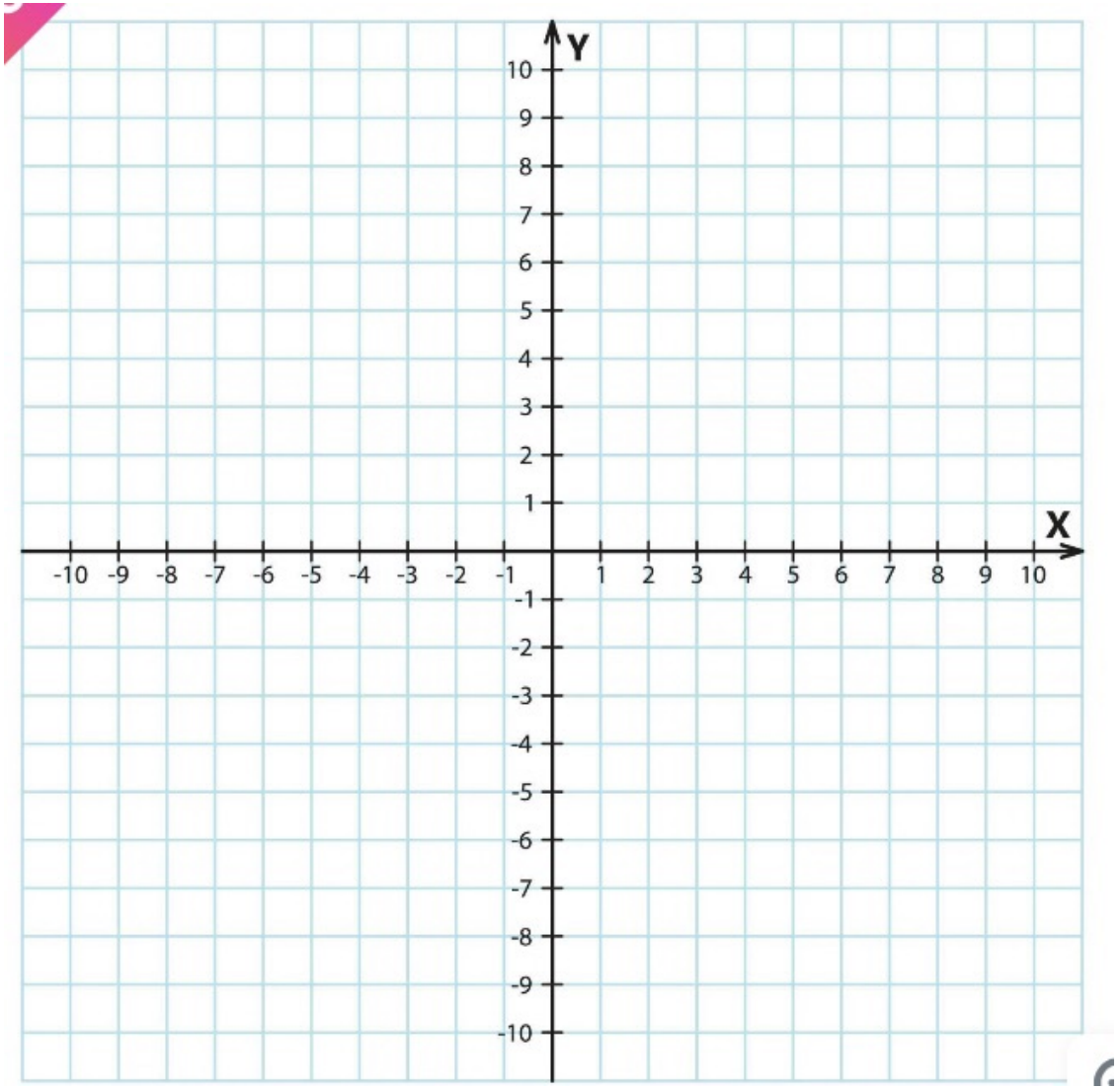
3.1) Straight Line Graphs

