Finding an equation of a straight line

Sunday, 28 January 2018 12:52 pm

$y = 2x + 3$ $\quad 3x + 4y = 12$

Key questions:
How do I find the gradient between two points?
How do I find the equation of a line given a y-intercept and a gradient?
How do I find the equation of a line given a point and a gradient?
How do I find the equation of a line given two points?

(x, y) m

$y = mx + c$

4 unknowns ⇒ 4 equations!

$x = 3$ $\quad y = 4$

(x_1, y_1)

$y - y_1 = m(x - x_1)$

2-3 lines of algebra

Lesson 2	1G Finding an equation of a line Let's start: *Fancy formula* Key ideas Example 19, 20, 21	Exercise 1G Page 39	3(½)	—
			4-6(½)	4-6(½)
			7, 8	8, 9
			10, 11	10, 11
			—	12

Gradient of a straight line between two points

Find gradient of the line joining the points (1, 4) and (3,8)

Remember, co-ordinates can be expressed in lots of ways. Co-ordinates are just a relationship between an x and y value. They can be given in a table, for example.

x	4	6
y	-4	-8

(4, -4) (6, -8)

① Sketch

rise 4, run 2, 1 → 3

m = grad = $\frac{rise}{run} = \frac{4}{2} = 2$

② $m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{8 - 4}{3 - 1} = \frac{4}{2} = 2$

x_1, y_1 x_2, y_2

Remember, Gradient is rise over run

eg $(1, -2)$ $(7, -6)$

$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-6 - (-2)}{7 - 1} = \frac{-6 + 2}{6} = \frac{-4}{6} = -\frac{2}{3}$

Find the equation of the line with the point (0, 4) and gradient -2.

$y = mx + c$

$y = -2x + 4$

B.F.I.

$y - y_1 = m(x - x_1)$ $(0, 4)$ x_1, y_1

$y - 4 = -2(x - 0)$

$y - 4 = -2x$

$y = -2x + 4$

Find the equation of a line with point (4,9) and gradient 3

$y = mx + c$

$9 = 3(4) + c$

$9 = 12 + c$

$c = -3$

$\therefore y = 3x - 3$

$y - y_1 = m(x - x_1)$

$y - 9 = 3(x - 4)$

$y - 9 = 3x - 12$ $(+9)$

$y = 3x - 12 + 9$

$y = 3x - 3$

3.4

Find the equation of a line with points (1, 4) and (3,8)

$m = \frac{8 - 4}{3 - 1} = \frac{4}{2} = 2$

$y = mx + c$

$4 = 2(1) + c$ $(1, 4)$

$4 = 2 + c$

$c = 2$

$\therefore y = 2x + 2$

$m = 2$ $(1, 4)$

$y - y_1 = m(x - x_1)$

$y - 4 = 2(x - 1)$

$y - 4 = 2x - 2$ $(+4)$

$y = 2x - 2 + 4$

$y = 2x + 2$

Problem solving question

Straight line graph

Kyle invests some money in a simple savings fund and the amount increases at a constant rate over time. He hopes to buy a boat when the investment amount reaches $20 000.

After 3 years the amount is $16 500 and after 6 years the amount is $18 000.

(3, 16500) (6, 18000)

a Find a rule linking the investment amount ($A) and time ($t$ years).

b How much did Kyle invest initially (i.e. when $t = 0$)?

$y = mx + c$

11 After 3 years the amount is $16 500 and after 6 years the amount is $18 000.

a Find a rule linking the investment amount (A) and time (t years).

b How much did Kyle invest initially (i.e. when $t = 0$)?

c How long does Kyle have to wait before he can buy his boat?

d What would be the value of the investment after $12\frac{1}{2}$ years?

(3, 16500)
(6, 18000)

$y = mx + c$

$A = mt + c$

