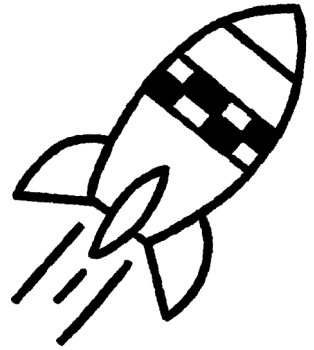


Dhererka siligga (Length of a wire)



Sayniska

Cutub: Iska caabbinta (Resistance) iyo wareegyada barbar socda (parallel circuits)

Natiijo

Waxaan sharxi karaa sababta siligyada dhaadheer ay u leeyihiin iska caabin (resistance) ka sareeya kuwa gaagaaban.

Erayada muhiimka ah

**iska caabin
(resistance)**

ion birta (metal ion)

elektaroon (electron)

saami (proportional)

Erayada muhiimka ah

Iska caabinta (Resistance) waa cabbirka sida ay u adag tahay in korontadu (current) qulqusho.

Ion birta (metal ion) waxaa la sameeyaa marka atom birta uu lumiyo hal ama in ka badan oo elektaroon (electron) ah oo uu leeyahay kharash togan (positive charge).

Elektaroonnada (Electrons) waa kharashyada ku jira gudbiyeyaasha (conductors) kuwaas oo qulqula si ay u bixiyaan koronto (electric current).

Laba doorsoome (variables) waa saami (proportional) haddii midi isbeddelo sida dhufashada (multiple) kan kale.

Dhererka siligga (Length of a wire)



Korontada (Current) maraysa siligyo dherer kala duwan



Iska caabinta (Resistance) siligga dhererkiisu kala duwan yahay

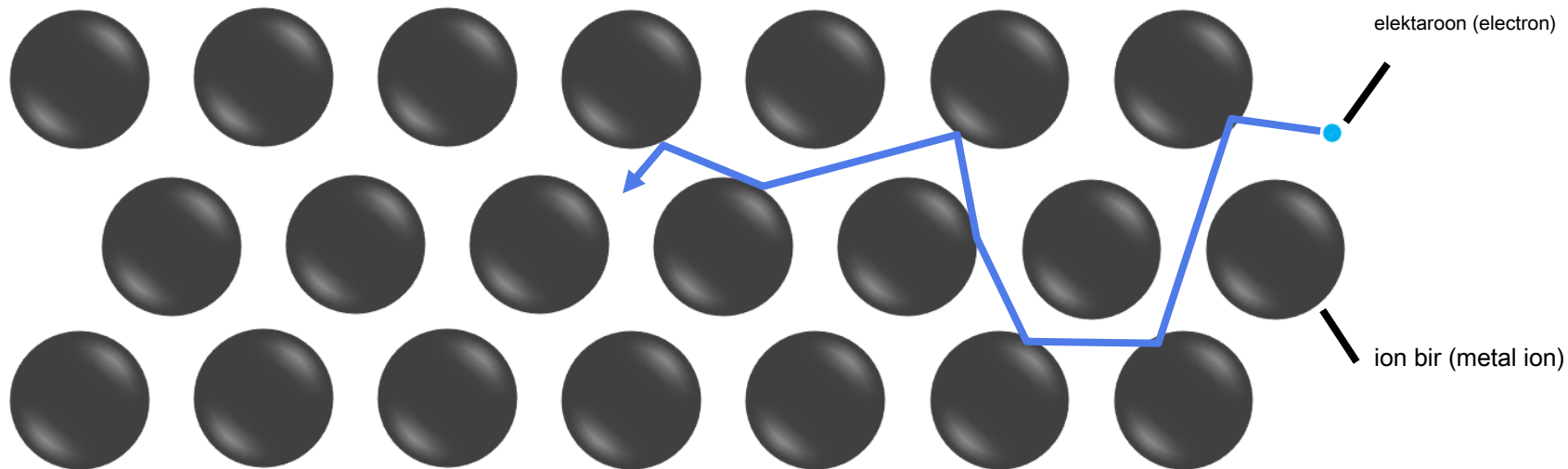
Korontada (Current) maraysa siligyo dherer kala duwan

Silig khafiif ah oo nichrome ah ayaa leh iska caabin (resistance) muhiim ah oo uu hor istaago qulqulka korontada (current).



