay? Maxaa loo isticmaalaa?

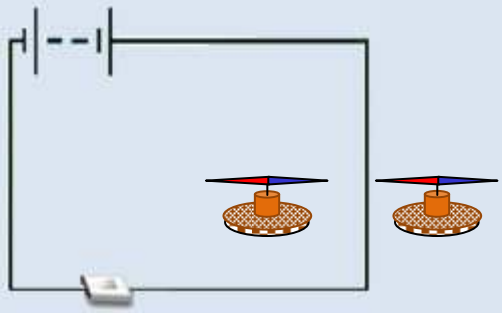
Saameynta Birlab – danabeedka ee qulqulka

Fisikiskii Fasalki 7aad waxaad ku soo Baratay in qulqulka danabku soo saari karo birlab – danabow. Jidka ugu fudud ee lagu tusi karo saameynta Birlab – danabeedku ku leedahay qulqulka danabku waa in la ag qabto ama dhigo jiheeye meel u dhow qulqulka xadhiga dabku sida. Qabo hawlgalka soo socda.

Hawlgalka 5.13 Indho indhaynta saamaynta ay birlab danabeedku ku leedahay qulqulka danabka

Qabo Hawlgal – gacan ka qabad ah, dabadeedna ka jawaab su'aalaha soo socda.

Qalabka loo baaha: **unug engegan, caabiye, jiheeye, xadhig – dheer oo isku xidha.**



Hamas Oersted

Jaantuska 5.32 Tijaabada isku xidhida mareegta oersteed

Jidadka la marayo:

1. **Isku – xidh caabiga, furaha iyo unuga engegan si taxane ah, sida jaantuuska 5.23**
2. **Xidh furaha ku hayna jiheeyaha xadhiga dabka hortiisa, Fiifri jihada uu u qalloocsamo jiheeyuhu**
3. **Dabadeed kala badal labada cidhif. Ee uu kaga xidhan yahay baytariga ayadoo aan laga dhaqaajinayn ama lagu xatidayo jiheeyaha xadhiga dabka hoostiisa. Fiiri jihada uu jiheeyuhu u qalloocsamo**
4. **Ku celi talaabooyinka (2) iyo (3) Adigoo dhigaya irbada jiheeyaha meel ka sareysa xadhiga dabkan**
   - **Maxay ku tustay fiir – firintaadii ama indha indhayntaadii?**
   - **Side ayey qulqulka danabku u saameysaa badada birlab – danabeedka ee ku wareegsan sida Jiheeyaha?**
   - **Miyaad ku gabagabeyn in badada Bir lab – danabeedku ay ku wareegsan tahay gudbiyaha qaada qulqulka?**

Hawlgalka 5.13 waxaad ku aragtay in irbada jiheeyuhu ay ka leexatay meesheedii hore marka qulqulka danabka ee dhexmaraya xadhiga – dabka la dul-dhigo ama la hoos dhigo jiheeyaha. Haddaba qulqulka danabku wuxuu soo saaraa badad birlab – danabeed. Raadkan ama saameyntan waxaa markii u horeysay daahfuray saynisyahan dhaj ah oo la odhan jiray Hamasoersted qulqulka danabka ee dhexmaraya Gudbiye wuxuu u yeelaa badad – Birlabdanabeed meelaha ku wareegsan dhacdadan waxaa la yidhaa raadka birlab danabeedka ee qulqulka danabka.

Su'aal furan

Miyaad sheegi kartaa waxayaalo kale oo raad ama saameyn ku leh qulqulka danabka?

Badada birlab danabeed ee ay sababto qulqulka toosan ee uu qaadayo xadhiga dabku

Qulquulka danabka ee dhexmaraya xadhig dheer oo toosan wuxuu soo saaraa xariiqo birlab – danabeed kuwaasoo kaga wareegsan sallaxyada xagasha quman ee xadhiga dabka.

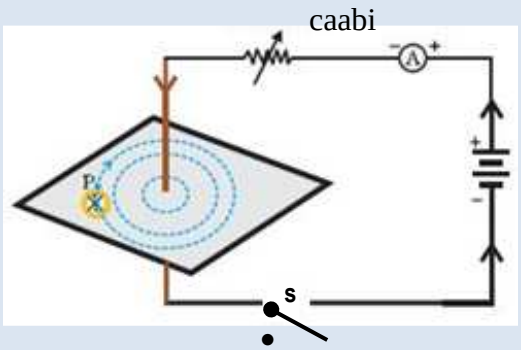
Hawlgika 5.14

Si loo fiiriyo jihada badada birlab danabeedka eek u wareegsan qulqulka danabka ee toosan ee uu qaado gudbi yuhu.

Qalabka loo baahan yahay: **unug engegan, xadhigga dabka oo toosan, caabiye, qurubyo xadiidah, fure ama dare damiye, irbada jiheeyaha iyo kartoon (wargad kartoon).**

Jidka la marayo:

1. ***ugu xidh xadhiga dabka si taxane ah caabiga, daare damiyaha iyo baytariga (dhagax) (sida aad ka muuqata jaanguska 5.33 kaga taagan xadhiga toosoan jihada ku qotonta.***



Jaantuska 5.33

2. **Dul – dhig warqada kartoonka ah xadhigga – dabka ee toosan dabadeed ku dhaji qotomaha.**
3. **Si fiican ugu daadi qurubyada xadiidka ah warqada kartoonka ah dusheeda. Fiirin siday isu habeeyaan ama u ururaan qurubyada xadiidka ahee warqada kartoonka dul yaala.**
4. **Ka dul-xaadh qurubyada xadiidka ah ee warqada kartoonka ah. Dabadeedna dul – dhig jiheeyaha warqada kartoonka ah. Si aayar ah dhaqaaji warqada kar toonka ah adigoo ku wareejinaya qulqulka xadhiga dabku sido.**
5. **Ku sawir jihada irbada jiheeyaha warqada kartoonka ah dusheeda. Jihada jiheeyuhu wuxuu inoo sheegaa ama inatusaa xariiqyaha badada birhab danabeedka ee ku wareegsan xadhiga dabka ee toosani qulqulka uu sido.**
6. **Isu – bedel xidhitaanka cidhifyada baytariga, dabadeedna ku celi talaabooyinka 4 iyo 5.**

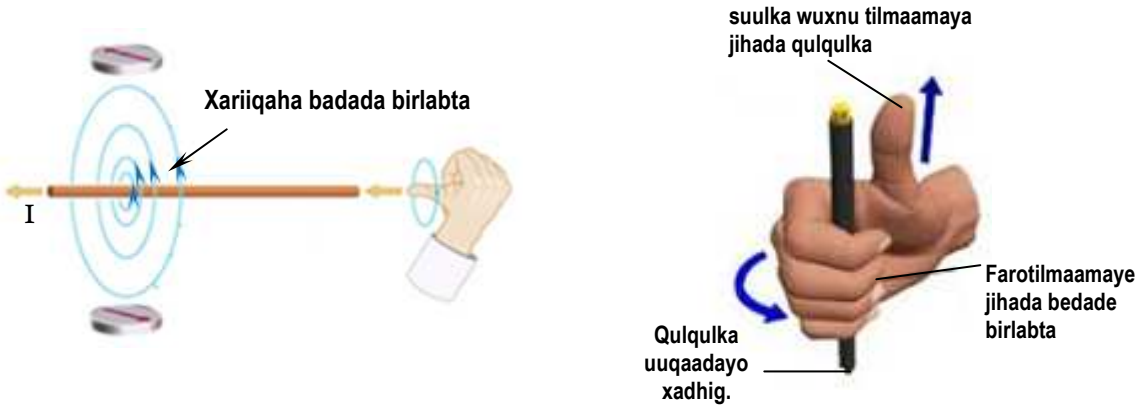
Hawlgalka 5.14 wuxuu ina tusayaa in xariiqyada badada birlab – danabeedka ee ku wareegsan qulqulka uu sido gudbiyaha toosani ay wareegsan yihiin.

Waxaa laga yaabaa in aad aragtay in jihada

Badada birlabta xariiqahoodu waxay kuxidhan yihiin jihada qulqulka.

Jihada xariiqaha badada birtabta ee qulqulka tooska, ah ee uu qaadayo gudbiyuhu waxaa sifudud loogu Muujin karaa isticmaalka, xeerka suulka midig xeerka suulka midi g ee qulqulka tooska ah ee uu qaado gudbiyuhu.

Wuxuu ururSadaa qulqulka uu qaadayo gudbiyuhu ee suulka gacanta midig wuxuu tilmaamay aa jihada qulqul. Farahaaguna waxay tilmaamayaan jihada xariiqaha taasoo badadu ay ku wareegsan yihiin xadh iga (sida ka mnnqadata jantnska 5.34)

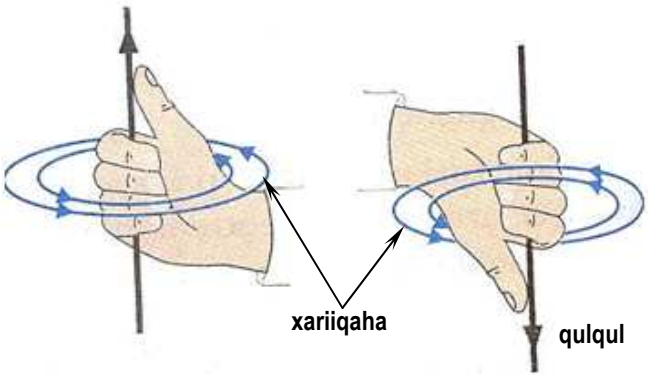


Jaantuska 5.34 Qaabka shaxanka in a tusaya xeerka suulka midig.

Adigoo isticmaalaya xeerkan waxaad raadinkartaa

1) Jihada bedada birlabta xariiqahaada, haddii jihada qulqlka la garanayo.
2) Jihada qulqulka, uu soo saaray jihada bedada birlabta xariiqaheeda lagaranayo.

Hada waxaad baadhi xadiga saameeya Laxaadka (xoojinta) bedada Bir labta, ee kuwareegsan qulqulka uu qaadayo gudbiynhu sida Hawlgalka 5.14 waxaad fiirinkartaa qeybta ama meesha ay cufnaanata qurubyada birtu kubadan tahay iyo firidhsanaan. Ma ogsoontahay qurbyada birtu ay kubadan yihiin meelaha xadhiqa udhaw. Taasina waxay in a tusaysaa in bedada birlabta ee udhowa xadhigu ay ka xoog badan tahay bededa birlabta ee ka fog xadhig (jaantuskda 5. 35)



Jaantnska 5.35 Jihada bedada birlabta xariqaheeda ku wareegsan xadhkaha toosan ee qaadaya qulqulka

Miyey xoojinta bedadu ku xadhantahay qulqulka haa way ku xidhantahay, haddii aad dib u firisid hawl galka 5.14 ee unugyada tirooyinka kala duwan. Unugyada tirada weyni waxay ku beegantahay qulqulka xoogan.

Ma ogsoontahay in cufnaanta qurubyade birlabtu ee qeyb gaar ah way korodhaa, marka uu qulqulku kordho.

Sidaas darted bedada birlabta ee qulqulkeedu xoogan yahay way ka xoog badan tahay ta qulqulka daciifka ah leh.

Laxaad bedada birlabta ee qulqulka uu qaadayo xaddigu waxay ku xidhan tahay

i) **Laxaadka qulqulka danabka**

ii) **Fogaanta uu u jiro xadhiga.**

Badada ku wareegsan xurbiyaha

Waa maxay xurbiyuhu? Xurbiyuhu waa xadhig duuban, oo leh tiro duuban waa weyn. Waxayna leeyihiin qaabab dhululubo ahaan sida ka muuqata jaantuska 5.36 b) iyo t).

Jaantuuska 5.36 Tuska i- xurbiye

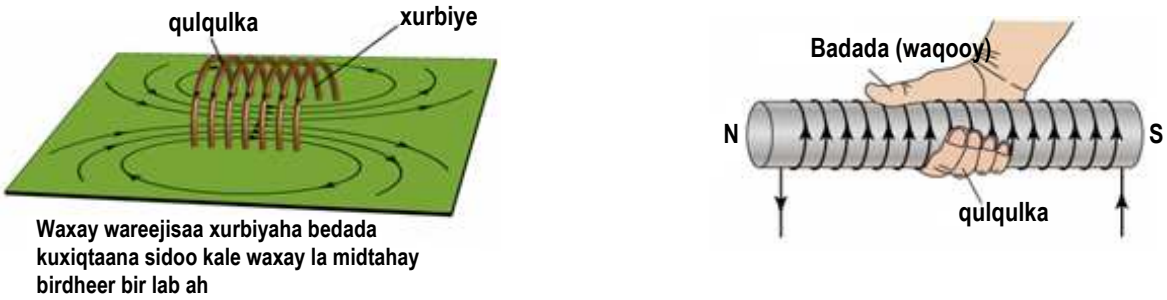
Xoojinta bedad bir lab danabeed qulqulka uu qaadayo xurbiyuhu waxay kuxidhan tahay

i) **Tirada duubabka**

ii) **Laxaadka qulqulka dhexmaraya xurbiyaha**

iii) **Nooca xudunta qalabka ku dhex jira xurbiyaha.**

Bedada birlabta ee gudaha xurbiyaha ay udhaw dahay iney iskumidnoqoto, laxaad badada birlabta ee kuwareegsan qulqulka uu qaadayo xurbiyuhu wuu kordhayaa marka ay xurbiyaha birxadiidahi badhtanka u taalo,



Jaantuska 5.37 Xariiqde badede birlabta ee xurbiyaha.

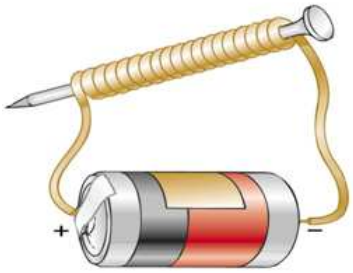
Sida ka muuqata jaantuska 5.37 badada birlab xariiqaha duub kasta oo xadhig ka midahi way iscaawiyaan, xurbiyaha dhexdiisa sidaas darteed. Bedada birlabta ee xur biyuhu way ka xoog badan tahay badada birlabta ee kabaxsanduubka.

Bedada birlabta ee xurbiyuhu way korodhaa marka tirada duubabku iyo qulqulka duubabku ay kordhaan. Waxaa intaa sii dheer badada bir labta ee xurbiyuhu way korodhaa marka bir xadiidka ah ladhexgalkiyo xurbiyaha.

Birlab danabow

Birlabdanabaw waa xurbiyaha birxadidka badhtankeeda, wuxuu na ka koobanyahay xadhig magudbiye, ah oo laga helo, wareega badhtan birta xadiidka ah. Duubku wuxuu yeelan karaa qaababkala duwan, waxay noqon karaan kuwo dhaadheer ama qaababka fardaha Ama musbaarka sida kamunqata jaantnska 5.38, ee ina tusaya birlabdanabaw ka samaysata musbaar bir, ah,

Birlab danabawgu wuxuu aad ugu fiican yahay kor u qaadida qalabka biraha ah marka qulqulka duubabka la xidho birta xadiid ka ah oo waxay lumisaa birlabnimadeedii.



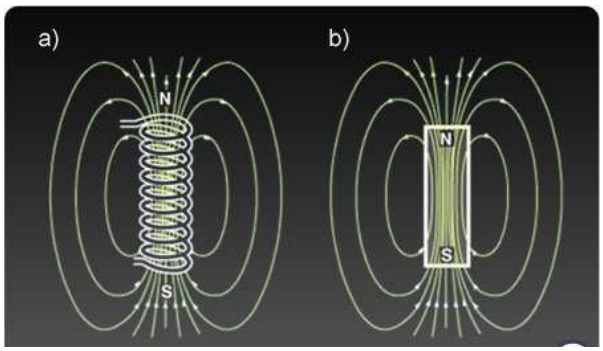
Jaantuska 5.38 Jebirlab danabow.