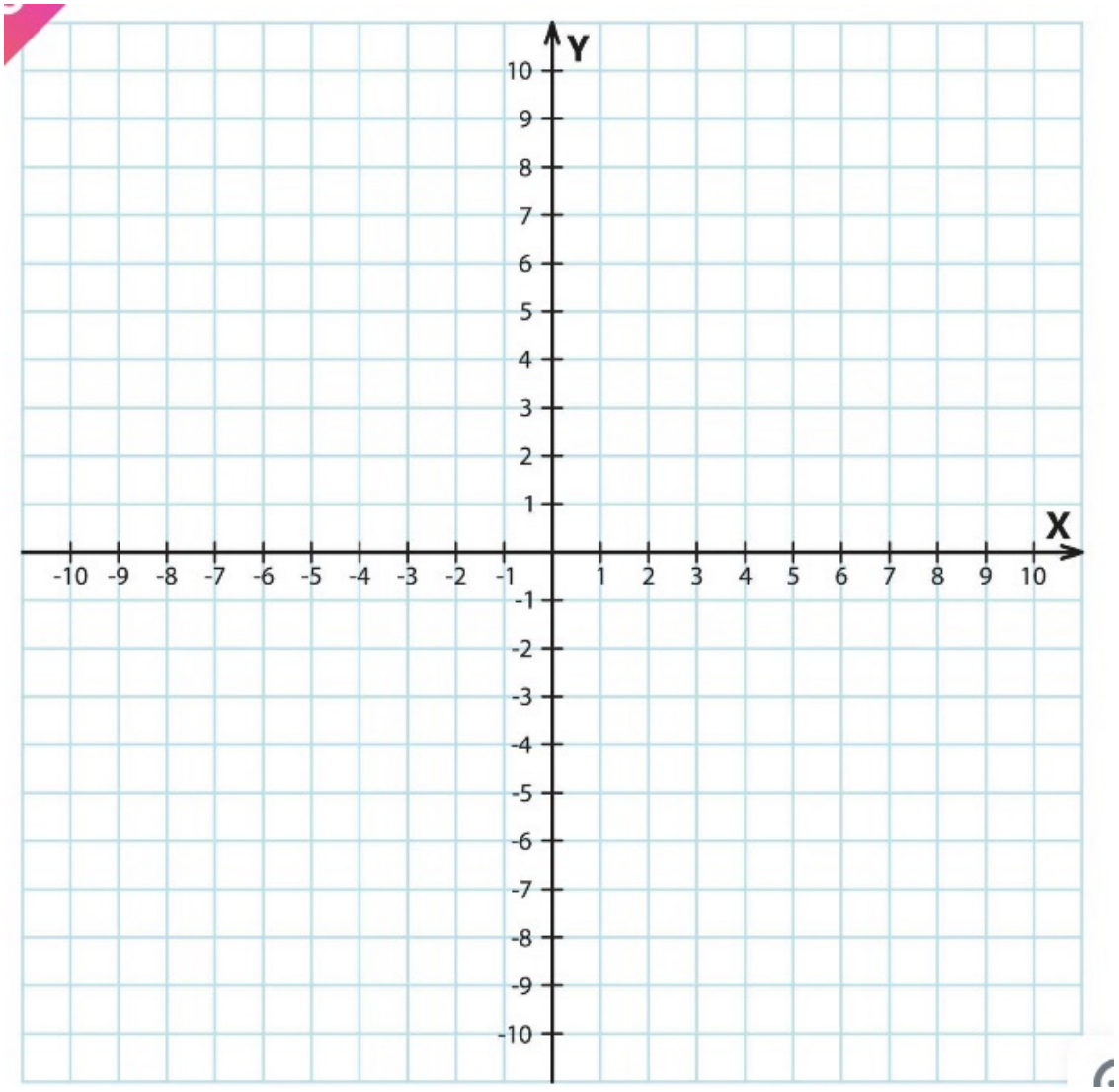
Graphs:Straight Lines.

Coordinate



Graphs:Straight Lines.