Iska caabinta (resistance) waxaa keena ion birta (metal ions) ee ku jirta siligga.

Hal qaab oo iska caabin (resistance) ah ayaa ah in elektaroon (electron) uu ku dhaco ion birta (metal ions) marka uu dhex marayo siligga.



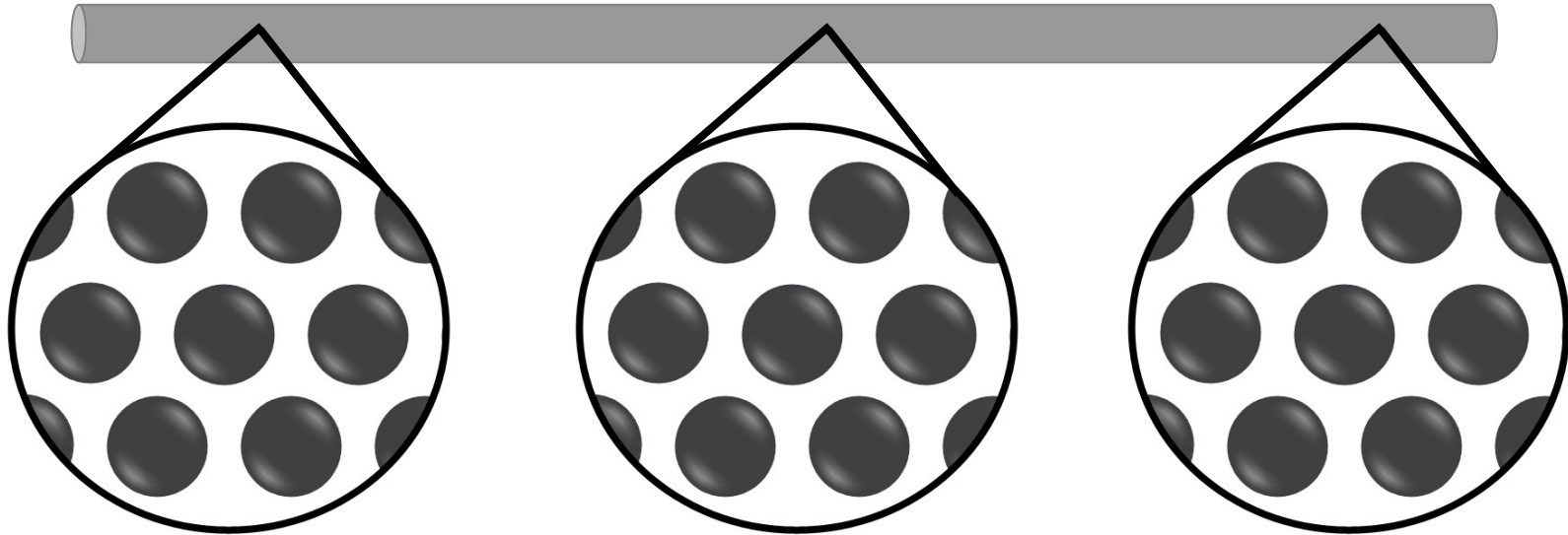
Tani waxay hor istaagtaa dhaqdhaqaaqa (motion) oo waa sababta iska caabinta (resistance).

Waa maxay hadal ku sifeeya sababta iska caabinta (resistance) uga jirta silig bir ah?