Bededa birlabta ee birlab danabawgu waxay ku xidhan tahay xadiyadan soo socda

- **Qulqulka dhexmaraya duubabka**
- **Tirada wareega duubabka**
- **Nooca birlab qalabka kudhexjira duubka.**

Raadi jihada bedada birlabta ee xariiqaha birlabdanabowga aad rabtid inaad sameysid. Xeerka suulka midig ee isku laabkastaa wuxuu isugu soo ururaa xurbiyaha ku dhexjira qacantaada midig ee barta fartaada ee kubeegan jihada qulqulka, markaan suulku waxuu tilmaamayaa jihada waqooyi ee birlab danabawga

Isu, ekaanshaha iyo kaladuwanaanshaha birlab danabawga iyo gobolada birlabta jaantuska 5.39



Jaantuska 5.39 Isu, ekaanshaha birlab danabnegi iyo gobolada birlabta

B. Isu, ekaanshaha udhexeeya. Birlab danabawga iyo gobalada birlabta

1. Labaduba waxay leeyihiin astaamaha birlabta.
2. Labaduba waxay leeyihiin bedad birlab oo ay xariiqahood isu, egyihiin,
3. Labaduba waxay leeyihiin, W – k cidhif
4. Labaduba way soojiitaan biraha.

T. Kala duwanaansha u dhexeeya birlab danabawga iyo gobolada birlabta

Birlabdanabawga	Gobolada Birlabta
- Birlab danabawgu waa ku meel gaadh. - Bedida xooqani way kordhi kartaa ama way yaraan kartaa - Lid ahaan tooda (iska soo horjeedkoo dun) wuu isbalalikaraa - Bedada birlabta mamuuqato marka la xidho qulqulka	- Birlabnimadoodu waa joogto - Bedada xoogani ismabadsho. - Lid ahaantooda (iske soohorjeedkoodu isma badalo.

Xagiijinta 5.6

1. Sharax qaabka bedada birlabta xariiqaha kuwareegsan, qulqulka toosan ee ay xadhkuhu qaadayaan.
2. Jaantuska 5.41 wuxuu ina tusayaa qulqulka dhexmaraya xadhig toosan hadaba waxaad sawirtaa bedada birlabta xariiqda kuwareeglsan.

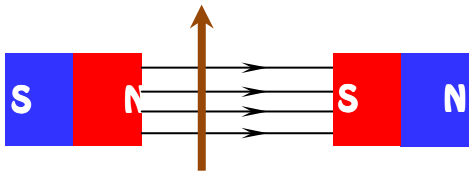
Jaantuska 5.41 Qulqul ku xoqida xariiq toosan

3. Waamaxay xurbiyuhu?
4. Sawir bededa birlabta, birlabta xariiqda kudhex jirta iyo qulqulka, ku, wareegsan ee uu qaadayo xurbiyuhu.
5. Qor xaddiyada ka dhigaya bilabdanabuwga mid xoogan.
6. Sawir bedada birlabta xariiqaha ku wareegsan ee gabalada birlabta iyo qulqulka uu qaadayo xurbiyuhn. Qeex, isu, ekaanshahooda iyo kala du wanaanshahooda.

5.7 Matoorka Danabka

matorka danabku waa qalabka wareega marka qulqulku ka gudbayo waxaana loo isticmaalaa in loogu badalo tamarta danabeed, tamarquud ama tamarsocod sidee buu u shaqeeyaa matoorka danabku? Waa maxay qodobada loo adeegsado?

Qulqulka uu qaadayo xadhiga ka baxsan bedada birlabta wuxuu leeyahay xoog. Jihada xooga birlabtuna ee xadhiguna waxay ku xidhantahay jihada qulqulka xadhiga iyo jihada bedada birlabta xariiqahooda.



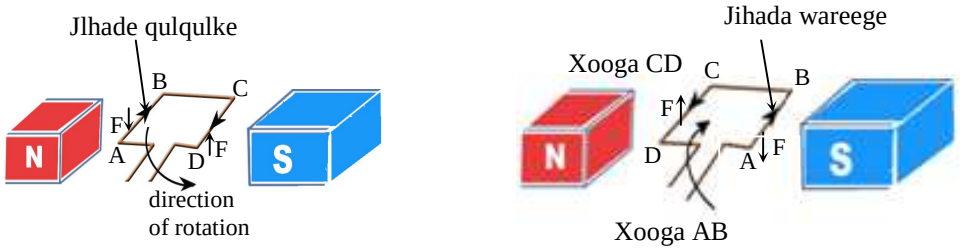
Jaantuska 5.41 Qulqulka uu qaadayo xadhig Ka gudbayo badade bir labtau

Waxaan isticmaalaa xeerka suulka midta si aan ugu cadeyno jihada xooga ku tilmaan suulka gacan taada midig jihada qulqulke, Farahaaga intahadheyna kutilmaan jihada bedada Birlabta markaana baa bacada gacantaadu waxay tilmaamaysaa jihada xooga

Jaan tuska 5.42 wuxuu muujinayaa xooga loo adeegsaday qulqulka uu qaadayo xadhiga ku dhexjira bedada birlabta. Fiisigiski fasalkii 7aad waxaad ku soo barateen in xooga loo adeegsado walaxda wuxuu soo saara saameyn wareeg oo loo yaqaano xooga maroojinta.

Sidaas dartaad xooga maroojintu wuxuu u sameysmaan jihooyin lid isku ah. Taas oo sababta waxlaxdu inay ku wareegto agagaarka dhidibka.

Qodob kana waxaa loo is ticmaalaa qodobada shaqada ee matoorka danabka.



b) xooga AB wuxuu ujeedea hoose xooga CD wuxuu ujeedee ko

t) xooga CD wuxuu ujeedea kor, xooga AB wuxuu ujeedaa hoos.

Jaantuska 5.43 Wareega duubabka bedade birlabta

Matoorka danabku wuxuu ka kooban yahay birlab xoogan oo joogto ah, iyo duubab xadhko siman wareega duubabkuna waxay u fududu yahay xeerarka xooga maroojinta sida tusaalaha kor ku qoran. Xeerarkuna waa laba xoog ee lidka isku ee kufalmaya xarigimaha lidka, isku ah qulqulka siman ee ay qaadayaa duubku markaa, duubku wuxuu ku wareegayaa dhidibka xoogagu waxay ku qotomaan salaxa xariiji bal fiiri duubka laydi ahaaneed ee ka muuqda (jaantuska 5.43b)

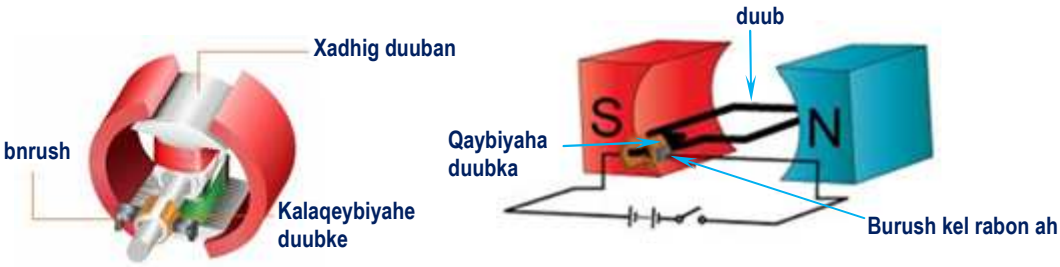
Xariijimaha $\overline{AB}$ iyo $\overline{CD}$ waxay ku qotomaan xariiqaha birlabta xooga. Gudbiyaha wuxuu ahaanayaa mid kuqotonma bedada birlabta eeleh xooga (marka gulgulka socodo), jihada xooguna waxay kuxidhantahay jihada qulgulka

Sidaas darteed, xoogag lid isku ah ay aa ku falmaya labada xariijimood. Tanina waxay sababtaa wareega duubka; kadib wareeg badhka (Jaantuska 5.43t) xoog xariijin kasta wali wuxuu lamidyahay kii hore. Laakin meelihiixariijimuhu way isbadaleen sidaas darteed jihada wareegu way isrogtey.

Qeybaha ugu muhiimsan ee matoorka danabku waa: burushka duubka qeybiyaha beda'da birlabta, iyo xadhiga duuban.

Wareega uu matoorku u wareego haljiho. Waxaa loo adeegsadaa burushke duubka qeybiyaha. Burushka duubka qaybiyuhu waa lammaha kala badh ka duubabka, oo uu magudbiyuhu kala soocan yahay.

Cidhifyada duub ka dhexwareegaya duubab ke qeybiyaha. Cidhif kamida waxaa lagu xidhay baytari hal dub qeybiye. Cidhifka kalena waa duubka qeybiyaha labaad, halkana waxaah ka ogaaneynaa qulqulka danab ee xariijin kastaa inuu iskala badalayo kadib wareeg badh. Tan waxaa sababa wareega duubka ee hal jiho. Kana waxaan kumnnjiney naa Jaantuska 5.44 waa kuwee qeybaha uqn muhiinlsan matoorka danabku? Magacaw adigoo isticmaalaya (Jaantuska 5.44).



Jaantuska 5.44 Shaxanke matoorke denabka

Si aan u kordhino xawaaraha matoorkadanabka waxaan sameynay midke mida ku wan sosocda.

1. **Duub, duubke bir badhtan ee fudud.** Birta Badhtankeedu waa xadhig duuban. Tani waxay kordhisaa xooginta bedada birlab
2. **Kordhi tirada wareega duubka.** Duleeli birta badhtanka oo kuduub wareegyo badan duleelada, tanina waxay kaa caawineysaa simida wareegya
3. **Isticmaal biralbdanabow, halka aad ka isticmaali lahayd birlab joogto ah**

Xageed ka heli kartaa matoor danab oo la isticmaalayo? Waxaan ka heli karaa waxay aabah aan u isticmaalo nolol maal meedkeedna sida CD, qalabyada lagu heeso, makinada tilmaha, mishiinka qoditaanka (riigal, marawaxada, baabuurta I.W.M.

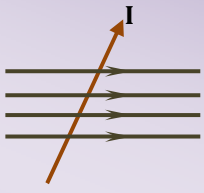
Mashruuc shaqo

Sameeya matoor danab oo fudud adiga iyo saaxiibadaa.

Matoorka danabku waa qalab u badala tamarta danab tamar socod. Waxaa jira qalabyo kale oo ku sheqee yo saameynta birlabta ee qulqulka danabka. Kuwaasha waxaa ka mid kuwalagu cabbiro danab sida;- fooltimirka, ammeterka, oommitir ka qalfanameterke I.W.M.

Xajiijinta5.7

1. Sheeg jihada xooga qulqulka uu qaadayo badada birlabtu sida ka muqada jan 5.45
2. Sawir shaxanka matoorka danabka oo ku qor qeybihiisa.
3. Sheeg qaarkamida caabiye danabeed kaas oo ay leeyihiin matoorka danabku



Jaantuska 5.44 Beele de birlabte

5.8 Soo Saarida Birlab danabawga

Qeybihii hore waxaad ku soo baratey in qulqulka danabka ee qudbiyuhu soo saaro bedadbirlabeed? Waa, sidee rogaalkeeduna? Miyey badada birlabtu soo saartaa qulquldanab?

Hawlgalka 5.15

Fiiri xariiqaha birlab ee xooga kala jaraya gudbiyaha, oo soosaaraya qulqulka danabke ee dhexmaraya qudbiyaha.

Qalabka loo baahayahay: **Qalab cabbirka danab ka eeg ka aad udeg – dega badan ll loo yaqaanogalfanamitir, xadhko qudiyeyaalah iyo birlab qaab keeduyahay (u)**

Habka laraacayo

1. **Ku xidh cidhifyada gudbiyaha, cidhifyada galfonamitir, qalfanomitirku waa qalab aad udareen badan oo ah qolab danabeed loo isticmaalo in lagu cabbiro, qulqulka danabka joogtada ah.**
2. **Birlabtan dhaqaaji hoos oo fiiri jihada qalfanometer, uu u leexdo. Muxuu leexadku ina tusayaa?**
3. **Udhaqaajikor birlabta oo fiiri jihada leexadka galfanoomitirka.**
   - **Maxaad ka ogaatey leexashada**
4. **Hada birlabta udhaqaaji, sijiifah adigoo ilaalinaya xadhig udhexeeya cidhifyada.**
   - **Miyuu jiraa waxa leexasho ah barta galfanomitir? Sabab?**

Hawlgalka kor ku xusan, tallabad 2, marka birlabta loo dhaqaajiyo hoos, galfanamitir, wuu leexdaa. Leexsankani wuxuu inatusayaa qul qulka uu abuurayo gudbiyuhu taalaabade 3. Marka birlabta loo dha qaajiyo kor, qalanomitir ku wuxuu uleexdaa lidka jihadii hore leexadkeedii. Marka ay birlabtu tahay midjiif udhaqaaqda, majiro leexad. Waxaad ogsoontahay inay lamid tahay marka aad dhaqaajisid qudbiyaha bededa birlabta.

La soco Hawlgalka ku xiga.

Halkaadka isticmaaleysid birlaba qaabka (u) waxaad isticmaalikartaa la ba gabal oo birlabah, ilaali cidhifyada lidka isku ah ee birlabaha isku xidhan. Ku xidha cidhifyada xadhiga toosan iyo cidhifyada eberka ee galfanomitir, dhaqaaji xadhiga kor, hoos, iyo jiifba into udhaxaysa cidhifyada, kala, ku xawaaraha sacodka xadhiga, markasta fiiri leexsan ee galfanomitir.

Haddisocodka gudbiyuhn bar – baro la yahay xariiqaha birlabnimade majirto wax saameyn ah oo aad arkeysda. Hawlgalkan waxaad ku arkeysaa

1. Inuuna jirin leexasho marka xadhiga loodhaqaajiyo si barbaro lahah xariiqaha badada birlabta
2. Leexashadu waxay badalaysaa jihada marka xadhiga loo dhaqaajiyo kor iyo hoos.
3. Qulqulka uu soo saarayaa waa midxoogan marka qudbiyuhu u dhaqaaqo si xawliya

Waxaadku arkeysaa asaameyn iskumida, marka aad dhaqaajsid babadada birlabta ah ee u dhaxaysa xurbiyaha. Guud ahaan qulqulka waxaa soo saara gudbiyaha markasta oo laka jaro gudubka xariiqaha xooga.

Hadaba xaalada sidan oo kale ah ayaa looyaqaan:- dhalinta birlab danabowga.

Ninka layidhaahdo (micheel faraday ayaa ah saynisyahan kii ugu horeeyey ee caddeeyey dhalinta qulqulka danab, ee ka sameysan birlab).

Jaantuska 5.15 ayaa loo yaqaanaa tigaabadin Michael Faraday

Soo saarid birla baana bawga **Waa habka lagu soosaaro xooga muujiya danab duubka isagoo udhaqaaqaya si xedhiidh la'ah birlabra qulqulka danab ay soo saarayaan duubabku ay aa loo yaqaa:- xoo saarida qulqulka iyo xooga mootiya danabka.**

Habka soo saarida birlab danabawga tamarta guud ayaa waxay isubadashaa tamar danabeed. Hawsha guud ee ay qaban ayaa waa dhaqaajinta duubka ama birlabta xidhiidka la leh midkala taas oo soo saarta qulqulka wareega.

Jihada qulqulka la soo saarey way isbada shaa marka ay is badasho badada birlabtu

Xaqiijinta 5.8

1. **Qeex weedhehan b) soo saarida birlabdanabeed ka**
   t) soosaared qulqulka
2. **Qeex wareega korantada ee dhaqaafa birlab ee xadhiga duubka xurbiyaha**

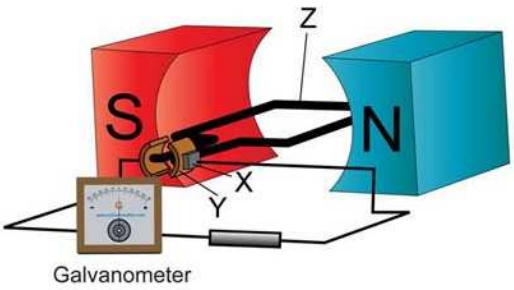
5.9 Mishiin

Qeybihii hore waxaad ku soo baratay qulqulka iney soo saaraa aaraan duubabka dhaqaaqaya ee bedada birlabta, xoojin soo saarid qulqulka waa daciif marka uu duubku kaliyahay. Nololmaalmeedkeena wareegyo badan oo duubi leydiyeed ah ay aan istic maalaa duubab. Intaa waxaa sii dheer wareegyada waxaa soosaara xadhig kaliya oo laga duleeliya badhtan birlabta.

Xadhiga duubitaan wuxuu ku wareegsan yahay badhtan birlabta ayaa loo yaqaanaa duubkawareega.