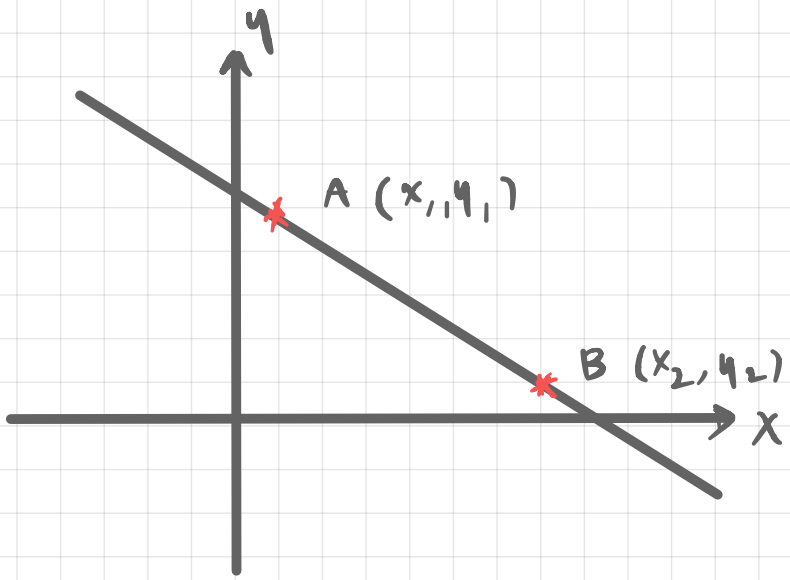
Lines:Basic



Graphs:Straight Lines.

Two pionts

$A(x_1, y_1)$ and $B(x_2, y_2)$



Graphs:Straight Lines.

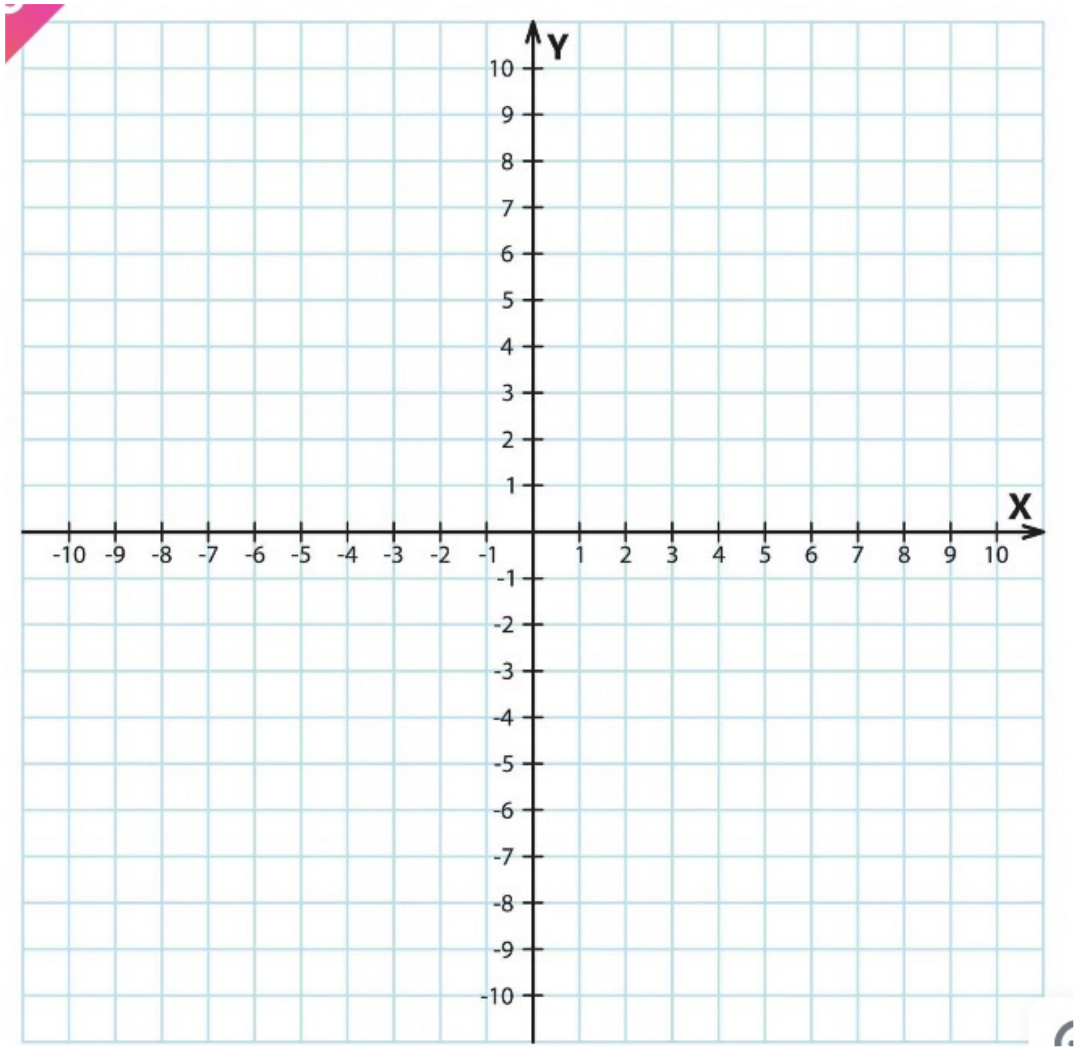
1) Gradient (m)

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

Example: The point A (5, 13) and the point B (-1, 1)

Work out the gradient of AB.

