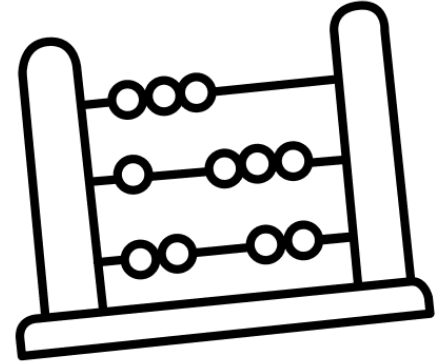


Beddelka mawduuca si uu ugu habboonaado duruufaha



Maths

Cutub: Tibaaxaha iyo qaaciidooyinka

Natiijo

Waxaan qiimeyn (value) karaa mashaakic kala duwan si aan u ogaado marka dib-habaynta qaaciidada ay faa'iido leedahay.

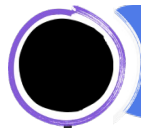
Mawduuca isla'egta/qaaciidada waa doorsoome (variable) lagu muujiyay doorsoomayaal kale. Waa inuu leeyahay jibbaar (exponent) 1 iyo isku-dhufasho (coefficient) 1.

Tusaale ahaan, a waa mawduuca qaaciidadan $a = \sqrt{c^2 - b^2}$

laakiin, a^2 ma aha mawduuca qaaciidadan $a^2 = c^2 - b^2$

Qaabka casharka

Beddelka mawduuca si uu ugu habboonaado duruufaha



Dib-habaynta tillaabooyinka isku-darka iyo isku-dhufashada



Dib-habaynta isla'egyada si loo helo jiirada (gradient)

Dib-habaynta tillaabooyinka isku-darka iyo isku-dhufashada

Xiriirrada isku-dhufashada waxaa dib loo habayn karaa qoys xaqiiqooyin ah.

Haddii $4 \times 5 = 20$ markaas...

Waxaan si la mid ah u dib u habayn karnaa qaaciidada isku-dhufashada.

xawaaraha (speed) $\times$ waqtiga (time) = masaafada
(distance)

$$\frac{d}{t} = s$$

$$\frac{d}{s} = t$$

Dib-habaynta tillaabooyinka isku-darka iyo isku-dhufashada



Doorsoomaha (variable) aan doonayno inaan xisaabino ayaa go'aamiya dib-habaynta aan isticmaalno.

$$s \times t = d$$

$$t \times s = d$$

$$\frac{d}{t} = s$$

$$\frac{d}{s} = t$$

Gaari wuxuu ku socdaa 50 mph saddex saacadood. Immisa ayuu ku safray?

Waxaan doonaynaa inaan ogaanno masaafada (distance) marka waxaan u baahanahay dib-habayn ay masaafadu tahay mawduuca.

Dib-habaynta tillaabooyinka isku-darka iyo isku-dhufashada

Doorsoomaha (variable) aan doonayno inaan xisaabino ayaa go'aamiya dib-habaynta aan isticmaalno.

$$s \times t = d$$

$$t \times s = d$$

$$\frac{d}{t} = s$$

$$\frac{d}{s} = t$$

Gaari wuxuu ku socdaa 50 mph saddex saacadood. Immisa ayuu ku safray?

$$s \times t = d$$

$$50 \times 3 = d$$

$$d = 150 \text{ miles}$$

Doorsoomaha (variable) aan dooneyno inaan xisaabino ayaa go'aamiya dib-u-habaynta (rearrangement) aan isticmaaleyno.

$$s \times t = d$$

$$t \times s = d$$

$$\frac{d}{t} = s$$

$$\frac{d}{s} = t$$

Diyaarad waa inay duusho 6000 miles waxayna ku socotaa 400 mph. Intee ayay soconaysaa safarku?



Waxaan dooneynaa inaan ogaanno waqtiga (time) marka waxaan u baahanahay dib-u-habayn (rearrangement) ay waqtigu (time) yahay mawduuca (subject).