Birta weyn eeduubani waxay iskuxidhaa wareega duubabka iyo ilaha tamarta quud. Marka duubabka wareegayaan waxay dhex wareegaan badada birta, taasina waxa ay keentaan in wareegu sooasaaro qulqul. Qalabka noocan ah waxaa loo yaqaa mishiin.

Mishiin waa qalab loo isticmaalo in looqu badalo tamarta quud tamar danabeed, waxaana lagu sameeyaa adeegsiga xeerka soo saarid birlab danabawga



X = Burush
Y = kala qeybiyaha duubka
Z = duubka wareega

Jaantuska 5.46 Qaabka mishiinka

Marka uu duubkaxadhigu ku dhexwareego bedada birlabta ama marka birlabtu ku wareegto agagaarka duubka aan dhaqaaqeyn qulqulka waxaa soo saaraya duubka. Qulqulka danabka ee duubkana waxaa qeybiyaha mareegta dibada eh waxayna kuqeybisaa qeybiyaha duubabka iyo burushka. Qeybiyaha duubabka waxaa si, adag loogu duubay duubka, waana lagu wareejiyey, qeybiyaha duubabka iyo mareegta dibada ah waxaa isku xidha burushyada. Qeybaha ugu muhiimsan ee mishiinkuna waa:- wareega duubka, burushyada, qeybiyeyaasha. Duubabka iyo bedada birlabta.

- Wareega duubku wuxuu ku wareegsan yahay xudunta birta xadiidka ah
- Qeybiyaasha duubabkuna:- waa duubab bir, ah oo loo kala jabiyey labaqeybood. Waxayna ku xidhan wareega duubka.
- Bnrushyada qotimo kaarboon, ah oo loo isticmaalo in lagu xidho mareegta dibada ah ee wareega duubka.

Marka duubku sameeyo wareeg badhi ihada qulqulku way isbadashaa qulqulka wuxuu ka bedelaa jlhadiisa wakati loo yaqaano qulqulka talantaaliya ah (AC) mishiin wuxuu soo saaraa qulqul talantaali ah oo loo yaqaano mishiinka AC.

Qulqulka aan badalin wakhti jihadiisa ayaa loo yaqaanaa qulqulke tooska ay (DC). Tusaale ahaan unuga engagan iyo baytariga baabuurtnba waa ilaha qulqulka tooska ah.

Daynabada baaskiilku waa matoor danabeed kaas oo soo saara qulqul toos ah (DC). Marka ay wareegaan taayirada baaskilku, xaaladana matoorka danabku wuxuu matalayaa mishiin D.C ah.

Xaqiijinta 5.9

1. **Waa maxay mishiinku?**
2. **Sawir mishiin AC oo ku qor qeybihiisa .**
3. **Sharax Faraqa udhexeeya qulqulada AC iyo DC.**

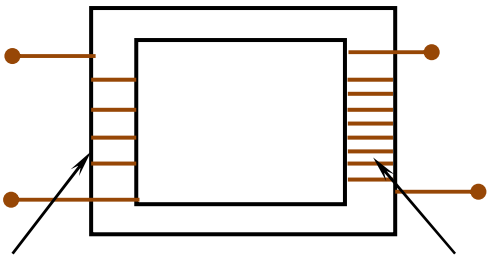
5.10 Badalaha (Transformer)

Badaluhu waa qalabka bedala tamarta danabad isagoo ka badalaya mareeg una badaleya Mareeg kale iyadoo laraacaya habka soo saarida birlabdanabawga. Iyadoo loo isticmaalaya qulqulka talantaaliga ah, qulqulka tooska ah oo kaliya loona isticmaali karo.

Badaluhu waa qalabka badala tamardanabeed ee hal mareega illaa mareegkale iyadoola adeegsanayo habka soo saarid birlabdanabawga, sidoo kale waxaa loo adeegsan qulqulke talantaaliga ah (AC) kaliya. Laakin loo adeegsan maayo qulqulka tooska ah (DC).

Badaluhu wuxuu ka kooban yahay laba duub, kuwaasoo laga helo Badhtanka birlabta labada duub ee xadhiga waxaa layidhaa (duubka hore iyo duubka daa nbe) marka qulqulka talantaaliga ah uu ka

gudbayo duubka hore, waxay badasha badeda birlabdanabeedka waxaana kor ukaca soo saaritaanka qulqulka talantaaliga ah ee duubka danbe



Jaantuska 5.46 Calaamada bedelaha

Jaantuska 5.47 Badalaha

Badalaha, duubka danbe ayaa ka wareeg badan duubka wareega hore waxaana loo yaqaa xoojinta badelaha. Marka badalaha la xoojiyo wuxuu badalayaa ama koor uqaada tamarkeyd isdheerida waxaaana badalaya tirada duubabka danbe iyago kabadalaya tirada tubabka hore, ($N_s > N_p$).

Badalaha duubka dhanbe wuu wareeg yarhay marka ladhimo tirada duubabka, waxaa loo yaqaanaa yaraynta badalaha.

Hadaba yareynta badaluhu waxaybadashaa tamarkeyd isdheerida wayna yareysaa waxay leedahay tirada duubka hore ayaa ka badan tirada duubka darba. ($N_P > N_S$).

Awooda danabka ee bedaluhu waa iskumid duubka hore iyo duubka danbaba awood danabka ee duubka hore.

Waa $Pp = I_P V_P$.

Awooda danabka ee duubka danbe waa

$P_s = I_s V_s$

Maadaama awooda I_1 V_1 ee usocdo xaga badalaha waa iney lamidnoqotaa. Awooda $I_2 V_2$ ee ka soo baxaysa I_1 iyo I_2 ee duubka hore iyo duubka danbe sidey u kale horeeyaan

Saamiga duubabkuna waa sidan

$$\frac{\text{Tamar keydisdheerida duub kahore}}{\text{Tamar keydisdheerida duubka danbe}} = \frac{\text{wereeg d.hore}}{\text{wareega d.danbe}}$$

$$\Rightarrow \frac{V_1}{V_2} = \frac{N_1}{N_2} = \frac{I_2}{I_1}$$

Tusaalayaal

1. Badale ayaa duubka wareega danbe leeyahay tamarkeyd isdheeri dhan 600volt; sidoo kale tamar keyd isdheerida wareega duubka horena tahay 120volt, Haddii tirada wareega duubka hore tahay 800, waa imisa tirada wareega duubka danbe?

Siin	weydiih	Furfuris
$V_1 = 120\ V$	$N_2 = ?$	$\frac{V_1}{V_2} = \frac{N_1}{N_2}$
$V_2 = 600\ V$		$\frac{120\ V}{600\ V} = \frac{800}{N_2} \Rightarrow 800 \times 5 =$
$N_1 = 800$		$\Rightarrow$ tirade w, drdanbe = 4,000

Isticmalka Badalaha

Awooda danabka waxay ku gudubtaa xariiqyo oo loo isticmaalo Badalahafor in uu kordhiyo ama uu yareeyo mishiinku awooda danabka, waxaad si sax ah ugaraneysaa inta Bedele ee taala gurigiina. Mobayl jaar jin waa badale, wuxuna ku shaqeeyaa tamar dhan 9v, wuxuuna badelaa 240v. oo inta ugu muhiimsani ay tahay 9V. waxaa ka loo kamida badalayaasha kombuyuutarka, raadiyawga I.W.M.

Taransformarku wuxu door muhim ah ka ciyaaraa qudbinta (qeybiyaa) tamarta koronta wuxuuna qeybiyaa meelo fagfag oo wadarka kamida. Tana waxaa sameya. Tamar weyn oo xariiquhu qaadayaa qulqul ayar, si uu u yareeyo tamar luminta ay sababayso kuleylin xariiquhu kululaadaan.

xaqiijin 5.10

1. **Waa maxay badalaha gudbiye?**
2. **Sheeg laba nooc oo taransformaro ah oo sharax waxqabadkiisa midkastoo kamid ah.**
3. **Sawir, taransformar (Gudbiye) , oo kuqor qeybihiisa**
4. **Sheeg qaar kamida qalabka elektaroonikada eeleh taransformarka?**

5.11 Awooda Gudbinta

Itoobiya waxay isticmaashaa awooda korontada ee biyuhu dhaliyaan waxaana loo isticmaalo waa caasimadaha laydhadh wadooyinka, warshadaha guryaha iyo waxyaabo kale masheegi kartaa quwad koronto oo laga helo deegaankeena? Magaaladeebayse tamarta siisaaa?

Meelaha ugu muhiimsan ee awooda korontada ka helo waxaan ku arki doonaa shaxda 5.3.

Hawlgalka 5.17 Fiirin (Indho - indhayn)

Booqo xarunta korontada ee kugu dhaw.

1. **Caddee tamarkeyd isdheerida kor uqaadida iyo tamarkeydisdheerida yaraaneysa ee habka gudbinta.**
2. **Waa maxay ujeedada yaraynta tamar keydisdheeridu**

Hadaba aynu fiirino sida ay tamarta danabku uga gudubto xarunta awood korontada oo ayugusoo gudubto guryaheena ay soo qaadano xaruta awood korontada ee koke waxay soo saartaa tamar dhan

25kv, tamartana waxaa lagu kordhiyaa Taraansformerka, waxayna noqotaa 270kv am 400kv: oo meelayaw kala duwan.

Tamar keyd isdheerid badan waxaa lagu yareeyae lumida tamarta danab maadeema oo ay soconeyso fogaan badan. Markay gaadho magaalo 400kv.

Waxaa lagu yareeyaa badalaha (taransfor). Waxayna nogotaa 11kv oo warshada loo isticmaalo guryaha, isguulka, tukaanada, waxaa loo isticmaalaa 240v. (Jaantuska 5.48). muujinta awooda korontada ee aah ka helo xarumaha kala duwan.

Jaantuska 5.48 Xariiqaha gudbinta

Guriga waxaaloo isticmaaka 240 v, waxaase ugu sii fiican in loo yareeyo ilaa gv

Shaxde 5.3

Magaca xarunta Awooda korontada	Meesha lagahelo
1. Meelkaawakana	Kilika oromada
2. Koka	Kililka oromada
3. Finjaa	Kililka oromada
4. Tekeze	Kililka tigreygaa
5. Tanabels	Kililka axmaarada
6. Tise abal	Kilillka Axmaarada
7. Gelgel glibe I	Kililka oramada
8. Gelgel glibe II	Kililka shucuubta koofureed.

Xaqiiji 5.11

1. Waa maxay shaqada taransformerku
2. Sawir calaamada taransforka?
3. Maxaa tamar keyd is dheerida sare loogn isticmaal koronta?

Xeerarka badbaadada korontada (electrical safety rules

Korontadu khatar ay ku tahay biniaadamka haddii aan la ilaalin khatarteeda. Hadda waxaad ubaahan tahay inaad baratid xeerarka badbaadada korontada si, aad uga badbaadisid naftaada iyo dadkaleba khatarta koronta. Hadaba halka waxaad ku baran waxyaaba loo baahan inaadka taxadartid waxaana kamid:-

1. Xadhkaha korontada
   - Waligaa xadhig diiran haku dhufan shay
   - Usheeg waalidka macalinka haddii aad aragtid xadhig go, an silo hagaajiyo
   - Hataabanin xadhkaha korontada kuwo diiran iyo kuwo aan diirnaynba ilaa aad weydiisid waalidka Ama macalinkaaga
   - Kafogee wax dableh xadhka korontada.
2. Biyaha
   - Ka fogee biyaha dhamaan caabiyada korontada
   - Ha taaban caabiyad korontada meelahe banaan eekorontaele sida daaraa demiyaha garahaaga oo qoyan.
   - Haku dabaala biyo danabeysan
3. Meelaha banaan eekorontada iyo soo keetke:-
   - Fartaada hataab siin meelaha bamaan eekorontada iyo sookeedada
   - Marka aad guluub badalisay korontade iska bakhtii
4. Xadhkaha gudbiyahe danable
   - Xadkaha gudbiya laydhku hadiiaad taabatid wuxuu sababaa dhaawac ama dhimasho sidaas daraadeed.
   - Dhamaan waxyaalabaha lagaga taxa dari karo, ama laga hortag karodhacdoo yin waa in la sameeyaa:-
   - Dadka loo soo tababaray oo kaliya waa iney hagaa jiyaan xadhkaha laydh.
   - Xadhiga xadhigainsifican loo hagaajiyo ama labadalo.
   - Xadhiga hahagaajin ilaa aadka bahtii so saa cado laydhka.
   - Mareeg kasta waa iney leedahay fuynus leeg cabbirkeeda.
   - Fuyuusku wuxuu kadifaacaa qalabka mareegta iney dhaawacanto.
   - Ha ku dulunduulin meelkudhaw xadhkaha laydhka.
   - Ha fuulin tiirarka leydh ka
   - Ha tagin aqalka isa oo uu shidanyah ay qalab electaroonikada ahisida qasaalade TV.Ge, kaawiyade, talaagad I.W.M.
   - Xadhka laydhku way kululaadaan marka qulqulku dhexmarayo, haddii wax kululeyliyaa ku dhaco, ama dabqabsado Haddii laydh badani ku soo dhaco ama aymareegta danabku yaraato, xadhkaha laydhku kululaadaan.

Soo koobbidda Cutubka

Cutubka waxaad ku soo baratay

- Mareegta danabku waa shaxan dhemaystirah tiran oo uu qulqulke danabku dhexmaro. Waxay na ka koo bantahay waxyaabo kaladuwan sida, laha tamar isdheerida, daaraadamiye, xadhkahe danabka iyo guluub.
- Qaabka guluubke leydh iyo waxqabadka fiyuuska wuxuuke dhigaa mareegtamid furan ama aandhamays tirayn wakhtige uu qulqul badani dhexmarayo.
- Qululka danabku waa saamigaqulqulke eekagadbaya dedka qeybata gudubka ee qudbiyahe
- Qulqul ka danabko waa socodke electroonikada nadu ayke socodneyaa cidhifka taban una soconayaa cidhifka toga nee ilaha danab.
- Habka wareeg qulqulkuwaa aragti odhaneysa qulqulku wuxun usocdaa dhinala lidka ku ah dhinaca ay ay elektaroonada qulqul jiraan.
- Tamar ta waxaa lagu cabbiraa iney tahay kar tida hawsha laguqabanayo. Xeerka ohm wuxuuqeexay aa xidhiidhke udhexeeya qulqulke iyo tamar keyd isdheerida waxuunna uqeexayaa sidan, “Qulqulke dhaxmaraya qudbiye bir, ah ee heerkul kiisuna joogtade yahay wuxuu saamigal toosah ku yahay tamar keyd isdheerida udhexaysa laba cidhif.
- Cabbirida qulqlka danabka, tamarkeyd isdheerida, iyo caabiga ee mareesta lagu siiyey.
- Qulqulka danabka ee dhex maraya gudbiye wuxuu soo saaraa bedade birlab danabeeda ee kuwareegsan.
- Qulqulke uu qaadayo xadhigu ee kabaxsan bedad birlabdanabeed ka wuxuu leeyahay xoog.
- Matoorka korontadu waa qalabka tamar danabeedka ubadala tamar quud. Ama tamar socod.
- Soo saarid birlab danabawgu waa habka soosaarida xooga mootiye danabka ee duubke isaga oo udheqaaqaye dhinaca birlabta. Mishiin waa qalabka loo isticaamalo inuu badelo tamar taguud. Tamar danabeed, iyadoo la isticmaa laya xeerrka soo saarida birlabdanabawga.
- Tarans former ka waa qalab loo istic maalo inuu tamar danabeed uu kabadalo halmareeg oo uu badalo walaxkale, iyada oo la, adeegsanayo habka soosaarida birlab danabawga. Taransformerku waa laba nooc ookalaah kordhiye iyo yareeye.
- Ilaha uguwaaweyn ee tamarta danabeedku waa awood dhalinta danab ka, waa xarumaha awooda dhalin ee danabku Waxay tamarka keydsan eebiyaha soo dhacaya u badelaan tamar danabeed.