Graphs:Straight Lines.



Graphs:Straight Lines.

2) Midpoint

$$\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$$

Example: The point A (5, 13) and the point B (-1, 1)

Work out the midpoint of AB.

Graphs:Straight Lines.

3) Distance between point (Length)

$$|AB| = \sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$$

Example: The point A (5, 13) and the point B (-1, 1)

Work out the length of AB.

Graphs:Straight Lines.

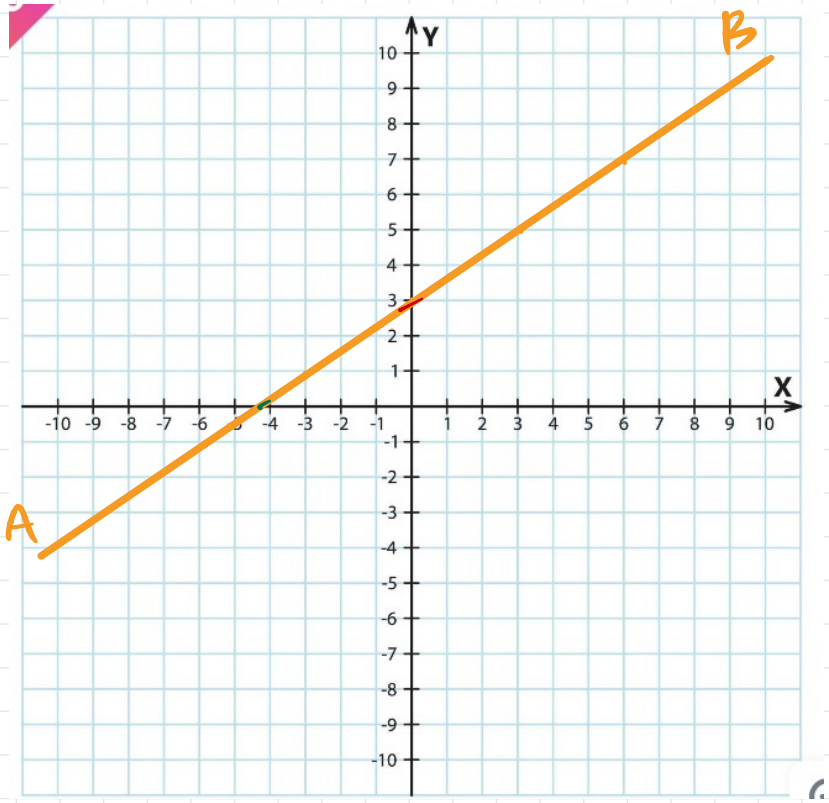
4) Equation of line

→ gradient (m)
point (x_1, y_1)

↓
gradient (m)
y-intercept $(0, c)$

Graphs:Straight Lines.

Example: Find equation of line AB



Graphs:Straight Lines.

Example: Given that $m = \frac{3}{2}$ and line passes through $(4, 1)$

Graphs:Straight Lines.

Example: Find equation of line passes through (1,2) and (7,4)

Graphs:Straight Lines.

Equation of lines

Lines

$2x + 3y = 7$

$2x - 7 = 3y$

$3y = -2x + 7$

$y = 3x - 7$

$4x - 7 = y$

$y = -\frac{2}{3}x + 7$

$\frac{x}{3} = 2y - 5$

Curves

$y = x^2 + 5$

$xy = 4$

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

$y = \frac{3}{x^2} + x$

$y = 4x^3 - 7x + 4$

$(x+1)^2 + (y-4)^2 = 7$

$y = 2^x$

Graphs:Straight Lines.

1) Change between $y=mx+c$ and $ax+by+c=0$

Graphs:Straight Lines.

Example: $y = \frac{3}{2}x + 5 \longrightarrow ax + by + c = 0$

Example: $y = 0.7x + 4.8 \longrightarrow ax + by + c = 0$

Graphs:Straight Lines.