Dib-u-habaynta tillaabooyinka isku-dhafka iyo isku-dhufashada

Doorsoomaha (variable) aan dooneyno inaan xisaabino ayaa go'aamiya dib-u-habaynta (rearrangement) aan isticmaaleyno.

$$s \times t = d$$

$$t \times s = d$$

$$\frac{d}{t} = s$$

$$\frac{d}{s} = t$$

Diyaarad waa inay duusho 6000 miles waxayna ku socotaa 400 mph. Intee ayay soconaysaa safarku?

$$\frac{d}{s} = t$$

$$\frac{6000}{400} = t$$

$$t = 15 \text{ hours}$$

Fiisikiska (Physics) waxaa laga yaabaa inaad la kulanto qaaciddo (formula) loogu talagalay xisaabinta karaar (acceleration) ee walax (particle).

karaar (acceleration) = xawaaraha ugu dambeeya (final velocity) – xawaaraha bilowga (initial velocity)

Fiisikiska (Physics) waxaa laga yaabaa inaad la kulanto qaaciddo (formula) loogu talagalay xisaabinta karaar (acceleration) ee walax (particle).

karaar (acceleration) (a) = xawaaraha ugu dambeeya (final velocity) (v) – xawaaraha bilowga (initial velocity) (u)

waqtiga (time)

(t)

$$a = \frac{v - u}{t}$$

Qaabkan (format), oo karaar (acceleration) (a) yahay mawduuca (subject), wuxuu ku fiican yahay xisaabinta karaar (acceleration) haddii aad taqaanid xawaaraha ugu dambeeya (final velocity) (v), xawaaraha bilowga (initial velocity) (u), iyo waqtiga (time) (t).

Fiisikiska (Physics) waxaa laga yaabaa inaad la kulanto qaaciddo (formula) loogu talagalay xisaabinta karaar (acceleration) ee walax (particle).

karaar (acceleration) (a) = xawaaraha ugu dambeeya (final velocity) (v) – xawaaraha bilowga (initial velocity) (u)

waqtiga (time)

(t)

$$a = \frac{v - u}{t}$$

Laakin sidee haddii aan ognahay a, u, iyo t oo aan rabno in aan ogaanno v, xawaaraha ugu dambeeya?

Dib-u-habaynta tillaabooyinka isku darka iyo isku dhufashada

Waxaan ka dhigi karnaa v mawduuca si loogu muujiyo marka loo eego doorsoomayaasha kale.

$$a = \frac{v - u}{t}$$

$$at = v - u$$

$$at + u = v$$

v hadda waa mawduuca. Waxaan ku beddeli karnaa doorsoomayaasha kale si dhakhso ah u helno qiimihiisa.

Kee ka mid ah dib-u-habayntan ayaa noqon kara mid faa'iido leh haddii aan ognahay a , v , iyo t oo aan rabno in aan ogaanno u , xawaaraha bilowga ah?

a $at + u = v$ ✗

Haddii aan rabno in aan ogaanno u , waxaan rabnaa in u noqdo mawduuca.

$$a = \frac{v - u}{t}$$

b $u = v - at$ ✓

$$at = v - u$$

c $u = v + at$ ✗

$$at + u = v$$

$$u = v - at$$

Ma aha oo kaliya xisaabta iyo fiisigiska inaan ku aragno qaaciidooyinka.

Break-Even waa qaaciido muhiim ah oo ganacsi, gaar ahaan ganacsatada cusub.

qiimaha iibka – kharashka doorsooma ee hal unug

Heerka Break-Even waa tirada unugyada uu ganacsigu u baahan yahay inuu iibiyo si uu u bilaabo inuu faa'iido sameeyo.

Tusaale, waxaad furtaa dukaan qaxwo ah oo kharashka bilowga ah £16 000. Markaad shaqeysid, waxaad iibisaa kulli kafee £3 waxayna kugu kacaan £1 inaad soo saarto. Goormaad gaari doontaa Break-Even?

qiimaha iibka – kharashka doorsooma ee hal unug

Ma iibin kartaa 8 000 oo koofiyadood? Intee ayay qaadanaysaa?