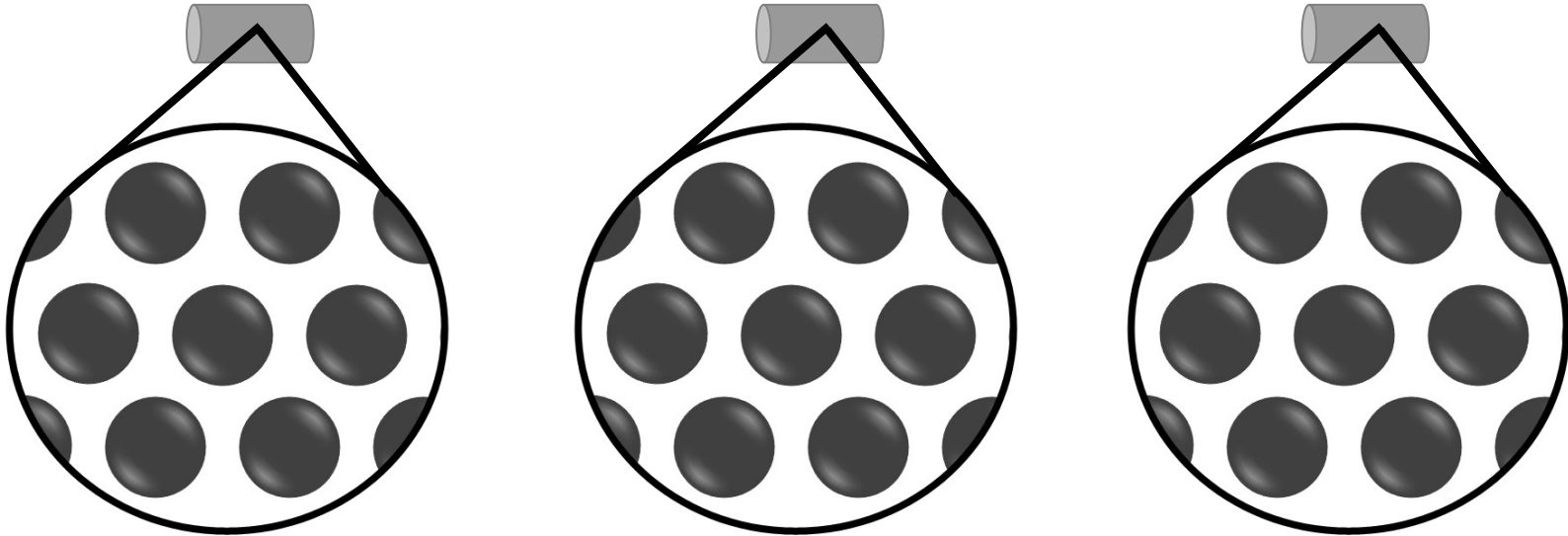
- a** elektronnada (electrons) waxay isku dhacaan ion birta (metal ions) ✓
- b** ion birta (metal ions) waxay u dhaqaaqaan jidka elektronnada (electrons)
- c** elektronnada (electrons) iyo ion birta (metal ions) way is soo jiitaan

Koronto (Current) maraya siligyo dherer kala duwan leh

Waxaa jira ion bir (metal ions) oo keena iska caabin (resistance) dhererka oo dhan ee siliga.



Qayb kasta oo ka mid ah kuwani waxay keeni doonaan iska caabin (resistance).



Waa maxay hadal ku sifeeya iska caabinta (resistance) silig bir ah oo isku mid ah?

a iska caabintu (resistance) waxay ugu badan tahay darafyada

b iska caabintu (resistance) waxay ugu badan tahay dhexda

c iska caabintu (resistance) waa isku mid qayb kasta oo siliga ah



Siligu wuxuu la mid yahay qaybo gaaban, mid kastaa wuxuu leeyahay iska caabin (resistance) yar, oo la isku xidhay.



Siliga waxaa sidoo kale loo qaadan karaa inuu yahay iska caabiyeyaal (resistors) badan oo isku xidhan taxane (series).

Way fududahay in koronto (current) lagu riixo hal iska caabiye (resistor) ...



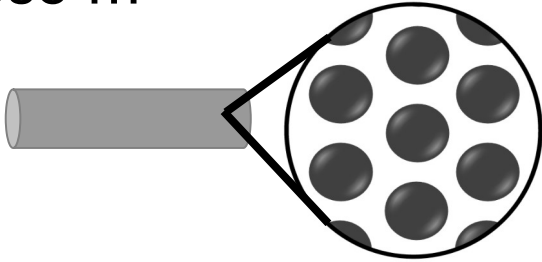
... marka loo eego in badan.

Way fududahay in koronto (current) lagu riixo dherer gaaban oo silig ah ...



... marka loo eego dherer badan.

Silig gaaban wuxuu leeyahay iska caabin (resistance)
hoose ...



Waxaa jira bir-ion (metal ions)
yar oo lagu shubo siliga
gaaban.

... marka loo eego kan dheer.



Run mise been?

Silig dheer wuxuu leeyahay iska caabin (resistance) hoose marka loo eego silig gaaban.