Example: $5x - 2y + 4 = 0 \rightarrow y = mx + c$

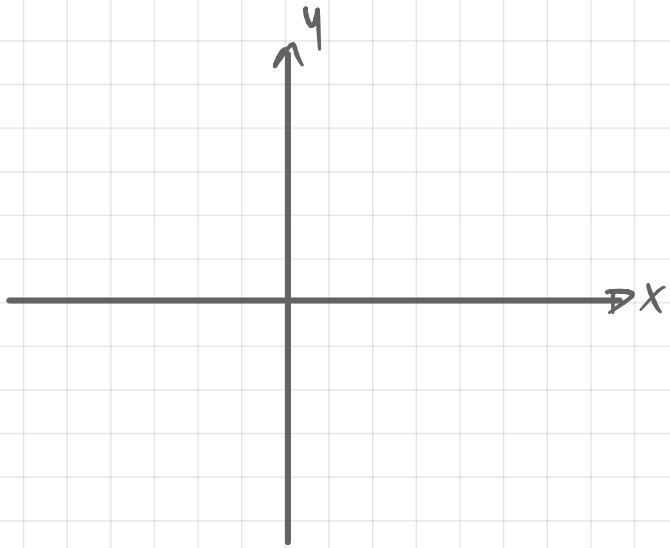
Graphs:Straight Lines.