Laakiin, sidee haddii aad taqaanay tirooyinka unugyada aad iibin karto?

Tirada Dakhli-la'aanta (Break-Even Quantity) =

kharashyada go'an (fixed costs)

qiimaha iibinta (selling price) – kharashka doorsooma ee hal unug (variable cost per unit)

Haddii aad taqaanay tiradaas, iyo kharashyadaaga go'an (fixed costs), iyo kharashkaaga doorsooma ee hal unug (variable cost per unit), waxaad xisaabin kartaa qiimaha iibinta (selling price) ee aad u baahan tahay inaad ku dallacdo si aad faa'iido u hesho.

Si taas loo sameeyo waxaan u baahanahay inaan ka dhigno 'qiimaha iibinta (selling price)' mawduuca (subject) qaacidada.

$$\text{Tirada Dakhli-la'aanta (Break-Even Quantity)} = \frac{\text{kharashyada go'an (fixed costs)}}{\text{qiimaha iibinta (selling price) - kharashka doorsooma ee hal unug (variable cost per unit)}}$$

$$Q = \frac{f}{s - v}$$

Si taas loo sameeyo waxaan u baahanahay inaan ka dhigno 'qiimaha iibinta (selling price)' mawduuca (subject) qaacidada.

$$Q = \frac{f}{s - v}$$

$$Q (s - v) = f$$

$$s - v = \frac{f}{Q}$$

Qiimaha iibinta (selling price) (s) hadda waa mawduuca (subject).

$$s = \frac{f}{Q} + v$$

Hadda waxaan xisaabin karnaa qiimaha aan u baahanahay inaan ku iibinno hal unug si aan u bilowno faa'iidada.

$$\text{qiimaha iibinta (selling price)} = \frac{\text{kharashyada go'an (fixed costs)}}{\text{Tirada Break-Even (Break-Even Quantity)}} - \text{kharashka doorsooma ee hal unug (variable cost per unit)}$$

Qiimaha iibinta (selling price) (s) hadda waa mawduuca (subject).

$$s = \frac{f}{Q} + v$$

Dib-u-habaynta tillaabooyinka isku darka iyo isku dhufashada



Kontoroolka kharashka waa curiye (element) aad muhiim u ah ganacsiga.

Dib-u-habi qaacidada break-even si aad uga dhigto 'Kharashka kala duwan ee halbeegga (v)' mawduuca.

$$Q = \frac{f}{s - v}$$

$$Q(s - v) = f$$

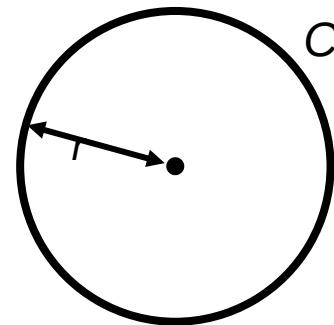
$$s - v = \frac{f}{Q}$$

$$s = \frac{f}{Q} + v$$

$$s - \frac{f}{Q} = v$$

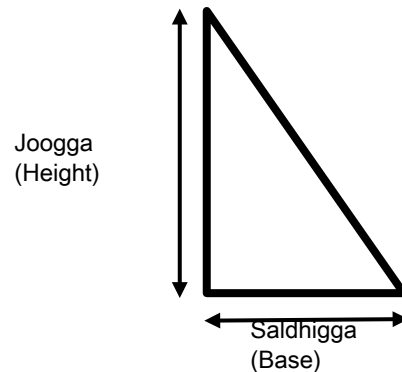
1) a) Dib-u-habi qaacidada wareegga goobada si ay u noqoto mid waxtar badan oo lagu helo radius (radius) haddii aad taqaan wareegga.