Nakhtiinka su, aalaha iyo masalooyinka

I. Kuqor “Run” ama “been” suaalaha soosocd

1. Qulqulka dhexmaraya laba caabi ee qeybaha taxanaha ah _____.
2. Wadarka tamar keyd isdheerid ee kagudbeysa caabi kastaa waxay lamid tahay tamar keyd isdheerida ilaha.
3. Qulqulka dhexmaraya labacaabi oo iskumidah oobarbaro ah wxuu lamid yahay wadarta qulqulka.
4. Laba caabi oo barbaro ah tamarkeyd isdheerida kagudbay saa caabikasta waxay lamid tahay tamar keydis dheerida ilaha tamarta
5. Hadddii laba caabi aybar baroyihiin markaa rogaalka caabiga saafiga ahi waa wadar taa rogaalka labada caabi.
6. Qulqul wuxuu soo saara bededa birlabadanabeed.
7. Qulqulka uu qaadayo gudbiyuhu malaha loog marka uu kabaxsanyahay badada birla beedka.
8. Matoorka danab wuxuu tamarta danabeed ubadalaa tamar socod.
9. Bededabir dabdanabeedka ku dhexjira birlab danabawgu saameyn kuma laha Tirada wareega duubabka.
10. Taransformerku wuxuu tamarta ka badelaa walax wuxuuna ubadelaa walax kale.

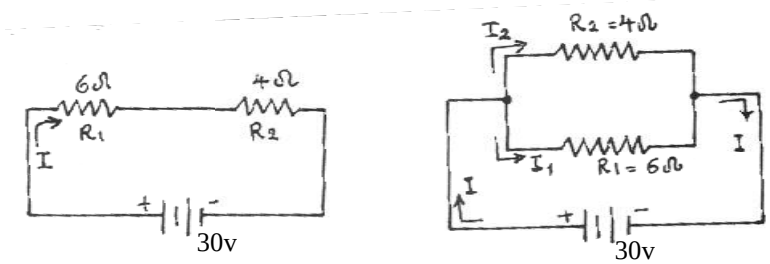
II. Ka dooro jahaabta sax de ah

1. Laba xoog oo lid iskuah oo lagufaley qotonka dhidibka waxay sababaan
   b. dibama hore socod j. Socod soodhicitaah
   t. Wareeg x. majiro socod (negi).
2. Qeybta matoorka danabka ee kalabadasha qulqulka xariiji mahe danabku waa
   b. Ambeer t. (kalaqeybiyahe wareega) j. Burushyo x. Baytari
3. Qulqulka uu gaadaya qudbiyuhu wuxuu _____ (bar – baro/qoton) xariiqahe birlab danebeed kan waxay leeyihiin xoogaga.
4. Keelibmarka uu mateerku wareego qoobo badhkeed isagoon lahay kele qeybiyihii duubku wuxuu uwareg (xaga hor/xagadan be
5. Matoorka danabku wuxuu badadaa (danabeed (guud) tamarta wuxuuna ubadalaa (danabeed /guud) tamar.

IV. Fur – Fur masalooyinka soosocdn

1. Qulquldhan 15A ayaadhex maraya qudbiye amindhah 1 saac. Hadaba waaintee xadiga uu danab ku kudhex marayo wakatiga ama imisa elektaroon baa ka gud bayo?
2. Laba caabiooah 40Ω midkaste waxaa loo xidhay sitaxane ah waxaa qudbayo tamar dhan 120v
   b) Waa imisa wadar ta caabiyada ee mareeg tu?
   t) Waa intee qulqulka dhexmaraya mareegtu
   J) Waa imise tamar keydisdheerida ka gudbaysa caabikasta.

3. **Quluubdhan 75Ω iyo kuleyliye dhan 150Ω ayaa la isugu xidhay si bar – baro ah iya da oo ay ka gudbayso 150V oo tamar keyd isdheeriah**
   b) Waa kuwee caabiyada iskudhiga ee laba walxood.
   t) Raadi qulqulk dhex maraya labada walxoodba
   J) Waa imisa qulqulka dhexmaraye mareegta gudaha ah?
   x) Isbarbardhig wadar ta qulqulade dhexmaraya gulubka iyo kuleyliyah wader ahaanba
4. **Xisaabi wadarta caabiyada iyo qulqulka dhexmaraya caabikasta**



Jaantuska e 5.49

(a) **(b)**

V. Kajawaab su, aalahan soosocda

1. Waa maxay isticmaal ka magudbiyaha udhexeey kalaqeybinta duubabka?
2. Waa maxay ujeedada loo duubo duubabka badan ee xadhkaha?
3. Adiga oo isticmaalaya shaxah sidee buu matoorka danabku ushaqeeyaa? Sharaxaad kabixi.
4. Sheeg oo caddee saamigal gacanta midi gee qulqul ka mu qaadayo xadhigueebadede birlabdanabeedku ku dhexjira.
5. Sharax tijaabadii faraday adigoo isticmaalaya duubka iyo birlab?
6. Sheeg soo saarid bir lab danabawga
7. Maxaa loogajeedaa birlab kor dhiyo taransformer ama dhiyo taransformer ama in layareeyo Badalaha
8. Waa maxay fuyuusku? Muxuuse qabtaa

Cutubka 6aad

ILAYSKA

Natiijooyinka cutubka: markau dhamaado cutubkani waxaad awoodi doontaa in aad

- ✓ Fahamtid fikiradaha la xidhidha ilayska.
- ✓ Waxad kor uqaadi (xirfadahaaga) kusaabsan masalooyinka la xidhidha ilayska
- ✓ Ku dhiiranaashaha xidhiidhka ka dhexeeya dhdhamaan wal xaha
- ✓ In aad isticmaashid waxa kasta oo aad ku kordhin karayso oo suurtogalah aqoontaada fisigiska

6.1 Waa Maxay Ilaysku?

Hawlgalka 6.1

- Qeex waa maxag ilays? Xubnaha dareenka tee baad u isticmaashaa ilayska.
- Cadee ilaha kala duwan ee ilayska
- Sidee buu Ilaysku u socodaa isha illayska illaa indhahaaga?

Inagu markeynu socono meel (madaw) mugdi ah waxba inaga dambeeya sabatu waa ma'arkeyno waxa inagu xeersan. Waxa ugu weyn qaybtaa maxaan ka ognahay caalamka ingu xeersan inaga natijadu waa araga. Ilagysku waxa u inoo sameeyaa in aan wax inagu xeersan aragno ayna inoosoo saarayaan dareenkeenu. Iftika ku dhacay indhaha iyo maskaxda Jan 6.1 ilaysku waxuu inaga caawiyaa aragtida waxa inagu xeeran.

Jaantuska 6.1 Jlays kainaga caawinaga argtida waxa inagu xeersan.

Laan kamidah laamaha Fisigiska dabiciga, hantida iyo waxyaabaha kale een ku egyno ilayska ka waxa lagidhaa obtikis

ilaysku waliba waxa uu noo sameeyaa nolosheena siday doonta. Ilaysku wa xa u samayn dhirtu inay baxdo si ay u soo saarto cuntada aan cuno. Dhirtu waxaay kaydsadaan tamarta taasoo ay ka helaan qoraxda. Tamartan keydsan waxa loo badalaa shidaal sida dhuxusha iyo xaabada.

Ilaysku waa hirka birlab danabowga kaaso ku siidaaya jidhka wax kulul tan waxaa soo saara dareemayaasha ilayska biniaadamka isha si ilays loo soosaaro waxa la adeegsan habkale tamarta logu'badalo ilays. Tusaale dabka korontada tamarta danabka waxa loo badali tamarkul iyo tamar ilays.

waa maxay ilaha ilaysku

Ilaha ilayska ee walxuhu waa kuwa loo rogo (lobadalo) ama bixiya ilayska tamarta leeyihin.
Kuwaa waxa la yidhaa walxaha bixiya ilayska (luminous bodies).
Tusaale qoraxda, dabka, iftiinka laambada, shamaca waa ilays bixiyeyaal. Waa ilaha ilayska.

Walxaha ugu badan ee aan soo saarin ilayska laftooda. Kuwa noocanah waxa la arkaa oo kaliya marka ilayska ayka qaatan ifayaasha soona celiyaan indhaheena si ay u qabtaan. Walxaha ilayska bixiya waxaa layidhaa ilaysicellyayaal (illuminahed) tusaale. Darbiga, dadka, buuga, dayaxa, iyo buuruhu waa ilaysiceliya yaal. Muxu dayaxu u noqon waayey il ilays ?

Hubin 6.1

1. **Waa maxay ilaysku?**
2. **Qeex ifeyaasha iyo ma ifeyaasha mid walba tusaale ka bixi.**
3. **Qar maqacaw ilaha ilayska ee deegaankiina.**

6.2 Sidee Buu Ilays Ku Usocdaalaa?

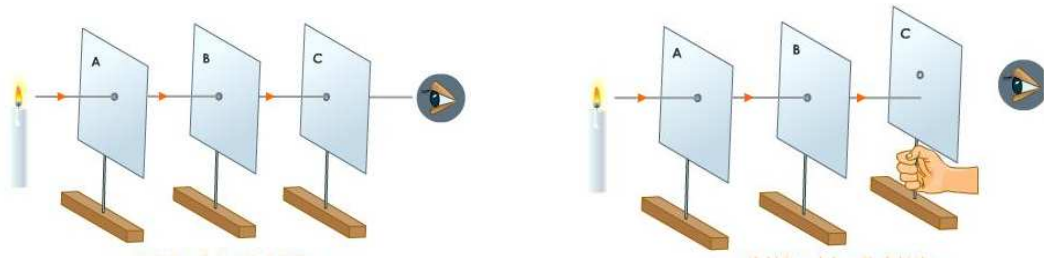
Hawlgalka 6.2 inago ufiirsanyna socdaalka ilayska.

Kooxsaxi badaaya kala shaqee hawlgaladan sosocda. Qeex sida ilaysku u socodaalo. Majidtoosan buu maraa mise mid xoogdan? Qalabka loo baahan yahay 3 waraaq kaartomeed oo madow (eeg Jan 6.2) ilaha ilayska (shamaca ama lamp)

3 waraaq kaartomeed ee ubaahan dalolo badhtanka qiyaas siman leh.

Jidka laraacayo:

1. **U hagaaji kartoonka sida ka muuqata jaantuska 6.2**
2. **Katafi miqa daloolka, riix oogiji si'aaduga dhigtid da lool dariiq toosan ah**
3. **Meeldhig shamaca iftiimaya, danbayso karfoonka. Tijaabi inaad aragtid shamaca gubanaya holacisa dhanka kale sida ka muqata Jaantuska 6.2 (waa in aad argtid holaca shamaca eegaya dalolka)**
   i. **Ma'ka arkaysaa hulaca dalolka?**
   ii. **Haddi kaartonka la dhaqaajiyo inyar booskiisa. Ma'arkaysaa ilaa hada holacisa?**
   iii. **Maxaaynu ku gabagabayni socodka ilayska? Ilaysku geesaha muu u socdaalaa**



b. Dalolo toosa **t. Dalolo aan habaysnayn**

Jaantuska 6.2 socodka ilayska

Hawlgalka 6.2 waxa lagayaabaa inaad fahamtay dalolada kaartonka midwalba hubi qiyaas is ku mid ah ma arki kartaa ilayska shamaca (Jan6.2a) lakiin haddii kaartonka (kaarka) la dhaqaajiyo (aan habaysnayn) inyar oo ka baxsan laynka ilayska la'arkimaayo sababtu waa holaca ilaysku waa uu ka xidhmi oogada kaarka barabaxay (jan 6.2t) ilaysku ku wareegi maayo geeska.

Hawlgalkani waxa ina tusayaa socodaalka ilaysku in u yahay mid toosan.

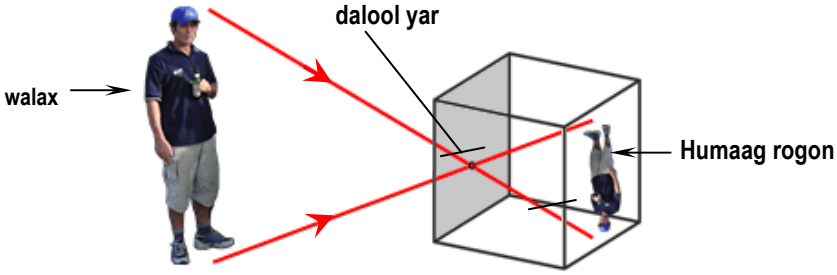
Aan so qaadano ficilkal tusaale ahaan nolol maalmeedkeena ka mid ah

Hadii aad furto daaqada ujeeda ilayska cadceeda ama dhanka geedka aad ukasocotid meesha cadceedu kaso baxdo ama u dhacdo waxaa arkaynaa ilays usoo burqanaya sitoos ah. Kanasoo gudbaya daaqada, gidaarka kasoo horjeeda ama udhexeeya caleemaha Geedka ee socda dhulka

Saamaynta oo kale waliba waxa lagu arki hoolka filimaanta oo kale sida ilaysku usoconayo (ugasocodaalayo) dhanka mishinka filinka kuna dhacaya shaashada muraayada T.4. dhacdooyinkan waxay cadaynayaan ilaysku inu ku socdaalo xariq toosan.

Run ahaantii waxaan arkaynaa ilayska sabab tu waa marka u ku dhaco saxarada ka gudba ama ka noqoda indheheena jihada u'ugudbayo ilaysku waxa layidhaa fallaadh. Marka ay u taalo xariiq toosan waa fallaadh. Koox fallaadho ilays ah waa dhudo ilays.

Waxa jira noocyo fallaadho oo kala duwan waxa lagu mujiyey jaantuska 6.3 iyagoo barbaro ah, ursursan ama firidhsan dhuduhu.



Jaantuska 6.4 kamarada biindaloolka (kaamerada bini – hoolka)

Hawlgalka 6.3 Rikibida (samaynta) kaamerada bin - doolka

Qalabka loo baahanyahay: **Sanduq waraa qadah, macdan qalin ah, warqadka lar caag leh (warqadsalideed), musmaar yar iyo koolo.**

***Jidka laraa cayo*: marka dalolka musbaarka u haldhinac sanduqa kayahay.**

- **Udhaqaaji lidkajihada sanduuqa iyo kubadal warqada salida ama warqada caaga.**
- **Ku daool dhinaca sanduqa koolada, si una ilaysku gudaha sanduqa ugalin (jan 6.4)**
- **Isticmaal daloolka musbaarka ee kaamerada waa in aad diyaarisid walxaha kugu xeersan sida calanka, shamaca shidmay ama Geedka dhanka cadeedka soo baxa**

Muraayadaha waa eilmiga barashedo ilaysko waa laan kamid ah obtikada taa soo daraasaadku samaysa ilayska lana isticmaalayo ilayska "Fallaadh" qaab dhismeed

Humaagu waxa u kusamaysmi shaashada si aad uga argatid caadi ahaan Haddi hawsha lagu qabto qol madaw madamo ilaysku ku socodo xariiq toosan barkasta oo kamid ah humaaga shaashadu waxa uuku ifayaa ilayska ku socodaalaya xariiqa toosan barta ilaha saxarada. Saxarada yar yar ee ilayska walxaha oo la iskugeyn si ay usameeyaan humaag qaliban (foorar), walaxdu waxaa inatusi jaantuska. Hadii dalolku wayn yahay. Humaagu waxa u noqon midisku dhexjira. Sawir nadifah maheeshay marka dololku yar yahay sida daloolka musbaarka.

Waxaan ka fikiraynaa dalolka wayn inu legyahay koox daloloah oo yar-yar iskuna xidhan siwadajir ah. Waxay so saarayaan humaagyo is le'eg. Iyo kuwo isku laaban waxaa sababa bixida humaaga isku dhexdarsama (laka la saarimaayo)

Hadhka

Marka walax ilays magudbiye ah ladhigo meel udhaxaysa isha ilayska iyo shaashada. Hadhku waxa u ku samaysmi shaashada dusheeda. Tansababteedu waa socodaalka ilayska ee xariqatoosan, ma awoodo inu kuwareego walaxda. Habku usamaysmo hadhku waa hawlqabad. Tusaale ilayska ku socodaalaya xariqa toosan marka ilaysku aad u yar yihiin taasi waa barta ilayska. Hadhku waxa uu soo saaraa madow iyo fiiqan iswadaleg dhamaan. Marka ishu ay weyntahay. Siday dontaba ha. Ahaatee, hadhku waxa u leeyahay hal madow oo badhtanka ah lana ururiyey kuna wareegsan Anbara ilayska falgalka wax layidhaa Bin – Anbaro.