Run



Been



Sabab u sheeg jawaabtaada



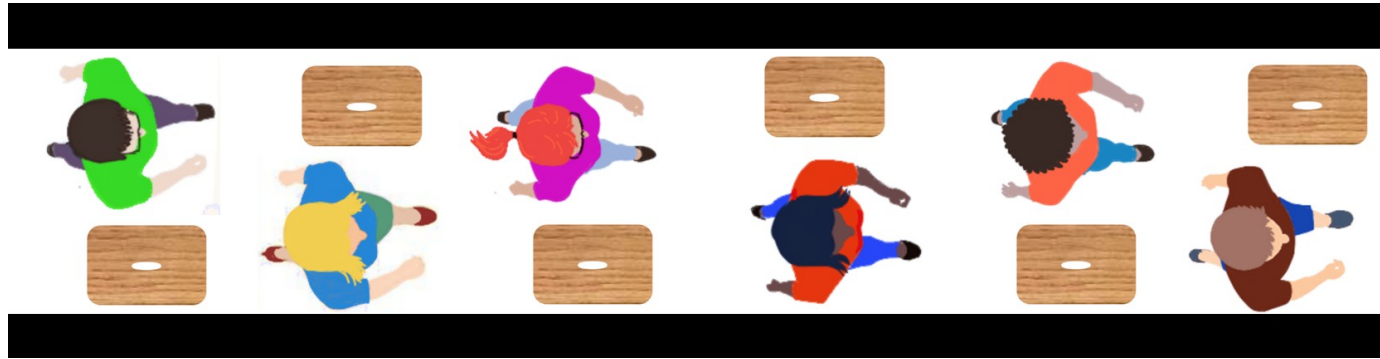
Waxaa jira bir-ion (metal ions) badan oo ku teedsan siliga dheer.



Waxaa jira elektaroonno (electrons) badan oo ku teedsan siliga dheer.

Koronto (Current) dhex mara silacyo dherer kala duwan

Qaabka dadka dhaqaaqaya (moving people model), waxaa jira kuraas (seats) yar oo jidka ku yaal qayb gaaban.



Kordhinta dhererka waxay kordhisaa tirada kuraasta (seats) jidka ku yaal waxayna kordhisaa iska caabinta (resistance).

Waa sheegasho (statement) run ah oo ku saabsan qaabka dadka dhaqaaqaya (moving people model)?

a

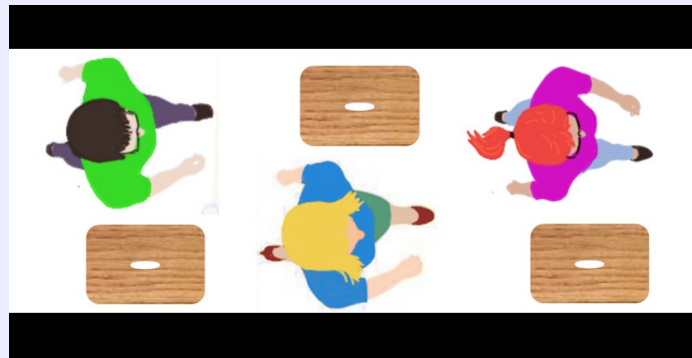
meel cidhiidhi ah waxay leedahay kuraas (seats) badan

b

meel dheer way fududahay in laga gudbo

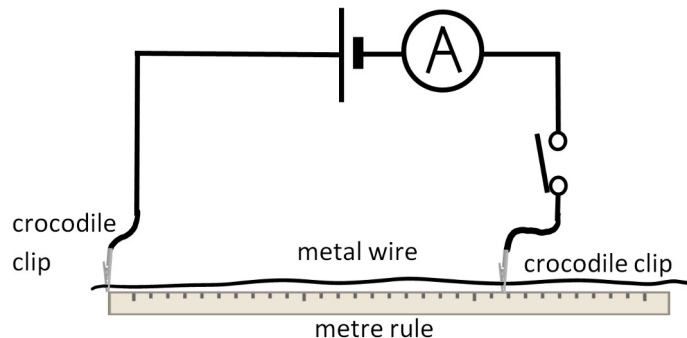
c

kuraasta (seats) ayaa jidka isku taalla



Tijaabi inta koronto (current) ee dhex mari karta dherer kala duwan oo isku silig ah.

- Ku bilow dherer 100.0 cm, ka dibna hoos u dhig 20.0 cm mar kasta, kuna dhamee 20.0 cm.
- Isticmaal ammeter (ammeter) si aad u cabbirto korontada (current).
- Ku qiyaas socodka (current) dhex mara dherer kasta saddex jeer, kadibna xisaabi celceliska socodka mid kasta.



length of wire (cm)	current (A)			
	1	2	3	mean

1) Sharax waxa aad heshay.