$$C = 2\pi r$$



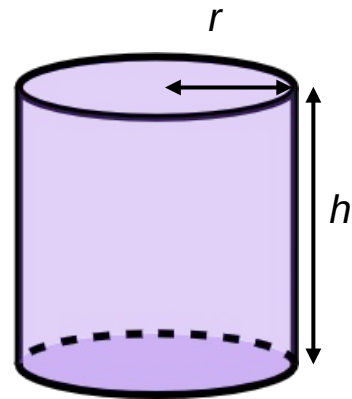
b) Dib-u-habi qaacidada bedka saddexagalka si ay u noqoto mid waxtar badan oo lagu helo joogga (height) haddii aad taqaan bedka iyo saldhigga.

$$A = \frac{1}{2}bh$$



1) c) Dib-u-habi qaacidada bedka dusha sare ee dhululubada si ay u noqoto mid waxtar badan oo lagu helo joogga (height) haddii aad taqaan bedka dusha sare iyo radius (radius).

$$A = 2\pi r^2 + 2\pi rh$$



2) Kani waa qaacidada loogu beddelo Celsius Fahrenheit.

Muuji laba siyaabood oo aad dib-u-habayn karto qaacidada si ay u beddesho Fahrenheit Celsius.

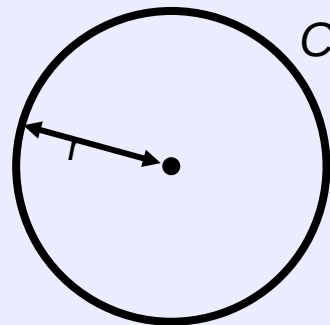
$$F = \frac{9c}{5} + 32$$

1) a) Dib-u-habi qaacidada wareegga goobada si ay u noqoto mid waxtar badan oo lagu helo radius (radius) haddii aad taqaan wareegga.

$$C = 2\pi r$$

$$\frac{C}{2\pi} = r$$

r, waxa aan rabno inaan helno, ayaa hadda ah mawduuca.



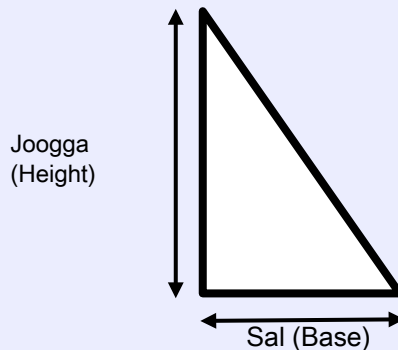
1) b) Dib-u-habaynta bedka (area) iyo sal (base) ayuko qate) shaxda
bagalka (triangle) iyo joogga (height) naadista jooqga (height) iyo sal (base).
taqaanid bedka (area) iyo sal (base).

$$A = \frac{1}{2}bh$$

$$2A = bh$$

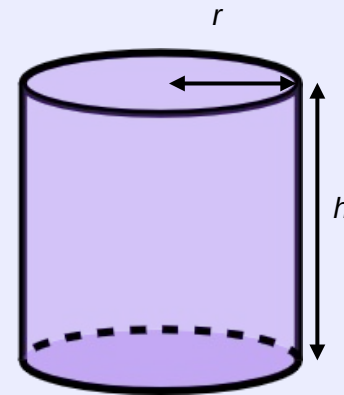
$$\frac{2A}{b} = h$$

*h, waxa aan la garanayn (unknown) ee aan
rabno inaan helno, ayaa hadda ah mawduuca
(subject).*



1) c) Dib u habayn (rearrange) qaacidada (formula) bedka dusha (surface area) dhululubada (cylinder) si ay ugu hufnaato helista joogga (height) haddii aad taqaanid bedka dusha (surface area) iyo gacan-dheerka (radius).

$$A = 2\pi r^2 + 2\pi rh$$



$$\frac{A - 2\pi r^2}{2\pi r} = h$$

h, waxa aan la garanayn (unknown) ee aan rabno inaan helno, ayaa hadda ah mawduuca (subject).