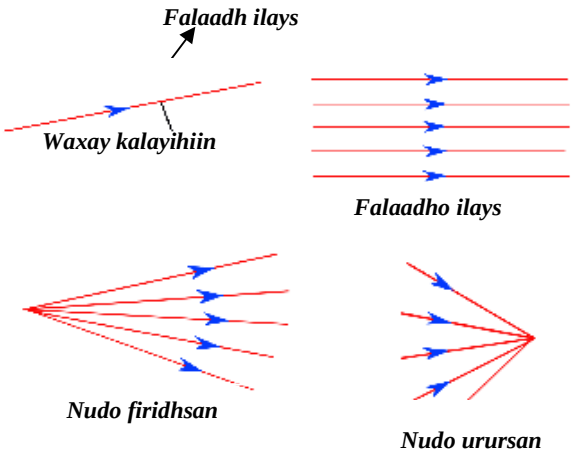
Hubin 6.2

1. Qeex habka ilays uu u faafo
2. Waa maxay daloolka musbaarka yar ee kaameradu? Sharax isticmaalkeeda.
3. Sharax humaaga dabicigu sidu ugu samaysmo daloolka musbaarka yar ee kaamerada.
4. Waa maxay macnaha weedh hani mootige, seebe, iyo gaabe, tusaale ka bixi mid walba.

6.3 Ilays Noqod

Socodaalka ilayska ee jihooyin isku dhan ah ka imanaya ilaha.

Faafida ilayska waxaa u taagan fallaadho ilays. Ilaysku waxa uu ku socdaa xariiqa toosan ee madhanaha marka ilays ku gaadho xadka ama sohdinta, dhexyaalka il haduna ka gudbeynin masocdaalayo. waxa laga yaabaa in isbadal ku dhaco.



Jaantuska 6.3 noocyada faiiaadhaha

Noocyada ilaysku utabaan (u faafaan)

- Ilayska ku socodaala xariiq toosan waxa uu ku socodaa madhanaha lsagoo shay ahaan ku dhex maraya walxaha qaar sida, darbiga, ilaaysku kamagudbo habayaraate walxaha noocan ah waxa layidhaa Gabe.

Walxaha kale oo ilayska gudbiya qaybahaan waxa layidhaa saabe dhalooyinka khaaska ah ee lo isticmaalo su'liyada iyo Qolka maydhiga, daaqadaha iyo biyaha.

Tusaale. Qalabka noocan ah sida hawada, daaqadaha caadiga ah ee u gudbiya ilayska.

Siwanaagsan baad waxuga dhex arki. Walxaha noocanah waxala yidhaa mootiye

Waxayu ush aqeyn sidhe xe oo faafid ilayska ah

Walaxda Gabe ilayska wayceliyaan dhamaanti, inkastoo saabuhu uu celiyo qeyb ka mid ah

Daloolka yar ee mismaarka kaamerada (pin – hole camera)

- Daloolka yar ee mismaarka kaameradu waxa ka kooban tahay sanduuq, daloolyar, dhinaca wajiga kule, ama shaashada, dharka yaroo cad, eeg jan 6.4

i. In xaddi ilays ah ayaa la nugi laga nugi xadka walxda

ii. Inta kale dibaa loo soo cilin walaxda koowad. Haddi ogada la mariyo inta badan ilays ku dibu'u sonoqonayaa kuna soo noqonayaa ogada dhacdada noocan ah ee ilayska waxa layidhaa ilays noqod.

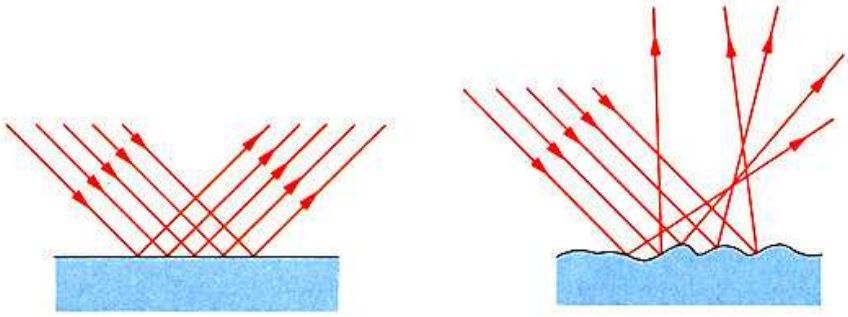
Ilays noqod waa dibu noqo sho ama dibusooboodiid ilaysku marka uku dhaco walxo kaladuwan

Marka fallaadhaha ilaysku ay kudha can Gabe dhaman waysoo laabanayaan. Miyaad aragteg inunxiidhidh udhexeya xagasha Fallaadhaha ilayska ekudhaca shayga Gabe ama xaga sha

waxa jira laba nooc noqodka ah ilays

i. Mid habsami ah (noqodka toosan) waa noqodka walxada joogtada, ilayka, ogada simanl tusaale muraayada (Jan 6.5b)

ii. Qaab laawaha:- noqodkani Qaab laawe ama ogada aan sinayn (Jan 6.5b)

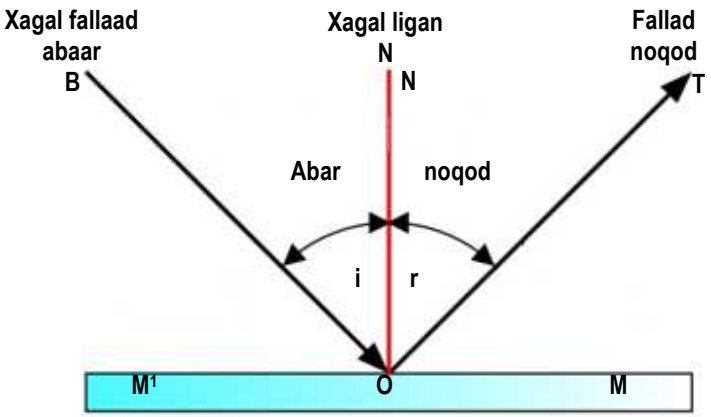


b. noqodka qaabsan ***t. noqodka qaab laawe***

Jaantuska 6.5 qaabsame iyo qaablaawe

Falllaadha ku dhacaysa oogada waxa layidhaa falaadh abaar (incidentray) halka fallaadhaha dibu noqonaya dhanka ogada layidhaa (reflected ray) fallaadh noqod.

Markad isku eegtid murrayda fallaadh abaar ku waxay katagi wajigaga kuna dhici murrayada waxay dibugu noqon fallaadh noqodkii fallaadha hani markay so gaadhaan



Jaantuska 6.6 weedha loo istiemaalo noqodka ilayska.

MM' waa ogada noqodka ilayska muraayada siman

BO waa jihada ilaysku kaga imanayo isha. lagadareemayo noqodka ogada ayaa layidhaa fallaadh abaar. Bart **'O'** waa bart noqodka **OT** tahay fallaadh noqod ilauska **NO** waa liganaha **MM'** waxana layidhaa quman (ligane) xagasha ka samaysantay fallaadh abaarka iyo liganaha waxa layidhaa xagasha abaarka. Xagasha ka samaysantay noqodka fallaadha iyo liganaha waxana layidhaa xagasha noqodka waxa u taagan yihiin sida $\hat{\imath}$ amd $\hat{r}$ si'iskuxigta

$\hat{\imath}$ = xagasha abaar

r = xagal noqod

Hawlgalka 6.4 barashada xeerka noqodka

Qalin iyo warqad cad kadibna sawir xariq Jiifa ilaa badhtanka warqada mid jilicsan, iyo waraaq karton jiifah hanoqodo isticmaal afar barood odaloola waraaga kaarton (shaxda) Jan 6.7

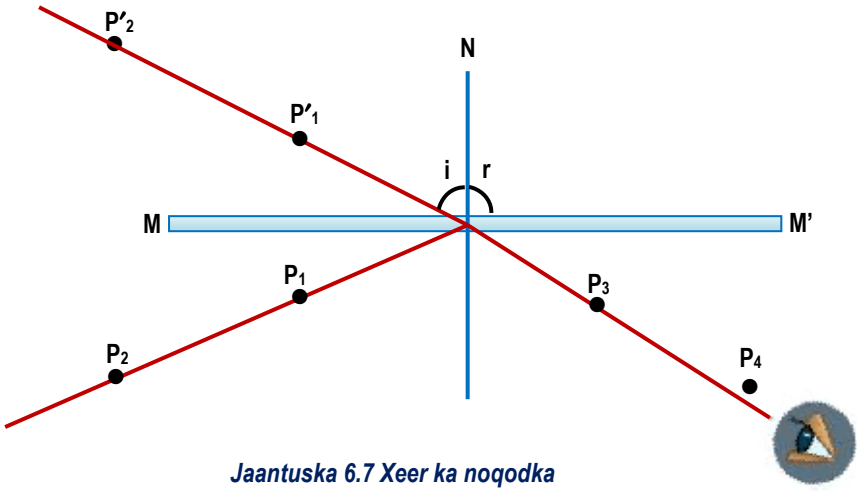
Meel muraada siman oo madhan joogahaan taasiwaa macdan silfara (qalinah) ogadeeda (taasi muraayadi danbe) waa laynka aadka sawiraysid iyaga siman laynka MM', kudhagan labad barood p_1 iyo p_2 warqada korkee da muraayada marka laynka isku Joogi P_1 iyo P_2 xagasha MM'. dalool P_1 iyo P_2 waa in aad u dhaxaysid 5 ama 6cm. indhahaaga markaad ka eegtid bar qoman ufiirso humaaga P_1 iyo P_2 la bada musbaarkayer ku khaji labad kale P_3 iyo P_4 si xariiq toosan ah humaago udagi sida sha xan ku ku to Jan 6.7 Hada muraayada dhaqaajiigo musbaarkaba sawir leyka P_1P_2 ama P_4P_3 kago MM'

Haddi aad tijaabisay sidaxadar lee laynasha ku kulma barta MM' kuma gacaw bart "O" sawirna liganaha MM' sida ku muqata.

Cabbirka xagasha $\hat{\imath}$ iyo $\hat{r}$ diwaa gali natijada. Ku celitijaabada xaglo kala duwan ama natijada kuqor shaxda hoose,

Shaxda 6.1 xagahsa $\hat{\imath}$ ama $\hat{r}$ waa xaglo, xagal abaar iyo xagal nogod sijogoto ah

Shaxanka 6.1		
Tirada tijaabada	Xaga abaar(i)	Xagal noqodka (r)
1	10^0	-
2	20^0	-
3	30^0	-
4	45^0	-
5	60^0	-



Jaantuska 6.7 Xeer ka noqodka

Helida natijada tijaabada kasoobaxday waxa lagu gabagabayn karaa xeerka nogodka.

Xeerka noqodka

Xagasha abaarku waxay le'eg tahay xagasha noqodka. Xagasha a baarka, xagasha noqodka, iyo liganaha, ogada nogodka barta abaarka dhamaanatood waxay dhacayaa ogada siman.

Tusaale

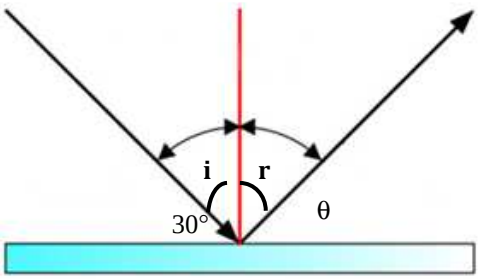
Xagal abaarka kudhagan ogada muraagada xagasha 30^o. waa imisa

b. Xagal nogodku?

t. xagasha udhaxaysa noqodka iyo muraagada?

Furfuris

- Sawir liganaha bartisa halka xagasha abaarku kaga dhagan yahay muraayada



Jaantuska 6.8 Muraayad siman

b) Xagasha u dhaxaysa abaarka iyo liganuhu waa

$= 90° - 30° = 60°$

Sidaas darted xagal noqodku waa $= 60°$ ilayn waxa is leeg $\hat{i} = \hat{r} = 60°$.

t) Xagasha u dhaxaysa noqudka fallaadha iyo muraagadu waa

$90° = \hat{r} + \theta° \Rightarrow \theta° = 90- \hat{r}$

hadi $r = 60°$ markaa $\theta° = 90° - 60° = 30°$

Fallaadhaha qaablaaweyaasha iyo fallaadhah qaabkasan sifudud baa loosharixi karaa iyadoo la isticmaalayo xeerka labaadee nudaha bar-barada ee ku dhagan ogada aan sinayn xagasheeda dhamaan falaadhaha nuduhu markay abaarayaan xaglaha kala duwan agagaarada kuwa kale noqodkooda Fallaadhaha kala duwan natijadodu way kala duwanaan sida xagal noqodka fallaadhaheduu kala duwan yihiin Natijadoduna waykala duwanaan jihooyin dhan.

Humaagu siduu ugu samaysmo muraayada siman

Muraayada simani waa dhalo siman oo dhankeeda midka midabb laga mariyey madaw ama macdan qalin ah (silver) ogada celinaysa waa dhinaca aan waxa lamarin fallaadhahailayska ku dhacaya muraayada waxay unu qonayaan jihoyin kala duwan.

Fallaadh noqodka walxaha ee muraayada waxa layidhaa humaag.

Jaantuska 6.9 Humaaga muraagada siman.

Hawlgalka 6.5 aan ufiirsano humaagaga muraayada siman qalabka loo baahan yahay muraayad siman

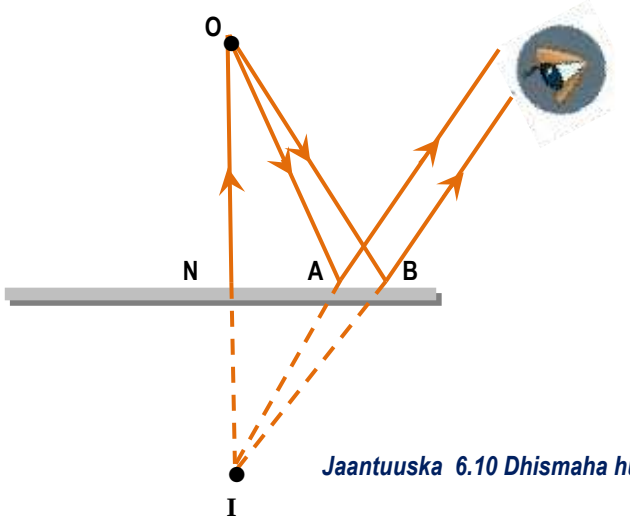
Jidka lamarayo: **so qaado**

Muraayad siman meeldhig hortaadah (wajigaaga)ah

- **Ufirso nooca humaaga ee muraayadu kaa qabatay.**
- **Humaaguwaa noocee, maqaliban yahay mise cidhifyada isbadaley muraayada waaside boskiisu dhanka muraayada? Jaantuska 6.9**
- **Maka Aragtey humaagag ay shashadu qabtay (warqadu) ama lagu taabto gacantaad?**
- **Humaaga noocan ah maxa layidhaa?**

Ka fikir barta walaxda **O**, inuyahag ololka shamacu midliica, hordhig muraayada hortisa. Labada fallaadhod **OB** iyo **OT**. Waxay ku dhagan yihiin muraayada bart B iyo T sida ka muqata Jaantuska 6.10 Fallaadhuhu markay noqodaan waxay qabanayaan indhaha hadii aykayimaadeen dhanka I indhuhu waxay qabanayaan bart I. sido kale, taa ON waxay leegtahay IN ama ONI. Waxay muraayada ku yihiin ligane Run ahaanti Fallaadho ka imanayaan ‘I’, humaagu waxa u cadenayaa inu quman yahay.

.ama arkayo shashada bart ‘I’



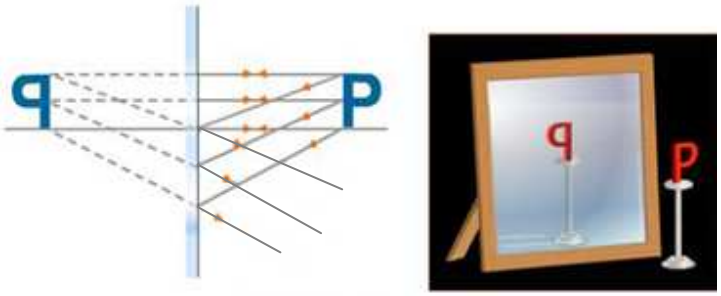
Jaantuuska 6.10 Dhismaha humaaga loo istic maalayo fallaadha jaantuuska.