2) Sketch graph

- Table

x				
y				

- Intercept

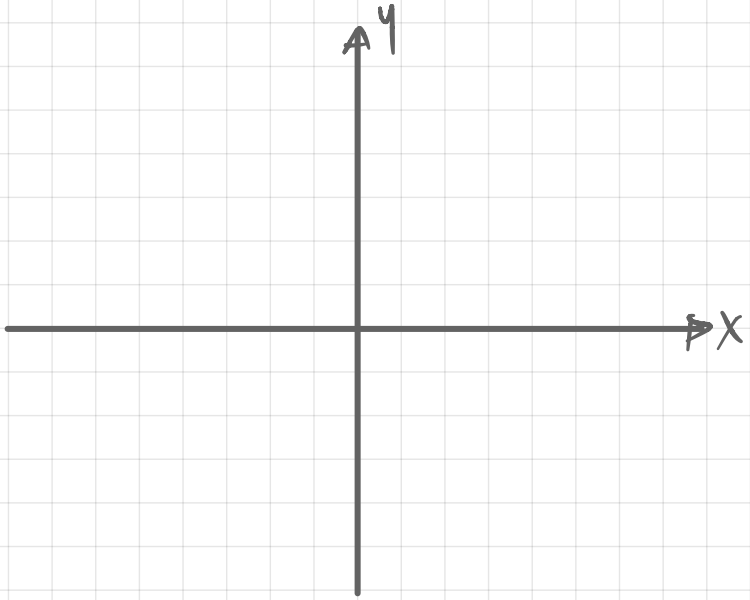


Cross the x-axis

x-intercept ⟶ $y = 0$; $x = ?$

Cross the y-axis

y-intercept ⟶ $x = 0$; $y = ?$

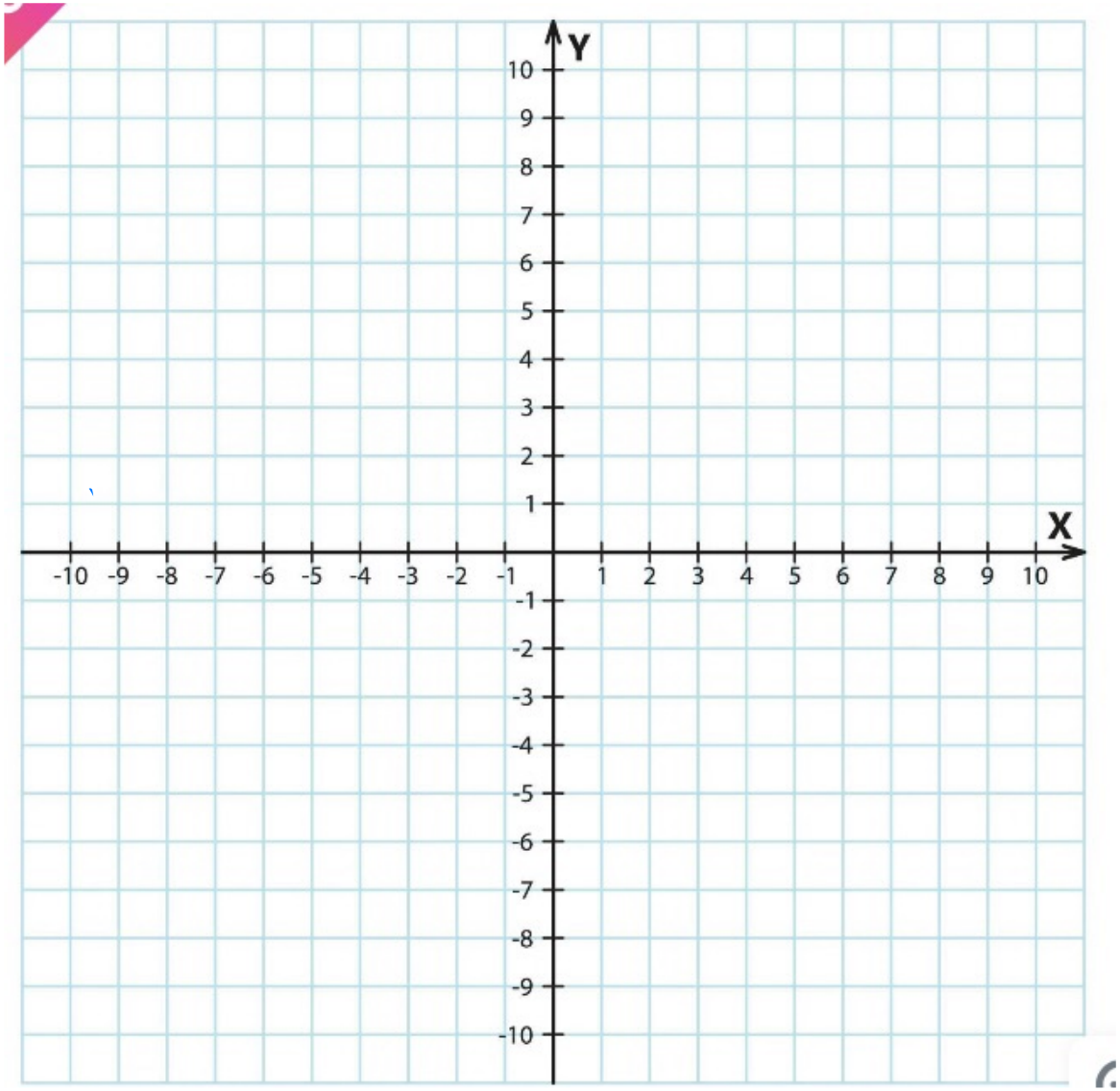


Graphs:Straight Lines.

$y = 3x-1 \quad , \quad -2 \leqslant x \leqslant 3$

(Table)