2) Isbarbardhig cabbirada socodka iyo dhererka.

Sample results:

length of wire (cm)	current (A)			
	1	2	3	mean
100.0	0.085	0.089	0.089	0.088
80.0	0.112	0.113	0.106	0.110
60.0	0.440	0.144	0.148	0.146
40.0	0.219	0.223	0.219	0.220
20.0	0.435	0.431	0.450	0.439

1) Sharax waxa aad heshay.

Markii dhererku yaraaday, celceliska socodku wuu kordhay.

Tani waxay ka dhigan tahay in iska caabbintu (resistance) yaraato marka dhererku yaraado.

Qiimihii ugu horreeyay ee dhererka 60.0 cm wuxuu ahaa mid aan caadi ahayn (anomalous), sidaas darteed looma isticmaalin xisaabinta celceliska.

2) Isbarbardhig cabbirada (measurements) ee current-ka iyo dhererka (length).

Markasta oo dhererka la yareeyo, socodku wuu kordhay.

Socodka 80.0 cm wuxuu ahaa 0.110 A, 40.0 cm-na wuxuu ahaa 0.220 A.

Markii dhererka la badh-dhigay (80.0→40.0), socodku wuu labanlaabmay (0.110→0.220).

Socodka 20.0 cm wuxuu ahaa 0.439 A, socodka 40.0 cm-na wuxuu ahaa 0.220 A.

Markii dhererka la labanlaabay (20.0→40.0), socodku wuu badh-dhacay (0.439→0.220).

Iska caabbinta (Resistance) waa nus markii dhererka uu noqday nus.

Iska caabbinta (resistance) ayaa labanlaabmay markii dhererka (length) labanlaabmay.

Dhererka (length) silaca (wire)



Current-ka maraya silacyo (wires) dherer kala duwan



Iska caabbinta (resistance) ee silaca (wire) dhererka kala duwan

Iska caabbinta (resistance) ee silaca (wire) dhererka kala duwan

Marka dhererka (length) silaca (wire) kordho, current-ka wuu yaraadaa. Tani waxay ka dhigan tahay in iska caabbinta (resistance) ay kordhayso.

Labanlaabista dhererka
(length) laga bilaabo 20.0 cm
ilaa 40.0 cm ...

dhererka (length) silaca (cm)	current (A)
20.0	0.439
40.0	0.220
60.0	0.146
80.0	0.110
100.0	0.088

... waxay keentaa in current-
ku 'nuslaado' laga bilaabo
0.439 A ilaa 0.220 A.

Haddii current-ku nuslaado, iska caabbinta (resistance) waa labanlaabantay.

Iska caabbinta (resistance) ee silaca (wire) dhererka kala duwan

Marka dhererka (length) silaca (wire) kordho, current-ka wuu yaraadaa. Tani waxay ka dhigan tahay in iska caabbinta (resistance) ay kordhayso.

Labanlaabista dhererka
(length) laga bilaabo 40.0 cm
ilaa 80.0 cm ...

dhererka (length) silaca (cm)	current (A)
20.0	0.439
40.0	0.220
60.0	0.146
80.0	0.110
100.0	0.088

... waxay keentaa in current-
ku nuslaado laga bilaabo
0.220 A ilaa 0.110 A.

Iska caabbinta (resistance) ayaa mar kale labanlaabantay.

Kordhinta dhererka (length) saddex jeer laga bilaabo 20.0 cm ilaa 60.0 cm ...

dhererka (length) silaca (cm)	current (A)
20.0	0.439
40.0	0.220
60.0	0.146
80.0	0.110
100.0	0.088

... waxay keentaa in korantada (current) ay hoos uga dhaedo 0.439 A ilaa 0.146 A.

Iskaabka (resistance) ayaa ku kordhay saddex jeer (a factor of three).

Marka dhererka (length) iyo iskaabka (resistance) ay isku qodob (factor) ku kordhaan, waxaan niraahnaa iskaabku (resistance) waa u dhiganta (proportional) dhererka (length).