2) Kani waa qaacidada (formula) loogu beddelo (convert) Celsius Fahrenheit.

Tus laba qaab oo dib u habayn (rearrange) qaacidada (formula) si ay ugu beddesho (convert) Fahrenheit Celsius.

$$F = \frac{9c}{5} + 32$$

$$F - 32 = \frac{9c}{5}$$

Tallaabada koowaad (Step one):
-32 labada dhinac (both sides)

$$5(F - 32) = 9c$$

$$\frac{5}{9}(F - 32) = c$$

$$F = \frac{9c}{5} + 32$$

$$5F = 9c + 160$$

Tallaabada koowaad
(Step one):
×5 dhammaan
qaybaha (all terms)

$$5F - 160 = 9c$$

$$\frac{5F - 160}{9} = c$$

Qaabka casharka

Beddelka mawduuca (subject) si uu ugu habboonaado macnaha (context)



Dib u habaynta (rearranging) tillaabooyinka isku-darka (additive) iyo isku-dhufashada (multiplicative)



Dib u habaynta (rearranging) isleegyada (equations) si loo helo jirada (gradient)

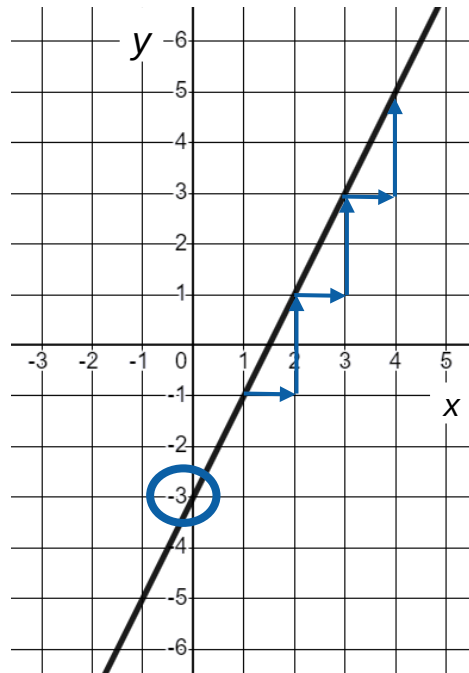
Dib u habaynta (rearranging) isleegyada (equations) si loo helo jiirada (gradient)

Haddii aan haysanno isleeg (linear equation) qaabka $y = mx + c$, waxaa jira astaamo muhiim ah (key features) oo aan si dhakhso ah u arki karno.

Isleegga toosan (linear equation) $y = 2x - 3$

Jiir (gradient) ah 2

Goys-y (y-intercept) ah $(0, -3)$



Dib-u-habaynta isla'egyada si loo helo jiirada (gradient)

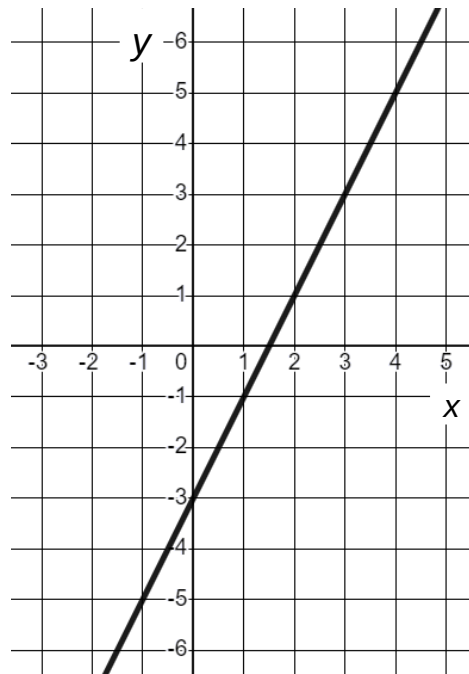
Haddii aan haysanno isla'eg toosan oo qaabka $y = mx + c$ ah, waxaa jira astaamo muhiim ah oo aan si dhakhso ah u arki karno.