Humaaga ka samaysma muraayada siman waxay layihin sifooyinka soo socda tani waa mid taagan, mafooraro

i. **Waxa uu le'eg yahay walaxda.**
ii. **Geesahaan u qaliban yahay (taasiwaa cidhifyadisu way isku roganyihiin)**
iii. **Fogaan iskumidah buu ujiraa gudaha muraayada sida walaxdu uhortaalo. Taa macnehedu waa humaaga ka samaysma muraayada siman waxa u tusaa in ay ka fogtahay muraayada**

Kaniwaa humaag Been ah humaag beenaad ku fallaadhaha ilaysku ka dhexgudbaan lakiin lama arkikaro ishu maqabato humaagbeenedku waa rogan yahay humagu waa muraayadaha dhalaala.

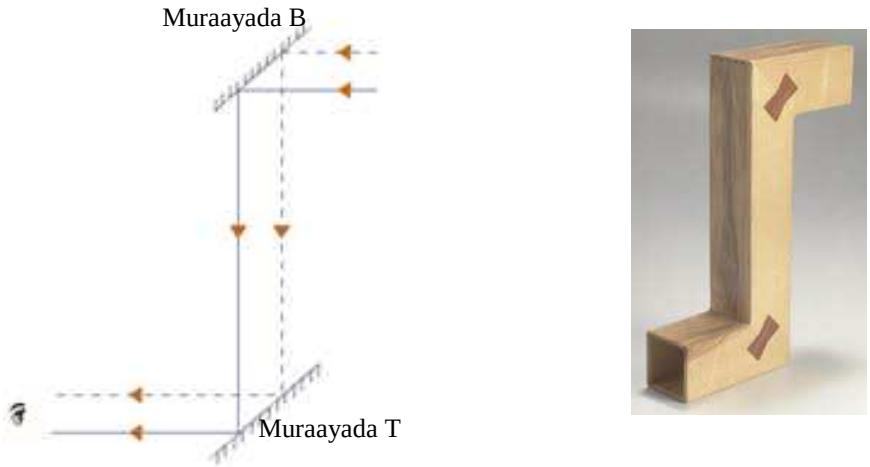
Humaaga runti waa mid fallaadh ah a ilaysku ay kagudbaan shaashada barteeda humaag runt a waxa laga arkaa shaashada.



Jaantuska 6.11 Humaaga xarfaka p ee muraayada siman

Xoqada (periscope)

Xoqaduwaa aalad kaa cawisa daawashada shayga walaxda inagu xeeran gabe. Isticmaalka xoqada waxaad ku arki ciyaaraha kubada gadaasha darbiga dheer.



Jaantuska 6.12 Xogada

isticmaalka xoqada waa laba muraayadod oo siman tubada dheer sida kamuqata jan 6.12 muraayda waxa la dhig tubada dhamaadkeeda xagasha 45^o si laga fiirsado jihada. Humaaga ku samaysmayo muraayada sare ay aa laga daawan muraayada hoose

Humaaga kusamaysmaya labad muraayadood

Marka labada muraayadood xagal janjeedhka ku 'θ' tira da humaaga samaysmay waxa u ku samaysmay tirada fallaadh noqodka

$$\text{Tirada humaagu} = \frac{360^\circ}{\theta} - 1$$

Tusaal: Humaaga ku abuurma laba muraayadood jan jeedh ka 90° waa: $\frac{360^\circ}{90^\circ}$ 1 = 4 Humaag.

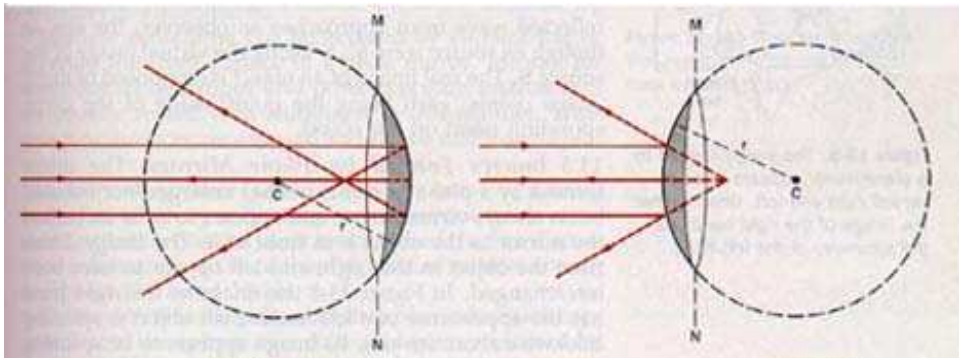
Muraayadaha Barbarada: Humaaga tirada aan dhamaadka lahayn waxa uka samaysmaa walxada udhaxaysa meesha labada muraayadood ee bar barada ah. Humaagyadan duljiifa xariiqtoosan dhemaraga walaxda liganaha kuah muraayada meesha ladhigayo humaaga waxa laga yaabaa caa di ahaan in lo dhiso, si aan u'xasu'sano humaag kaste, oo laga arkay muraayad iyagoo matalayo humaag beeneed ama soosaaraya humaaga muraayada

Hubin 6.3

1. Waa maxay falaadh noqodku?
2. Waa maxay faraqa udhexeya fallaadh noqodka qaabsan iyo kuwa qaab laawe?
3. Qeex weedhaha. Fallaadh abaar, Fallaadh noqod, layka liganaha (sicadufaah faahi)
4. Qeex oo cadee xeerka noqodka.
5. Waa imisa xagasha u dhexaysa fallaadh abaarka iyo fallaadh noqodka hadii xagal abaarku yahag 40°?
6. Cadee humaaga dabiiciga ku samaysma muraayada siman
7. Qeex farqiga udhexeeya humaag rumeedyo humaag beeneed
8. Waa maxay xoqada? Cadee sida loosameeyo

6.4 Humaaga Ka Samaysma Muraayada Qaloocan (xoodan)

Muraayada qaloocani waxay kasamaysan tahay walxa qaab goobeed leh. Ka fikir daloolka qalocsanka dhala da goobada ah, waxaan soo saaraynaa oogo qaloocda inago goynayna qaybta (turayna) qaloca goobada Hadii ilaysku kasoonoqodo ogada dibada. Waxaa samays mi muraayad tuur leh hadii fallaadhaha. Noqonaya ilayskoodu gudaha ogada, waxaynuhe li muraayad xoodan. Muraayadaha noocan ah waxa layidhaa muraayadaha qalooc san

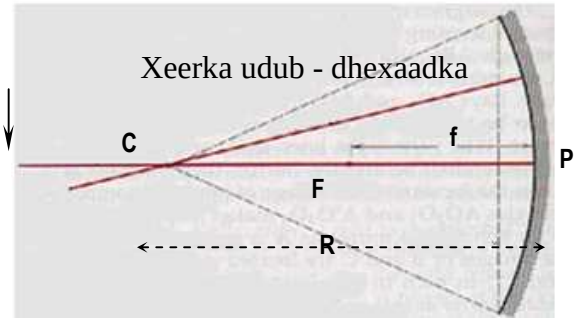


b. Muraayad xoodan *t. muraayad tuur leh*

Jaantuska 6.13 Muraayadaha qaloc

Marka ay fallaadhuhu ka noqonayaan oogada muraayada way qaloocda ama way siman tahay xeerka nogodku waa ku run qabashada lakiin baxada iyo barta humaagu way kala duwan yihiin kuwa ku samaysmay muraayada siman.

Sababta qalooca dabiciga ee muraayadaha, masameeyaan humaag ueeg muraayada siman waxaan ka soohadalnay cutubka bilawgiisi.



Jaantuska 6.14 Shaxankan sima si logu qee xo weedha muraayadaha qaloca

Muraay adaha xoodaniwaxa logistic maali muraayadaha wadida. (taasiwaa muraayada ha baa burta) iyo waxaad ku arki meherada ha qaar.

Siaad ubarato samayska humaagyada muraayadaha qalooca waxan uisticmaalaynaa inay cadeeyaan xidhidhka muraaya daha eeg Jaantuska 6.14

1. **Cidhfka (P)** muraayadani waa badhtanka muraayada
2. **Badhtanka qalooc (C)** waa Goobada taaso muraayada qaybkamidah.
3. Xeerka udub dhexaadka:- waa laynka dhexmaraga cidhifka ama badhtanka muraayada xoo dan.
4. Fogaanta P ila C waa Gacan ka xoodan **(R)**. Waa gacan ka Goobada ee laga go'yey. Ficilka muraagada qalocsam waxay ku salay san tahay Gacamnka xoo dan
5. Xeerka kulmiska **(F)**: muraayada xoo daniwaa barta ay fallaadhuhu bar barokuyihiin xeerka udubka isku keenaya fallaadh noqodka Jaantuska 6.15 **(b)** waxa u sifayn marka nuduha I laysku ay abaarayaan muraayadaha xoodan, falladhaha noqonaya way is ku imanayaan bar kaliga "F" waxan layidhee xeerka iskuimadka
6. Xeerka iskui madka **(F):** muraayada tuurta leh waa ay fallaadhu hu bar baro ama kusoxidh maan xeerarka udubka, inay mujiyaan ay na kala baxaan kadib noqodka muraayada tuurta leh, fallaa dhahu usaxay ka muqanayaan kalaba xa ama banaan ubixida ay ka baxayaan barta "F" gadaasheda muraaya da marka ay noqo daan fallaadhu hu eeg Jaantuska 6.15**(t)** muraayada xoodan, fa laadhaha iskuimanaya barta taaso caday naysa helida shashada lahordhigayo muraaya da bar aad uirtimaysa. Muraayada xoodani waa kulan sidas darted waa kulan run ah marka looego muraayad tuurta leh, fallaadh noqodku kama gubayaan kulanka lakiin wayka muqanayaan.
7. Dherer kulmiska **(F)**: muraayed qalocsan fogaanta, xeedrka kulmiska cidhifka P. dherer kulmis waa raadin ta tijaabada leeg badh gacanka ka xoodan.

$$F = \frac{1}{2}R = \frac{40}{2} = 20\text{cm}$$

Jaantuska Fallaadhaha ka samayska Humaaga

Marka walax meel muraayad ka horaysa ladhigo garan karimay no humaagu halku ahaa, ama humaagu nooce buuahaa (yahay). Barnaamishkeena guud waa habii fallaadhaha ilaysku. Kabilaadbmaan barta walaxda maxaadhicimarka fallaadhuhu ku noqodaan dhan muraayada?

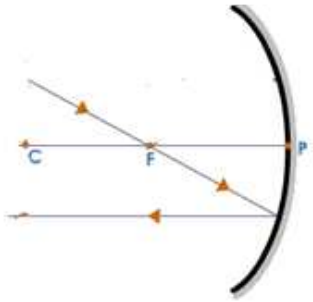
Waxaan hagaajinaynaa barnaamiJ fu'dud oo anaga ah laqada nayo fallaadhaha jihadooda kadibnoqodka fallaadhaha. Waan fahmaynaa ama sifudu baanusawiraynaa kuwa sosocda waa fallaadha jihadooda lagaranayo

i. Fallaadha bar – barada xeerka udub dhex gudbaya xeerka kulmiska (F) Kadibnoqodka Jan 6.15(b)
ii. Samiga xeerka kulmiska(F) waa noqodka bar barada udubka as aasiga Jaantuska 6.15(t)
iii. Fallaadha badhtanka dhaxma raysa xoodan (c)

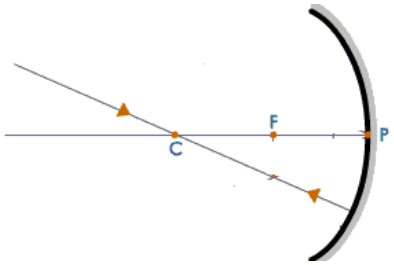
waa fallaadha ku noqonaysa wada deedi (Jaantuska 6.15 J) iska horimaadka fallaadha ugu yaraan laba fallaadhod ka humaaga walaxda hortaal muraayada

Humaaga ay sameeyaan muraayadaha xoodan iyo kuwa tuurta leh

b. Fallaadhah as aasiga bar barada noqod keedu waxay dhexmari



t. Fallaadh kasta oo dhexmaraysa f noqod keeda bar bar as aasiga



J. Fallaadh kasta oo dhexmaraysa 'C' waxay kudhici xagasha midig waxaynakunoqo xarriq toosan

Jaantuska 6.15 dhismaha fallaadha ah muraay adaha

Hawlgalka 6.6 Ufiirsashada Humaaga

b. muraayada xoodan
t. muraayada tuurta leh

Qalabka: **Muraayada tuur, xoo dan (sida deegaanka loga he layo, walxaha dha laa la og'doda)**

Jidka lamarayo:

b. Muraayad xoodan

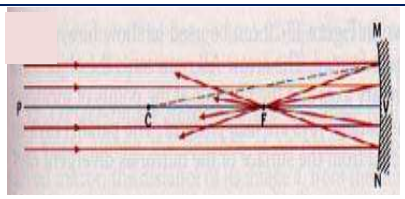
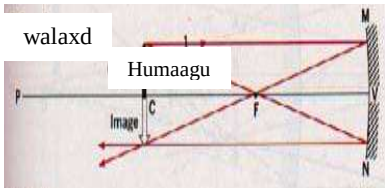
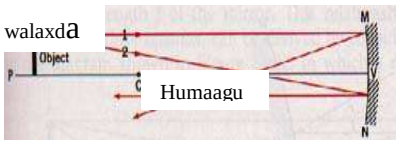
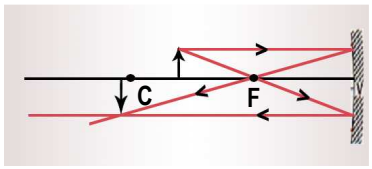
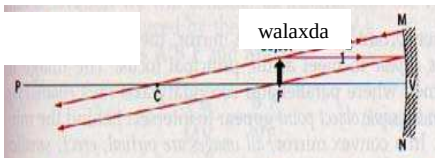
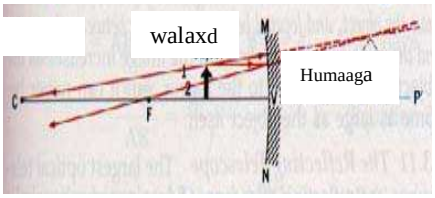
- **Dhig horteeda muraayada xoodan Fogaan ujirta, tijaabi humaaga inaad fahamto.**
- **Ku soodhaw muraayada sitartiibah aan ufirsano nooca humaaga samays may.**
- **Ugu dabayn aad ugu soo dhawaw qeex nooc humaga una fiirso markaad usoo dhawaatid muraayada**

t. muraayada tuurta leh

si aad u faham to talaaboyinka muraayada xoodan ee xaga sare ku qoran.

i. Humaaga kasamaysma muraayada xoodan

Dabiciga ama meesha humaagu ku samays mayo muraayada xoodan ka fogee meesha walaxda hor teeda muraayad xoodan, waxan ka fahmi karnaa, sawirka fallaadhaha jantuska qiyaasta jantuska fallaadha eeg Jaantuska 6.16 Sharaxay faraq humaagu kusamays mayo fogaanta walaxda

b. 	**Walaxdu dhamaad malaha (aadbagu fogtahay)**	**Humaagu waa** 1. At F 2. Run 3. Qaliban 4. Kayar walaxda
t 	**Walaxda 'C' (S_o = 2F)**	**Humaagu waa** 1. Run 2. Qaliban 3. Way is leeg yihiin 4. At C
j 	**Walaxda kada bag sa C (s_0 > 2f)**	**Humaagu waa** 1. Run 2. Qaliban 3. Walaxda ka yar 4. Udhexeya C iyo F
X 	**Walaxdu waxay udhaxay saa fiyoc (2f> s_0 > f)**	**Humaagu waa** 1. Run 2. Qaliban 3. 3(Jibaar) ayuu kawanyahg walaxda 4. Ka danbeeyeel C
h 	**Walaxda F (s_0 = f)**	**Humaagu waa liqay**
d 	**Walaxda udhaxaysa F iyo P (f> s_0)**	**Humaagu** (1) Been (2) Kawayn yahaywalaxda (3) Taagan (4) Muraayad ga daasheeda

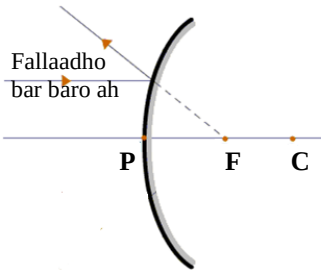
Jaantuska 6.6 Humaaga kasamaysma muraayada xoodan

Jaantuska 6.16 waxanu ina tusayaa humaaga meeshisa kala duwan ee boska walaxda muraayada xoodan waxa helaynaan labad Humaag run iyo been humaaga run ti waa ka samaysma kaqiiqdii fallaadhah ilayska ayaa ku dudhacaya shaashada (screen)