Iskaabka (resistance) siligyada dhererka kala duwan leh

Waa maxay korantada (current) ee silig dhererkiisu yahay 50.0 cm?

a 0.176 A ✓

b 0.183 A

c 0.200 A

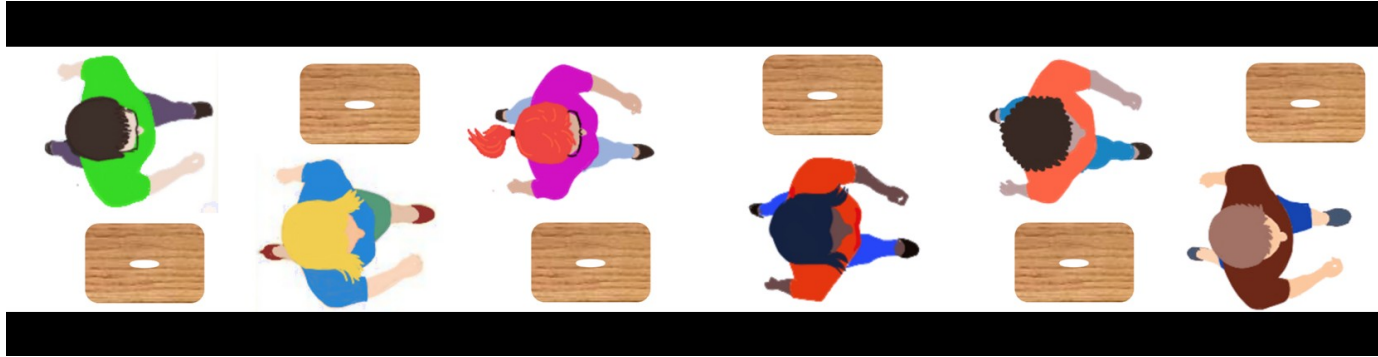
dhererka siligga (cm)	korantada (current) (A)
20.0	0.439
40.0	0.220
60.0	0.146
80.0	0.110
100.0	0.088

Korantada (current) dhererka 100.0 cm waa 0.088 A.

Dhererka 50.0 cm, korantadu (current) waxay noqon doontaa labanlaab ($2 \times 0.088 = 0.176$ A).

Iskaabka (resistance) siligyada dhererka kala duwan leh

Qaabka dadka socda (moving people model), waxaa jira saddex kursi (seats) oo jidka ku jira qayb gaaban.



Labanlaabista dhererka (length) waxay labanlaabaysaa tirada kursaska (seats) ilaa lix waxayna labanlaabaysaa iskaabka (resistance).

Iskaabka (resistance) siligyada dhererka kala duwan leh

Run mise been?

Qaabka dadka socda (moving people model), kordhinta dhererka (length) iyo tirada dadka waxay u oggolaanaysaa koronto (current) sare inay socoto.

T Run

F Been



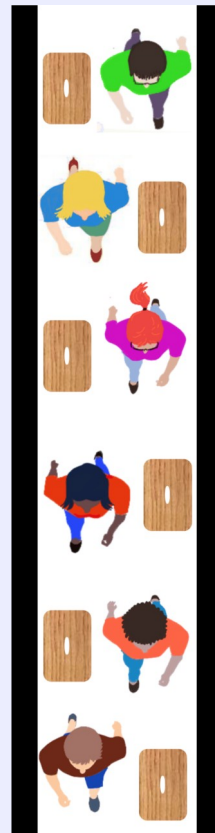
Sabab u sheeg jawaabtaada

a

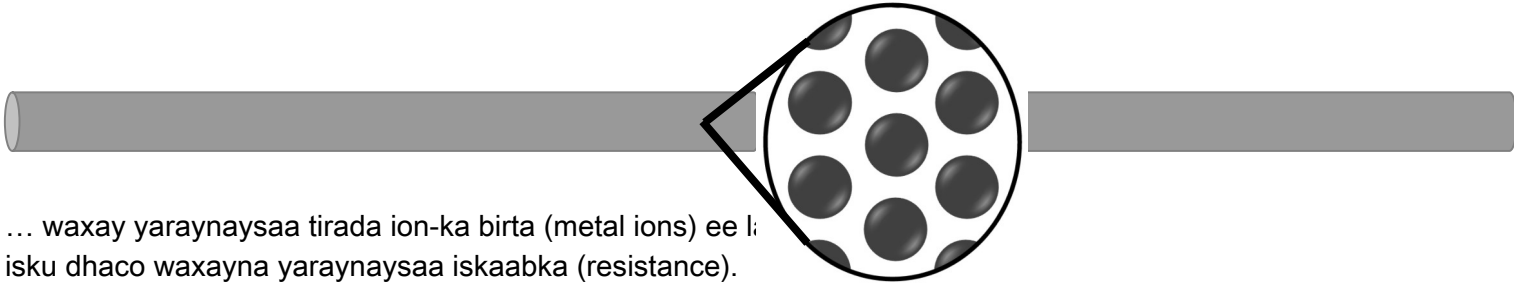
Dad badan waxay la mid yihiin koronto (charge) badan ama koronto (current) sare.