Qaabka $y = mx + c$ ○

Jiirada (gradient)
(m)

Goys-y (y-intercept)
(c)

y waa mawduuca (subject).



Mararka qaarkood waxaan arkaynaa isla'egyo toosan oo qaabka $ax + by = c$ ah

Qaabkan, jiirada (gradient) ma aha mid sahlan in la arko.

Caasha, Isra iyo Axmed waxay ka hadlayaan isla'egta $4x + 5y = 40$



Waxaan u malaynayaa in jiirada (gradient) ay tahay 4 sababtoo ah waa isku-dhufashada (coefficient) x

Waxaan u malaynayaa in jiirada (gradient) laga yaabo inay tahay 5, isku-dhufashada (coefficient) y markan.



Waxaan u malaynayaa inay noqon doonto $40 \div 5$, ama $40 \div 4$

Isla'egta $4x + 5y = 40$

Haddii aan y ka dhigno mawduuca (subject),
waxaan ogaan doonnaa waa maxay jiirada
(gradient).

$$\frac{1}{5} \times 5y = \frac{1}{5} \times (40 - 4x)$$

$$y = 8 - \frac{4}{5}x$$



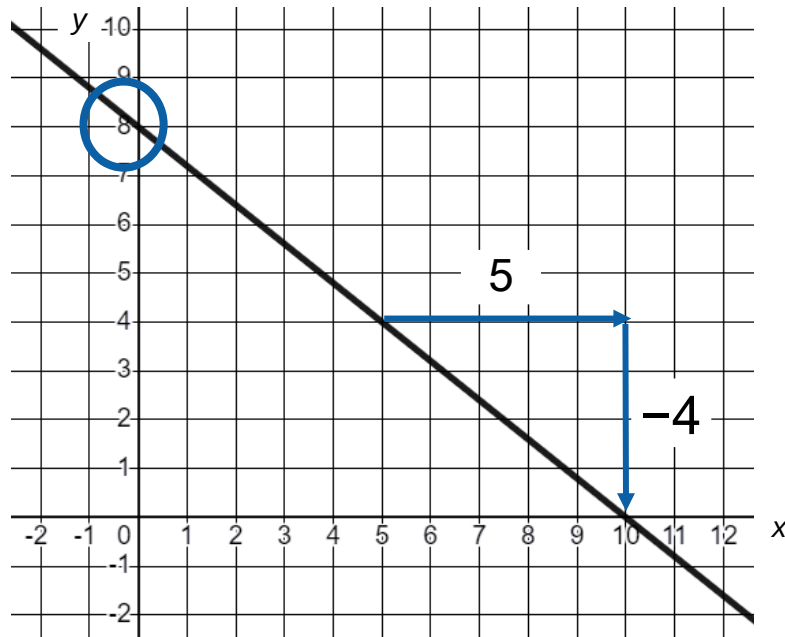
Iyadoo y hadda yahay mawduuca (subject),
waxaan arki karnaa in jiirada (gradient) ay
tahay

$$-\frac{4}{5}$$



Dib-u-habaynta isla'egyada si loo helo jirada (gradient)

Isla'egta $4x + 5y = 40$



$$4x + 5y = 40$$

$$5y = 40 - 4x$$

$$\frac{1}{5} \times 5y = \frac{1}{5} \times (40 - 4x)$$

$$y = 8 - \frac{4}{5}x$$

Jirada (The gradient) $-\frac{4}{5}$

Jirada-y (y-intercept) (0, 8)

Soo saar jiirada (gradient) iyo jiirada-y (y-intercept) ee isla'egta hoose adigoo dib u habeynaya si y u noqdo mawduuca.

$$3x + 7y = 28$$

$$7y = 28 - 3x$$

$$\frac{1}{7} \times 7y = \frac{1}{7} \times (28 - 3x)$$

$$y = 4 - \frac{3}{7}x$$

Jiirada (Gradient) $-\frac{3}{7}$ Jiirada-y (y-intercept) (0, 4)