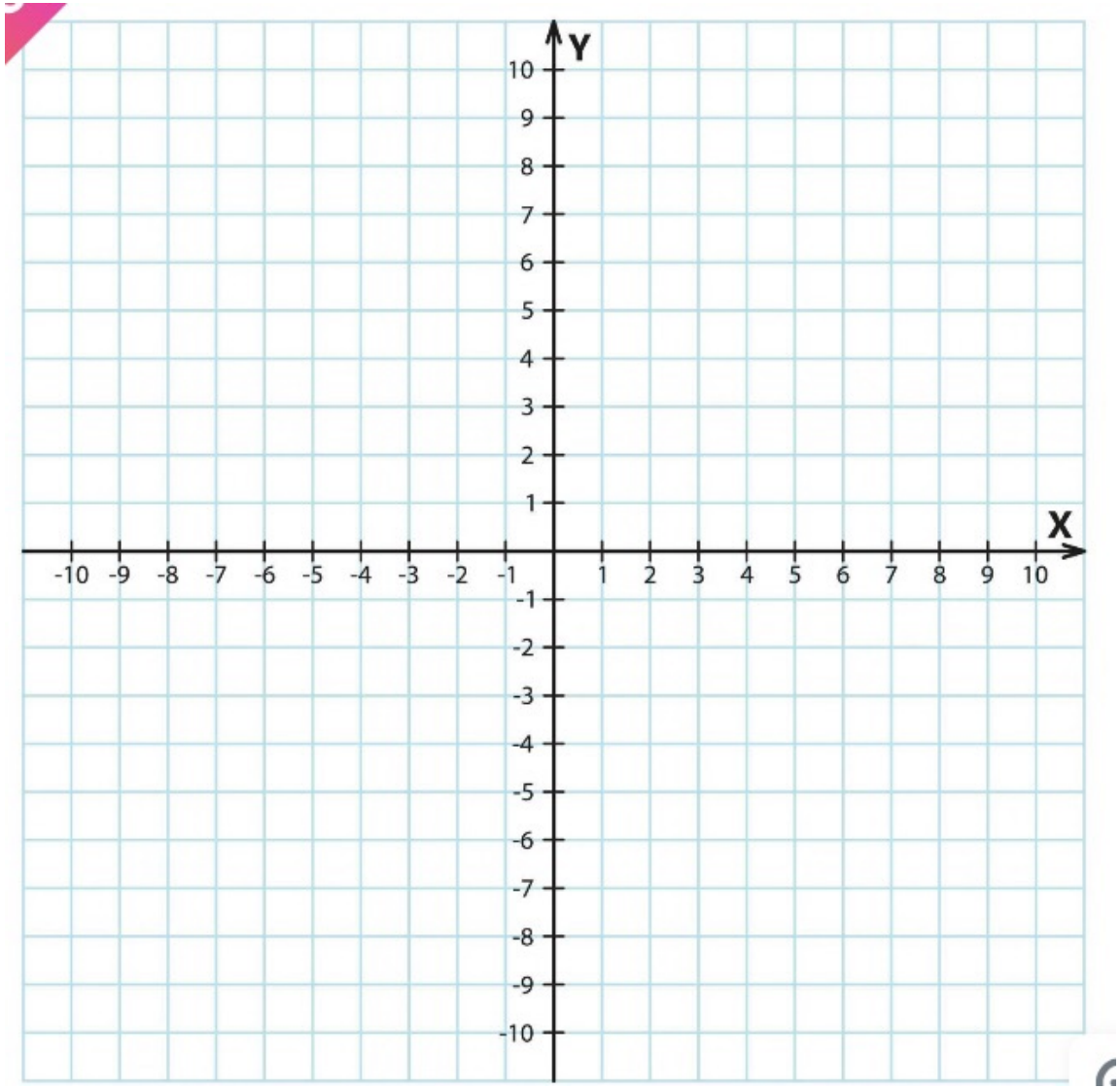
x			
y			



Graphs:Straight Lines.

$3x+2y-12 = 0 \ , \ -2 < x < 8$

(Intercept)



Graphs:Straight Lines.

3) Gradient

$y = mx + c$ ⟶ $y = \frac{3}{2}x + 7$

$y = -4x + 1$

$y = \frac{5 - 7x}{2}$

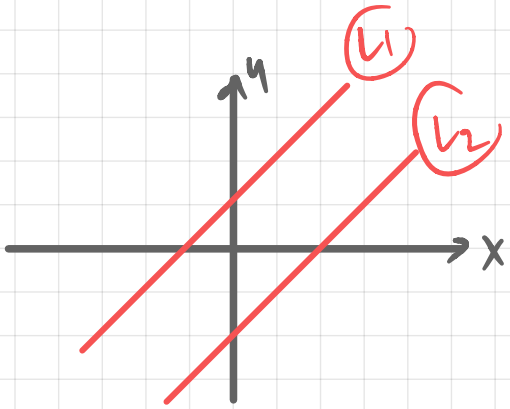
$ax + by + c = 0$ ⟶ $3x + 2y - 4 = 0$

$\Downarrow$

$y = mx + c$

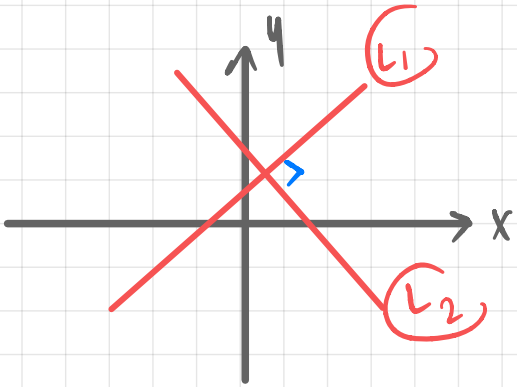
Graphs:Straight Lines.