b

Kursaso badan (seats) waxay ka dhigaan dhaqdhaqaaqa mid adag sidaas darteed korantada (current) waa la yareeyaa



Gooynta silig dheer kala badh ...



... waxay yaraynaysaa tirada ion-ka birta (metal ions) ee lii
isku dhaco waxayna yaraynaysaa iskaabka (resistance).

Iskaabka (resistance) wuu kala badh yimaadaa.

Iska caabinta (resistance) siligga dhererkiisa kala duwan



Hubi

Maxaa ku dhici doona korontada (current) ee silig dhuuban (thin wire) qaado haddii Waa la jaray saddex qaybood oo isleeg (oo kaliya hal qayb ayaa la isticmaalaa)?

a

hadda (current) wuxuu noqon doonaa saddex jeer ka weyn ✓

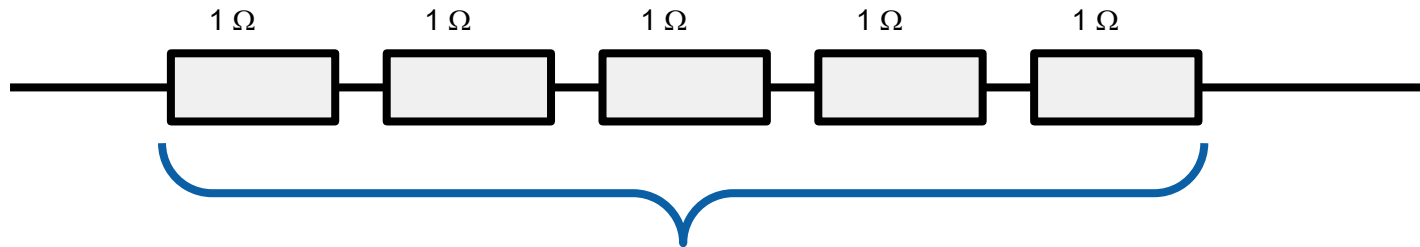
b

hadda (current) wuxuu sii ahaan doonaa isku mid

c

hadda (current) wuxuu noqon doonaa saddex jeer ka yar

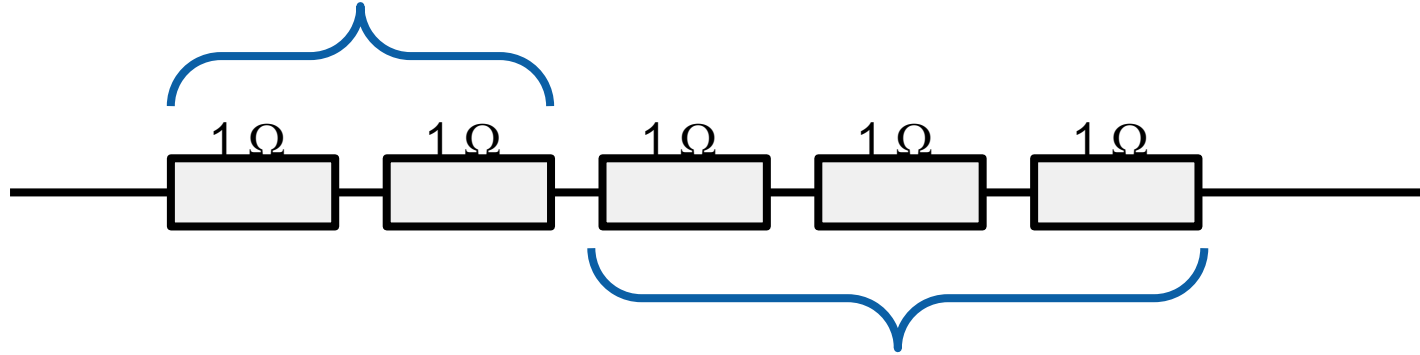
Mid kasta oo ka mid ah resistors-kaani wuxuu leeyahay iska caabin (resistance) ah $1\ \Omega$.