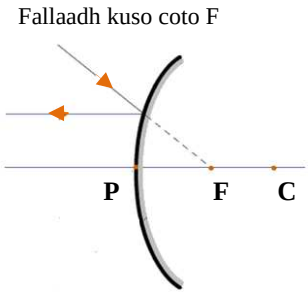
Muraayado xoodan

1. **Hadii walaxda meelkadanbeysa dherer kulmiska ladhigo, humaagu waa run iyo qaliiban baxada iyo meeshu waxa kusalay san yihiin fogaan tawalaxda ka muraayada.**
2. **Hadiiwalaxda udhaxayso dherer kulmiska iyo muraayada humaaguwaa Been, taagan, iyo kawayn walax da.**

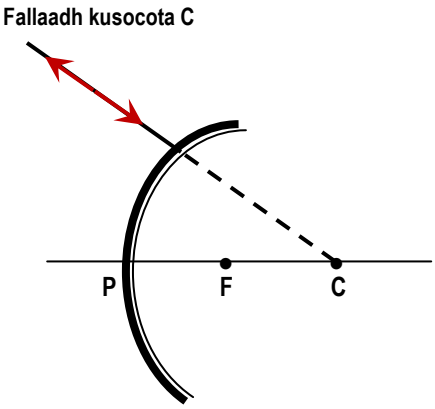
i) Humaaga kasamaysma muraayada tuurta leh



b. Fallaadh kas to bar barola'ah udubka as aasigu u celinayaa waxay kamuuqan ka "F"



t. fallaadhkas to tagaysa kulma s aasiga waa lasocelin iyado bar baro ah udubka

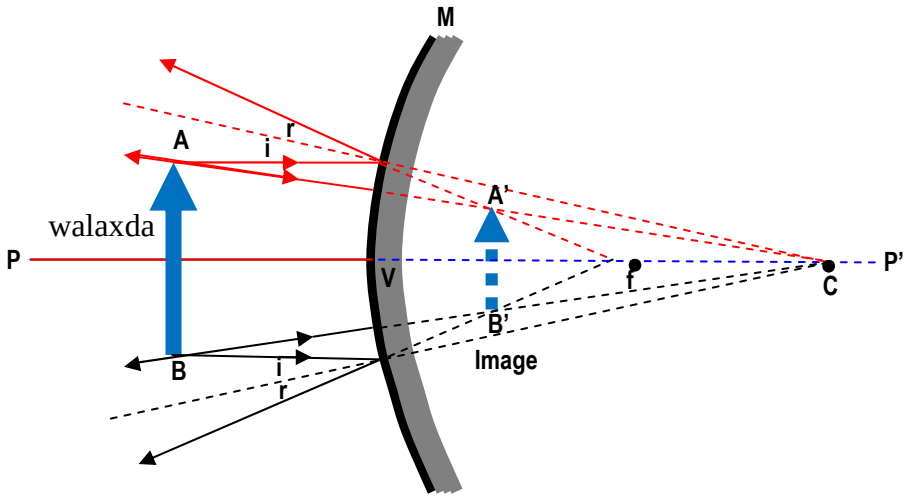


j. Fallaadh kasta oo tagaysa C waa celiye toos bay unoqon

Jaantuska 6.17 dhismaha fallaadhaha muraayada xoodan

Jaantuska 6.17 waxan mujinayaa dhismaha jantuska ee muraayada tuurta leh. Humaagani waaxa samayn muraayada tuurta leh. Kuma salaysan fogaantau dhexaysa. Walaxda iyo muraayada barta fallaadh noqoku waxay abaari inay kala tagaan, waydinta humaaga, tababarqaadsho, siday dontaa hahaate, raacida fallaadha midka mid ah labada fallaadho waxay ina karsiin boodinta ta booska humaaga

muraayada tuurta leh humaageedu waa taagan yahay. Yaraan, Been, ama gadaasha muraayada dhamaan welxaha booskooda. (Jan 6.18)



Jaantuska 6.18 Samaynta fallaadha ha muraayada tuurtaleh.

Muraayada inta badan la dha qaajinayo waa muraayada tuurtaJaantuska . Ilayskoodu waa culusyahay bed balladhan iyo Fogaana ta walxada a ga'gaarkeeda sitoos ah Fallaadha isha darawalka, sidan sababta isaga ama iyadu waxay arkayaan si yar baxada walaxda iyo dhamaan waxa gadaashisa **isaga** iyo **iyada jooga.**

Hawlgalka 6.7 Kaladood su'aa lahan sosocda saaxiibadaa

Waa maxay farqiga uhaxeeya humaag beeneed iyo humaag rumeed? Isticmaal samaysanka humaagtan muraayada, tuurta, xoodan, iyo dhalo fahfaahin kabix?

Walaxda iyo humaagu waxa laga helaa "O" iyoI si joogka ah Jaantuska 6.14 iyo Jaantuska 6.18 waxay inaa tusayaan booska iyo dabeecada humagu so saara muraadagd qalocan , marka ilaysku kala baxo, makulmaan, dib bayu noqonayaan humagu waxa u ku samaysmaa meesha Fallaadh xariiq ahaan ay ku kulmaan waxana layi dhaa Humaag Rumeed humaaga ku abuurma kala baxa, fallaadhaha waxa layidhaa humaag beeneed.

Hubin 6.4

1. Qeex muraayad, qalloocda, (tusaale kaxibx), xoodan,
2. Sharax wedhaha
   - Dhidibka aasaasiga ah
   - Kulmiso
   - Dhererkulmis
   - Gacanka xoodan
   - Cidhifka muraayada
3. Qeex dabeecada iyo barta humaag ku samays mo muraaya da xoo dan isticmaalkeeda fallaa dhaha marka walax da meelo kala duwaan laga eego

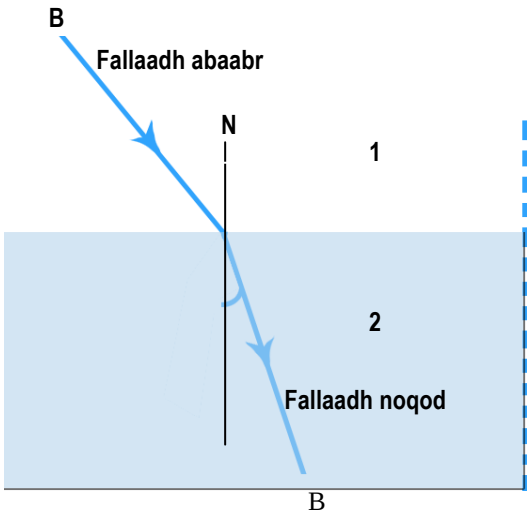
6.5 Firidhka (Baaha) Ilayska

Hawlgalka 6.8 Ufirso baaha ilays ka ee wal xaha kala duwan

Qalabka loobaahanyahay: **toosh, kartoon dalool dhuban, biyo, caag, saxan dhalo ah.**
Jidka lamarayo: **Ku qabo hawshan meel madow (mugdiah)**

- **Diyaari tooshka sida kamuqata jan 16 waxa samaysmi fallaadh**
- **Fallaadh tooska ogada biyaha ama xagasha dhalada.**
- **Ufiirso waxa dhacaya fallaadhu markag ku dhacdo xadka u dhexeya hawda, biyaha (dhalada)**
- **Jihadee buu ilays ku biyaha uga tafi (sadka dhaladee?)**
- **Fallaadha dibada uso baxaysa dhankadhalada (biyaha) u fiiriso siday u fidayaso**

Casharkii hore waxaad ku so baratay in ilaysku u socodaalo xariq toosan ee walaxda lagusiye lakiin taniwaa Run oo kaliya ilaysku marku socodo walxah dhexdo oda waala cabbiri cufnaanta obtikadooda. Cufnaanta obtickadu waa astaan ta ag walxahu ugud baan, iyo cabbirka xawaara ha ilaysku ugudo walxaha tusaale: xawaarha ilaysku marku dhexmarayo meelyar ¾ oo xawaare ah ilayska. Hawada cufnaantoda obtikadu waa ¾ gorooka biyaha marka fallaadha ilaysku ka gudbayo meel ilaa walax kale ay ugudbiso ilayska Jihadeedu waa silama filaan ah inu isku badalo. Intayna oo ogada ku kala qaybsamin (labad walxod) tani waxaay dhacdaa ookaliya marka ilaysku kudhago ogada firdhinay sa. (celinagsa). Ilayska ku socodalaya jidka toosan marka badhtanka walax cusub ligane ku noqoto jihadu way isla badashaa fa llaadhaha ilayska waxana la yidhaa qaloocsan ka ilayska



Jaantuska 6.19 Fallaadha qalooc sanka ilays ka

Sidaas darted qaloocsanka ilayska waxauuku dhacaa ilayska socodaalaya hawda ilaa dhalada hawada ilaa dareeraha dhalada ilaa hawada iyo dareeraha ilaa hawad qaloosanka dhacaya dhanka walxaha kaynaankodu kala duwan yahay sida walxahoodu u kala duwan yihiin.

Qaloocsanka ilaysku waa qaloocinta fallaadhaha ilayska u gudbaya walax ilaa walax kale. Waxay dhici marka ilaysku socodaalayo in yar kala duwanaashaha kaynaanka ee walxaha kala duwan. Fallaadha soogalaysa waxa layidhaa fallaadh abaar. Qaloocsan ka kadib walaxda cusub waxay kee ni qaloocsan

Laynkuna waxa uligane kuno qon sohdinta labada walxod barkaliga halka fallaadha abaarku ukagalayo waxa layidhaa ligane.

Dhacdada qaloocsanka fah'faahinteedu barkad lagudabaasho oo biyo ah sijoogta ah uga muqdo gunteed taasa ah waxa kalo lagu fahfaahin karaa qalin Ama shay qalocsan marka aad muqurtid biyahadhalada dhexdisa ama dareere kalaba.

Qeexida wedhaha

Ufiirso fallaadhaha ilayska ka imanaya walxaha 1 ilaa 2 isticmaal jan 6.19 waxan isticmaalaynaa kuwan sosocda.

1. **Fallaadh abaar**:- waa jidka dheeree ilaysiu ku sosocodo walaxda koowaad
2. **Qaloocsanka fallaadha:-** waa Jidka dheer ee ilaysku ku socodo walaxda labaad.
3. **Xagal abaar:-** waa xagasha udhaxaysa fallaadh abaarka iyo liganaha.
4. **Xagal noqodka:-** waa xagasha u dhaxagsa noqodka iyo liganaha oogadiisa.

Eeg Jan 6.19 waxa uu ku tusayaa fallaadh qalloocsanka dhanka liganaha. Tani waxay dhacdaa marka falladhu walaxda cufan ku dhacdo. Hadii fallaadhu ka bilaabnto (kasocoto) walaxda 2, wado is ku mid ah bay marayaan. Taasi waa OB fallaadh abaar OT Fallaadh noqod. Sababtan waa walaxda cufnteedu yar ta hay qalocsankeedu waxa uuka fogaada liganaha si kale hadaan u dhigno Fallaadha ku socodaalaysa meesha cufan walaxda qalocsanka way ka fogaan meesha ay ka gudbayso ogada kala baxa walxaha waxaan kusoo koobaynaa

Xeerka qalloocsanka

Xeerka qaloocsanka waxaa loo qeexaa sidan sosocto a:-

- **Fallaadh abaarka, liganaha, barta abaarka fallaadh qalocsanka, waxay dhacaan salax iskumid ah**
- **Qalocsanka ilayska dhanka liganaha waa dhexyaal cufan ama qalocsanka katagaya liganaha dhexyaalka fu'dud**

Hubinta 6.5

1. **Waa maxay qaloocsan ka ilaysku?**
2. **Sawir ama qeexi fallaadh jantuska caddeena sida ilaysku u socodo dhexyaalka uguna gudbo ka kale.**
3. **Qeex xeerkii wakhti ugu yar ee feermat (fermat's)**

6.6 Bikaacooyin

Hawlgalka 6.8 Hawlshaqsi

i) **Waa maxay Bikaaco?**
ii) **Qeex waa maxay Bikaacooyinka fallaadhaha bar barada leh**
iii) **Tax faa iidooynka bikaacada**
iv) **Waa maxag daloolka. Kamarado biindaloobka ay utaagan tahay**

Bikaacadu waa Arag - gudbiye dhexyaalka, inta badan dhalo, isku haysta laba xoodane oogada ama halshaxan hal ooga xoodan

Erayga “Bikaaco” “lentil” iyo magacu waxuu ahaa kii ugu horeeyey ee la siyo bikaacada tuurta leh sabab ta way isuegyihiin xaga qaab midhaha lentil (midhaha miisirka) Bikaacooyinka waxa lo isticmaalaa Qalabyo (qalabahaan) waxa lagu isticmaalaa Gudaha kaameerada, Muraayada indhaha, borjaktor (Projector). Way nayso, dirada iyo kuwo kale (sharax ka laduwanaashaha isticmaalkoda bikaecoyinka la inagu tusay jantuska (6.20)

b. Kaamerad

t. Habeen arg to (Habeenkii baa waxalgu arka)

J Muraayad indhood

x. Sabuurada ilayska bixisa (ilays qudbiye)

Kh. dirada

d waynayso

Jaantuska 6.20 Kala duwa naashaha

Isticmaalka bikaacooyinka.

Bikaacooyinku waxay soo saaraan Humaagrumed ama humaagbeen aad

Noocyada bikaacooyinka

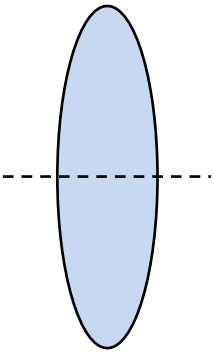
Waxa jira laba nooco oo bikaacooyin ah waxayna kala yihiin

1. Bikaaco tuur leh
2. Bikaaco xoodan

1. Bikaaco tuur leh

Bikaacooyinkani way dhumuc yar yihiin xaga dhexda walibana xaga geeska. Wayka yar yihiin bikaacoyinka tuurta lehiwaxa layidhaa bikaacooyinka ururiso

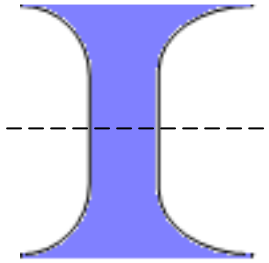
Bikaaco tuurleh waxay samaysaa fallaadho bar – baro ah ilayskbilowgii ka yimid isha ilayska way kulminayaan waxana la yidhaa kulmiso (focus): tani waxay samaynaysaa laba humaag mid run ah iyo mid been ah Humaaga beenta ahiwaa la weeyneyn laakiin humaaga runta waana laweeyneyn karaa ama waa la yarayn araa waxa uu ku salaysan yahay fogaanta walaxda ayujirto bikaacada



Jaantuska 6.21 Bikaacotuutleh waa kulmiso

2. Bikaacooyin xoodan

Bikaacoynkani wey dhudhuban yihiin dhanka dhexda, cidhifkana way ka dhumusan yihiin bikaacada xoodan waxa layidhaa firdhiso. Bikaaco kulmiso waxay samaysaa fallaadho bar – baro la ah ilayska dhexamaraya way firdhin ama way baahin
Markaad ka dhex eegtid bikaaco tuurleh, marwalba waxaad arki yaraan ama humaag rogan.



Jaantuska 6.22 n Bikaa co fiirdhiso

Erayadan u isticmaalayno bikaacada.

1. Xeerka udubka bikaacadu waa xariiq qiyaased oogada badhtanka qallooca.
2. Bikaaco kasta bartuu dhexmareyoo fallaadhaha ilaysku bilaw la'aan waxa lamarin bikaacada bartani waa badhtan ka obtikada ee bikaacada
3. **Xeerka kulmisada (F):-** bikaaco kulmisadu waa barta dhamaan fallaadhaha bar – barada ahi xeerka udubka Run ahaanti kulmiso kadib qalocsanka bikaacad.
4. **Xeerka kulmisada (F)** bikaaco firdhisadu waa barta fallaadhaha bar – bardu ka imanayaa xeerka udubka ee kamauqda firdhisada kadib qalocsanka dhermaraya bikaacada.
5. **Dhererkulmiska (f)** waa fogaanta udhaxaysa badhtanka obtikada (O) iyo xeerka kulmisada (F) bikaacada.