4) Parallel lines



$L_1 \parallel L_2 \rightarrow$ $m_1 = m_2$

5) Perpendicular lines



$L_1 \perp L_2 \rightarrow$ $m_1 \times m_2 = -1$

Graphs:Straight Lines.

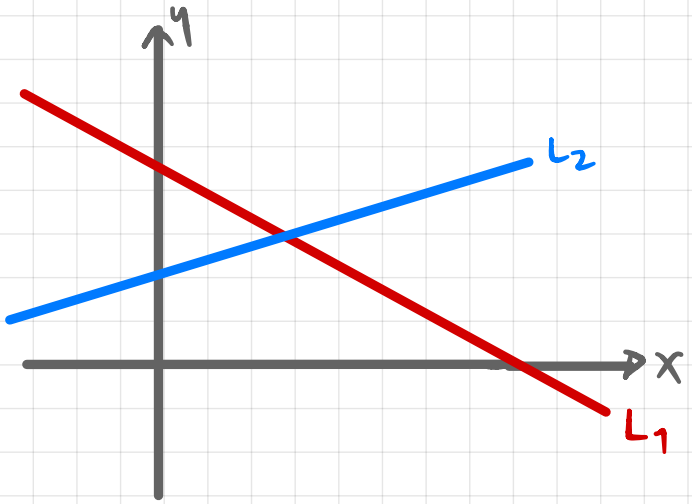
Example: Find the equation of the line which is parallel to line $3x + 4y = 10$ and which passes through the point $(8, 1)$

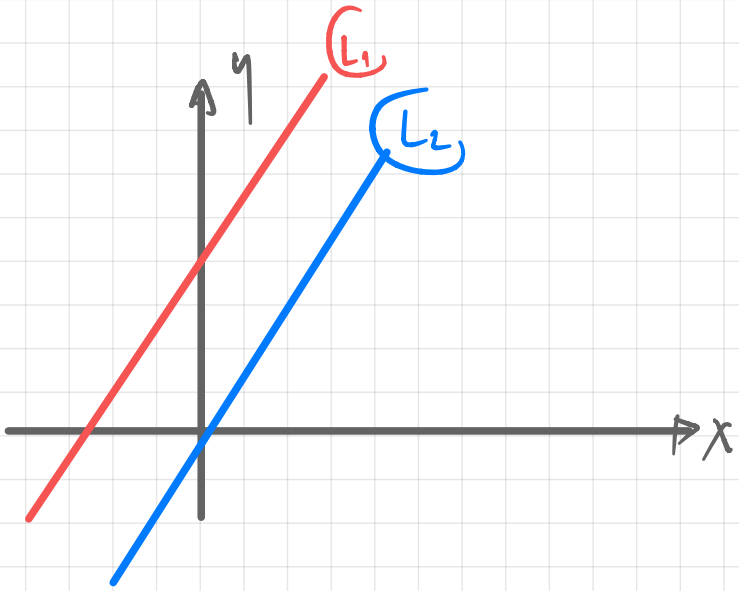
Graphs:Straight Lines.

Example: Find the equation of the line which is perpendicular to line $3x + 4y = 10$ and which passes through the point $(8, 1)$

Graphs:Straight Lines.

6) Intersection point





Graphs:Straight Lines.

Example: Find the coordinates of the point of intersection of the line with equation $3x+4y=3$ and $x-2y=2$

Show your working clearly.

Graphs:Straight Lines.

Extra

Example: The straight line L passes through the point $(3,-2)$ and $(5,4)$. The straight line M is perpendicular to L and intersects the y-axis at the point $(0,5)$. Find the coordinates of the point where M intersects the x-axis.

Graphs:Straight Lines.

Example: PQR is a triangle in which angle PQR $= 90^\circ$

m and n are integers such that

the coordinate of P are $(m, 9)$

the coordinate of Q are $(2, 3)$

the coordinate of R are $(5, n)$

Given that the gradient of PR is $-\frac{4}{7}$

work out the value of m and n

Graphs:Straight Lines.

Graphs:Straight Lines.

Graphs:Straight Lines.

Example: The straight line L_1 has equation $5y = 4x + 10$

and line L_2 has equation $y + x - 11 = 0$

The line L_1 and L_2 passes through B and cut the x-axis at the points A and C respectively.

Find the area of triangle ABC.

Graphs:Straight Lines.