Wadarta iska caabinta (resistance) waa $1 + 1 + 1 + 1 + 1 = 5\ \Omega$.

Iska caabinta (resistance) siligga dhererkiisa kala duwan

Iska caabinta (resistance) 2 resistor waa $2\ \Omega$.



Iska caabinta (resistance) 3 resistor waa $3\ \Omega$.

Iska caabinta (resistance) siligga dhererkiisa kala duwan



Hubi

Silig 10 cm ah oo leh iska caabin (resistance) $10\ \Omega$ ayaa la jaray qaybo 6 cm iyo 4 cm ah. Waa maxay iska caabinta (resistance) qayb kasta oo silig ah?

a

Iska caabinta (resistance) qaybta 6 cm waa $6\ \Omega$,
iska caabinta (resistance) qaybta 4 cm waa $4\ \Omega$.



b

Iska caabinta (resistance) qaybta 6 cm waa $4\ \Omega$,
iska caabinta (resistance) qaybta 4 cm waa $6\ \Omega$.

c

Labada qayboodba waxay leeyihiin iska caabin (resistance) ah $5\ \Omega$.

Silig nichrome ah oo dhererkiisu yahay 100.0 cm wuxuu leeyahay iska caabin (resistance) sax ah oo ah 200 Ω .

Sharax sida ay suurtoagal u tahay in la sameeyo resistors:

- 1) 100 Ω
- 2) 50 Ω
- 3) 3 Ω oo ka yimid dhererka siligga

Waxaad isticmaali kartaa kuwa gooya siligga (wire cutters) iyo mitir-ruler.

Sharax sida ay suurtoagal u tahay in la sameeyo iska caabbiyeyaasha (resistors) ee:

1) $100\ \Omega$

$100\ \Omega$ waa badh $200\ \Omega$, sidaas darteed haddii siliga la jar jaro badh si loo sameeyo dherer 50.0 cm , wuxuu yeelan doonaa iska caabin (resistance) $100\ \Omega$.

2) $50\ \Omega$

$50\ \Omega$ waa badh $100\ \Omega$, sidaas darteed haddii dhererka 50.0 cm ee hadhay la jar jaro badh si loo helo 25.0 cm , wuxuu yeelan doonaa iska caabin (resistance) $50\ \Omega$.

Sharax sida ay suurtoagal u tahay in la sameeyo iska caabbiyayaasha (resistors) ee:

3) $3\ \Omega$ oo laga soo qaado dhererka siliga.

100 cm wuxuu bixiyaa $200\ \Omega$

50 cm wuxuu bixiyaa $100\ \Omega$

25 cm wuxuu bixiyaa $50\ \Omega$

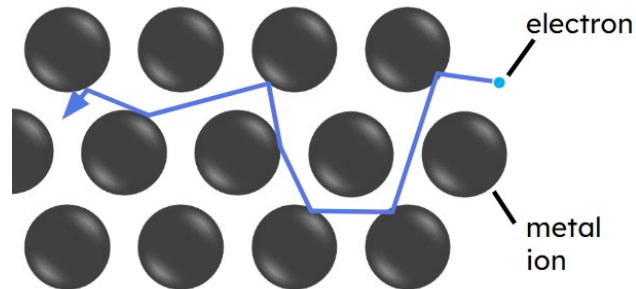
1 cm wuxuu bixiyaa $2\ \Omega$

Sidaas darteed, 1.5 cm wuxuu bixin doonaa $3\ \Omega$

Tirada ohms waa laba jibaar tirada cm.

Iska caabbinta (resistance) silig waxaa sababa elektaroonnada (electrons) oo isku dhaca ion-ka (ions) birta.

Silig dheer wuxuu yeelan doonaa ion (ions) badan oo bir ah, isagoo sababa isku dhacyo. Wuxuu yeelan doonaa iska caabin (resistance) sare.



Laba jibaarista dhererka silig isku mid ah waxay laba jibaaraysaa tirada ion-ka (ions) birta. Waxay laba jibaaraysaa iska caabbinta (resistance) siliga.

Iska caabbinta (resistance) siligu waxay u dhigantaa (proportional) dhererkiisa.