Jaantuska fallaadha lo isticmaalayo in lagu kala saaro dabeecada humaaga iyo meesha dhacayo humaagu bikaacada dhexde da.

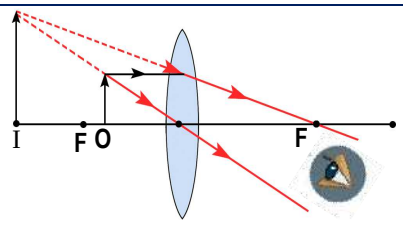
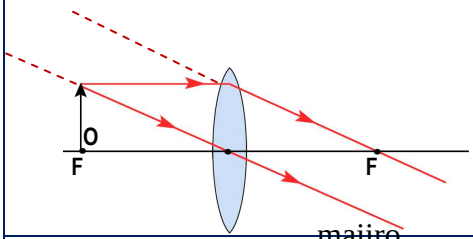
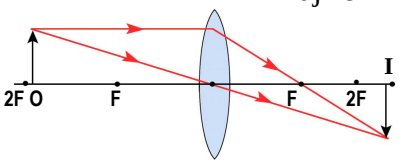
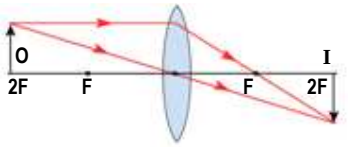
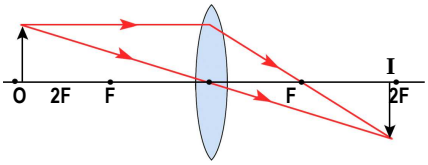
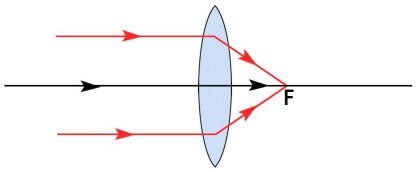
Dhisida fallaadha jaantuska muraayada qlalocsan waa in laga helo meel ladhigo iyo dabeecada humaaga ukaga **samays** mayo **bikaacada fallaad**hahani **waxay** kala **yihiin**

b. Fallaadhaha bar – barada xeerka udub dhexaadka, ka dhexgudbaya kulmisada qaloocsanka badiba.
t. Fallaadhaha ka dhex gudbaya badhtanka obtikada, marayana bikaacada. Qalloocsanka samimaayaan taasi, jihadodu is badalimayso

Samaysanka humaagu ku samaysmo bikaacada xoodan

Humaaga ay sameynagso walaxda bikaacad waxa u dhacaa barta halka ugu yaraan laba fallaadho oo qaloocsan insku golayn marka la dhisayo fallaadha jantuska waxaaanu taaganahay walaxda iyo humaaga liganaha xariiqda ee fallaadha madaxa ku leh.

Markaan dhisano jaantus fallaadheedka, waxaan ku muujin karnaa walaxda Ama humaaga xariiq qotonta oo madaxana fallaad ku leh.

	Walaxda udhexaysa bikaakada iyo F	**Humaagu waa** 1. Walaxdu ka dabeyaa 2. Been 3. Taagan 4. Kawayn walxda 5.
 majiro	Walaxda bay saran tah F	Humaag majiro
	Walaxtaala F iyo 2 F dhexdood	**Humaagu wuxuu dhacaa** 1. 2F dabadeed 2. Run 3. Rogan 4. Kaweyn walaxda
	Waalaxda udhexaysa F iyo 2F	**Humaagu waa** 1. Ga daasha 2F 2. Run 3. Qaliban 4. kawaynwalxda
	Walaxda kadabaysa 2F	**Humaaguwaa** 1. udhexeya F iyo 2F 2. Run 3. Qaliban 4. Kayar walxda
	Walaxda dhamaad malaha (aadufog)	**Humaagu waa** 1. Saaran F 2. Run 3. Qaliban 4. Kayerwalaxda

Jaantuska 6.23 Samays ka humaagu ku samays mo bikaa cada xoodan.

Hawlgalka 6.10

Sidee buu uqabanayaa humaagu bikaacada

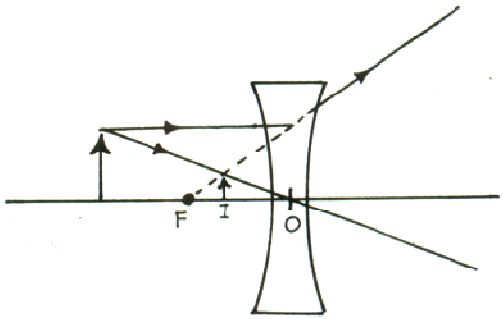
b) Kadood walaxda gal daasha iyo bart F?

t) Udhexeeya F iyo bikaacada

Sida muraayada qaloocda, weynu kala soocaynaa humaaga runta iyo humaaga beenta waxan ku celinay naa marlabaad humaag runti waa midka qabta ama ku turashaashada (projected) xaqiiqdi fallaadhaha ilaysku way ka gudbayaa. Humaaga beentu waa mid u dhexmarayo fallaadhaha ilaysku si ay u sameeyaan oo kaliya muqashada gudubka oo kaliya, xaqiiqdi hawl la'aan la kirimaayo lumaag beened ku lagu kalimaa iyo, sidaas darted haku firdhiyo shashad a

Humaaga ay samayso bikooco xoodan

Meelkasto ladhigo walaxda, humaaga waysamayn bikaacada xoodani mar walbana waa been, taagan yahay, yar-yahay wuxuu waliba dhacaa inta u dhaxaysa xeerka kulmiska "F" iyo badhtanka obtikada bikaacdu (O). Jan 6.24 waxay inatusayaa wadada ay fallaadahu socodaalan iyago barbaro ah xeerka udub dhexeedka iyo halka dhexgudbayo badhtanka obtika da (O) bikaacada. Fallaadhahan waxa lo isticmaala in lagu cadeeyo humaaga meesha uu dhaco.



Jaantuska 6.24 Humaaga kasamaysma bikaaco xoodan.

Noocyada Bikaacada	Meesha ladhigayo walaxda	Meesha iyo dabecada humaagu ku samaysmo	Isticmaal ka
1. Bikaaco Tuurta leh (kulmiso)	• Walaxda ka dabaysa 2F	- Run - Qaliban - yar	- kaamerada Telyskob Brojakter Weyneysada maraayad
	Walaxda 2F ah	- Run - qaliban - baxad leeg	
	Walaxdau dhexaysa 2F iyo F	- Run - Qaliban - waynegso	
2. Bikaaco xoodan fiirdhiso	Meelkasto ka hor imanaysa bikaacad	- Been - Taagan - yar	muraagadin dhocd.

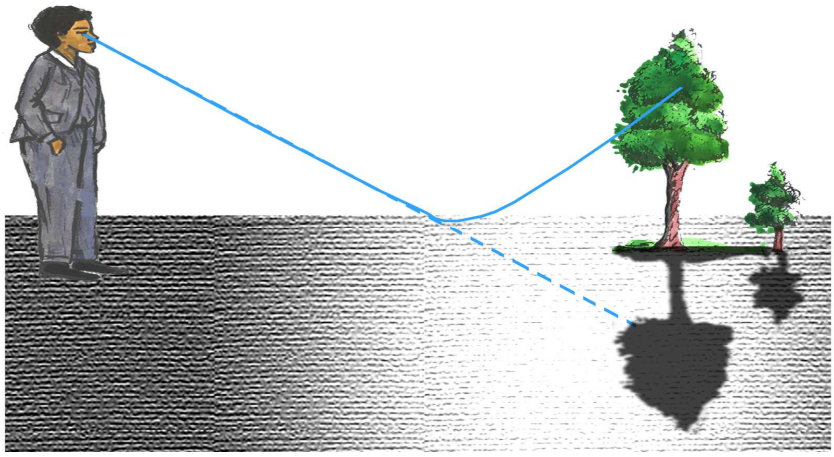
Bikaaco tuur leh waxay leeda hay kulmisrun ah lakiin bikaaca da xoodani waxay lee dahay kulmis beened.

ABDI

Dadka, keebaa socodaalay qoraxdu markag kulushahay go'eega humaag beenedka, fogaanta ay walaxdu aan sugnay barkada biyaha Waydi saaxibada ama waalidkaa abdiwaxa ufah may laamiga korkisa ag kulushahay.

Abdiwaxa usameyey noqodka ilayska ee kusocdaalaya udhaxaynta maalinta kulu iyo qabow.

Dhalaan hababistu waxay ka samaysantaa qalloocsanka ilayska ku socda ee udhexeeya hawada kulul iyo ta qabow.



Jaantuska 6.25 Abdi

Firidhka Ilayska

Hawlgalka 6.11

Markaan Fiirino ilays cad waxaa samaysma midabo kala duwan.

Waa maxay Deegaantu? Sidey usamaysantaa? Imisa midab ayaa laga heli Deegaanta Dhex deeda?

Kooxda midabada ah ee aad ku Aragtid muraayada dusheeda waxaa la dhahaa shucaac. Kala jajabida ilayska caddi u kala jajabo midabada kala duwan waxaa la yidhaa firdhin. Ilayska. Waxaa sababa qalloocsanka ilayska caddi uu u qalloocsamayo xaglo kala duwan ee quruurada firdhisada ah (Birisamka) sida jaantuska 6.26

Ileyska midabka ugu dheereeyaa waa ka aad ugu qalloocsama, halka ilayska ugu socodka yari uu ka yahay ka ugu qalloocsanka yar. Horsanaanta midabada shucaacu waa sidan soo socota. Casaanka ayaa ugu sareeya, waxaa ku xiga midabka liinta, Huruud, doog, buluug, Buluug takhah, Basali baa ugu hooseeya Basaliga ayaa ah ka ugu qalloocsan badan, casaankuna waa ka ugu qalloocsanka yar Hadaba, Ilayska caddi wuxuu ka samaysan yahay todoba midab.

b) Firdhinka ilayska ee firdhiyaha quruurada ah (Biriisam)

t) Rainbow

Jaantuska 6.26 Firdhint ailays ka

Deegaantu waa koox ama shucaac midabo ah waxaa sameeya marka qalloocsanka ilaysku uu dhexmaro dhibcaha biyaha ah ee samada.

Hubint (xaqiijinta) 6.6

1. **Waa maxay bikaacooyinku?**
2. **Sharax faraqa u dhexeeya bikaaco tuurleh iyo bikaaco xoodan.**
3. **Qeex badhtanka muraayada, dhererka kulmiska, barkulmiska, gacanka qalloocsan iyo udub dhexaadka bikaacada.**
4. **Sharax ama qeex humaaga ay samayso bikaaco xoodan iyo bikaaco tuuro adigoo isticmaalaya jaantusyo**
5. **Waa maxay muhimada ay u leedahay teknoolojiga bikaacooyinku?**
6. **Sharax ama qeex firidhka ilayska magacowna midabada shucaaca ilayska?**
7. **Waa maxay Adigoo bar bar – dhigaya qalloocsanka (mirage) qeexna.**

Soo koobbidda Cutubka

Cuttubkan waxaad ku soo baratay in

- Ilaysku yahay hirarka birlab danabow, kaasoo ka soo baxa walax kulul
- Ilaha Ilaysku waa cadceeda, guluub shidmaya, shamacyo, iyo toosh
- Ilaysku wuxuu ku safraa xariiqyo toosan walaxda kaliya ee qaada dhexdeeda
- Ilaysku wuu ka wada gudbaa dhammaantii walxaha gudbiyeyaasha ah a kuwa badh gudbiyaha ahna wuu ka badh. Gudbaa Kama gudbo walxaha saabaha ama ma gudbiyaha ah wey soo celiyaan ama wey nuugaan (liqaan).
- Nogodka ilaysku waa soo noqodka ilayska marka uu la kulmo saabe ama ma gudbiye (opaque). Walax ah.
- Xeerka noqodku wuxuu sheegayaa in xagal abaarku ay la mid tahay xagal noqodka.
- Humaaga ay samayso muraayada sallaxa ahi waa dhab, taagan, le'eg walaxda kana dambeeya muraayada.
- Muraayda xoodani waa laba nooc. Muraayad Golxo iyo muraayad tuurleh.
- Muraayada golxo waxay samaysaa humaagyo run ah kalana Rogan. Xajmiga iyo meesha uu dhacaa waxay ku xidhan tahay fogaanta walaxdu ujirto muraayada. Walax taala Barkulmiska iyo muraayada dhexdeeda Humaadgu waa humaag Beenaad, taagan, kana weyn ka walaxda.
- Humaaga ay samayso muraayada Tuur ta lehi had iyo jeer wuu taagan yahay, yar yahay, Beenaad wuxuuna dhacaa muraay ada dabadeeda.
- Qalloocsanka ilaysku waa qalloocsanka uu ilaysku qalloocsamo marka uu walax ka gudbayo ee uu u gudbayo gudbiye kale
- Bikaacooyinku waa laba nooc: Bikaaco tuuro iyo tu Golxo Bikaacada Tuuro Fallaadhaha Barbarada ah ayey ku kulmisaa Bar la yidhaahdo Bar kulmis (Ama Godka udub dhexaadka). halka Bikaacada Golxo ay kala fogayso fallaadhaha Barbarada ah
- Kala jajabinta Iftiinka lookala jajabiyo midabo kala duwan waxaa la dhahaa firdhisan. Midabka cadi wuxuu ka samaysan yahay todoba midab.

Nakhtiinka su'aalaha iyo masalooyinka

1. **Ku Buuxi shaxdan soo socota tusaaleyaal**

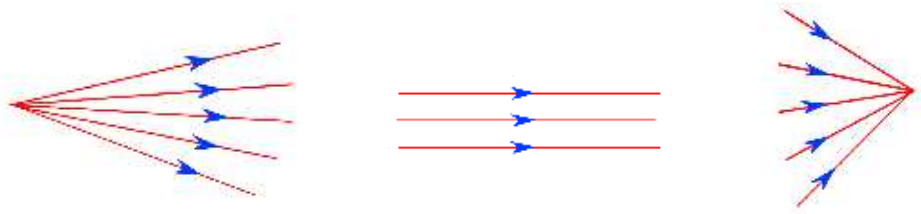
Walax	Seddex tusaale midkasta
Gudbiye	1 2 3
Badh Gudbiye	1 2 3
Saabe	1 2 3

2. **Kuqor noocyada fallaadhaha ilayska ee laguu tilmaamay magacdooda meelaha bannaan ee lagu sii yey. Jaantuska 6.27**

   b) _____

   t) _____

   j) _____



b) *t)* *j)*

Jaantuska 6.27 Noocyada fallaadhaha ilayska

3. **Ku sharax tusaale Gacan ka qabad ah sida fallaadha ilaysku u safraan**
4. **Qeybaha ilays noqodka ee ka yimaada muraayadu waa la calaamadeeyey maxay u taagay yihiin xarfahani**

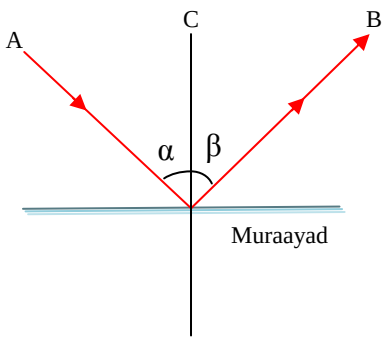
   A._____

   B._____

   C_____

   <α_____

   <β_____



Jaantuska 6.28 Noqodka Fallaadha ilayska

5. **Qeex**
   - **b) Ilays Noqodka**
   - **t) Qalloocsanka Ilayska**
   - **j) Firdhisanka Ilayska**

6. **Sharax waxa muraayda golxo iyo muraayada Tuuro ay ku sameeyaan fallaadha Barbarada ah eeku socda wajiyadooda.**
7. **Dhis jaantuska fallaadhaha si aad u heshid humaaga shamac shidmaya oo yaala muraayada sallaxa horteeda.**
8. **Qeex samayska humaaga ay samayaan bikaacooyinka Tuuro iyo kuwa Golxo. Buuxi shaxanka hoos lagugu siiyey.**

Noocyada Bikaacada	Nooca humaaga
Bikaaco Tuuro	
Bikaaco golxo	

9. **Waa maxay faraqa u dhexeeya Humaagyada Beenaadka iyo ka Runta ah?**
10. **Sawir Fallaadhaha Noqodka iyo fallaadh Abaarada**
    - b) **Muraayada Golxo**
    - t) **Bikaacada tuuro**