Soo saar jiirada (gradient) iyo jiirada-y (y-intercept) ee isla'egta hoose adigoo dib u habeynaya si y u noqdo mawduuca.

$$3x + 7y = 28$$

$$7y = 28 - 3x$$

$$\frac{1}{7} \times 7y = \frac{1}{7} \times (28 - 3x)$$

$$y = 4 - \frac{3}{7}x$$

Jiirada (Gradient) $\frac{3}{7}$ Jiirada-y (y-intercept) (0, 4)

Soo saar jiirada (gradient) iyo jiirada-y (y-intercept) ee isla'egta hoose adigoo dib u habeynaya si y u noqdo mawduuca.

$$2x + 5y = 30$$

$$5y = 30 - 2x$$

$$\frac{1}{5} \times 5y = \frac{1}{5} \times (30 - 2x)$$

$$y = 6 - \frac{2}{5}x$$

Jiirada (Gradient) $\frac{2}{5}$ Jiirada-y (y-intercept) (0, 6)

1) Soo saar jiirada (gradient) iyo jiirada-y (y-intercept) ee khadadka ay bixiyaan isla'egyadan adigoo dib u habeynaya si y u noqdo mawduuca.

a) $x + 4y = 12$

b) $2x + 6y = -18$

c) $8x - 2y = 15$

2) Dib u habeey qaabkan guud ee isla'egta toosan (linear equation) si y u noqdo mawduuca oo hel tibaax (expression) jiirada (gradient) iyo jiirada-y (y-intercept) marka qaabkan ku jirto.

$$ax + by = c$$

1) Soo saar jiirada (gradient) iyo jiirada-y (y-intercept) ee khadadka ay bixiyaan isla'egyadan adigoo dib u habeynaya si y u noqdo mawduuca.

a) $x + 4y = 12$

$$4y = 12 - x$$

$$\frac{1}{4} \times 4y = \frac{1}{4} \times (12 - x)$$

$$y = 3 - \frac{1}{4}x$$

Jiirada (Gradient) $-\frac{1}{4}$ Jiirada-y (y-intercept) (0, 3)

b) $2x + 6y = -18$

$$6y = -2x - 18$$

$$\frac{1}{6} \times 6y = \frac{1}{6} \times (-2x - 18)$$

$$y = -\frac{1}{3}x - 3$$

Jiirada (Gradient) $-\frac{1}{3}$ Jiirada-y (y-intercept) (0, -3)

1) Soo saar jiirada (gradient) iyo jiirada-y (y-intercept) ee khadadka ay bixiyaan isla'egyadan adigoo dib u habeynaya si y u noqdo mawduuca.

$$c) \quad 8x - 2y = 15$$

$$8x = 15 + 2y$$

$$8x - 15 = 2y$$

$$4x - \frac{15}{2} = y$$

Jiirada (Gradient) 4, jiirada-y (y-intercept) $\left(0, -\frac{15}{2}\right)$

2) Dib u habayn qaabkan guud ee isla'egta toosan si y (subject) uga dhahdid oo hel tibaax (expression) jirada (gradient) iyo y-intercept marka qaabkan ku jirto.

$$ax + by = c$$

Qaabka $ax + by = c$ jirada (gradient) waa
iyo y-intercept waa

$$\frac{1}{b} \times by = \frac{1}{b} \times (c - ax)$$

$$y = \frac{c}{b} - \frac{a}{b}x$$

$$-\frac{a}{b} \quad \left(0, \frac{c}{b}\right)$$

Dib u habaynta waxay faa'iido u yeelan kartaa iyadoo ku xiran waxa aan raadineyno ee qaacidada (formula) ku jira.

Tani way isbedeli doontaa iyadoo ku xiran macnaha (context).

Bedelka mawduuca (subject) wuxuu u baahan yahay xirfado la mid ah xallinta isla'egta.