

Daily Practice 20.4.2016

Q1. Multiply out and simplify $(2x - 1)(x + 3) + 2x$

$$2x^2 + 6x - x - 3 + 2x$$

$$2x^2 + 7x - 3$$

Q2. Simplify $p^2(3p - 4)$

$$3p^3 - 4p^2$$

Q3. Calculate the median of 3, 2, 1, 7, 8, 4

median 3.5 1, 2, 3, 4, 7, 8

Q4. Write with a positive index $3p^{-4}$

$$3p^{-4} = \frac{3}{p^4}$$

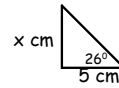
$$x^{-1} = \frac{1}{x}$$

Today we will be learning more about the Straight Line.

Daily Practice 22.4.2016

Q1. Solve the equation $3(2x + 1) = 7(x - 4)$

Q2. Calculate the length of x



Q3. Find the value of a car worth £5000 that depreciates by 5% in its first year and 16% in its second

Q4. $2\frac{1}{3} - \frac{3}{4}$

Q5. State the equation of the line passing through (1, 2) and (0, 4)

Revision of the Straight Line

State the equation of the lines joining the following pairs of coordinates:

- A(-2, 3) and B(1, 5)
- C(-3, -5) and D(0, 7)
- E(-8, -1) and F(4, -10)
- G(-3, 2) and H(0, 2)
- I(-1, 7) and J(3, 0)

1. $m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{5 - 3}{1 - (-2)} = \frac{2}{3}$

$y = mx + c$ (1, 5)

$5 = \frac{2}{3}(1) + c$

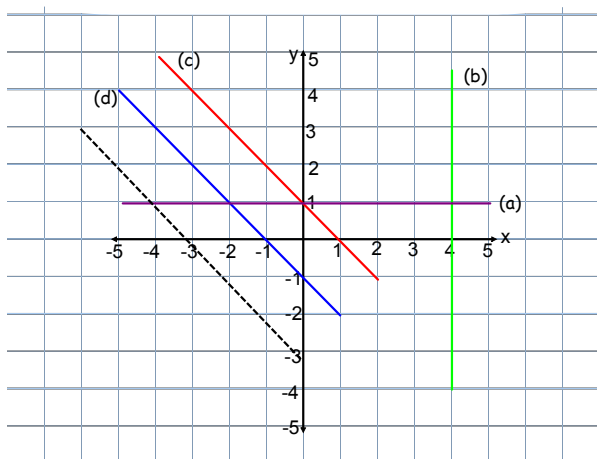
$5 = \frac{2}{3} + c$

$c = 5 - \frac{2}{3} = \frac{13}{3}$

$y = \frac{2}{3}x + \frac{13}{3}$

Equation of a straight line _____

What can we say about the equations of the lines shown? _____



Equation of a straight line _____

Parallel lines have equal gradients $m_1 = m_2$

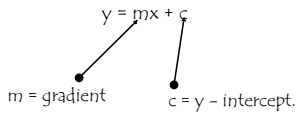
Vertical lines have an undefined gradient and have equation $x = a$.

Horizontal lines have a zero gradient and so have equation $y = b$.

Revision of the Straight Line

To find the equation of a line you need:

1. The gradient
2. The y - intercept or a point on the line



Today we will be learning about the straight line equation of the form $y - b = m(x - a)$

Daily Practice 25.4.2016

1. Evaluate $\frac{2}{3} - 1 \frac{3}{4} = \frac{2}{3} - \frac{7}{4} = \frac{8}{12} - \frac{21}{12} = \frac{-13}{12} = -\frac{13}{12}$

2. Factorise $x^2 + 2x - 15 = (x+5)(x-3)$

3.
$$m = \frac{45-35}{4-3} = \frac{10}{1} = 10$$

$$y = mx + c \quad 45 = 10(4) + c$$

$$45 = 40 + c \quad c = 5$$

$$y = 10x + 5$$

Find the equation of this straight line in the form $y = mx + c$

Equation of a straight line in the form $y - b = m(x - a)$ 25.4.16

State the equation of a line given the gradient = m and a coordinate on the line is (a, b)

$y = mx + c$
 $b = ma + c$
 $c = b - ma$
 $y = mx + b - ma$
 $y - b = mx - ma$
 $y - b = m(x - a)$

(a, b)
 $c = y\text{-intercept}$

Equation of a straight line in the form $y - b = m(x - a)$

This means we can state the equation if we have a coordinate on the line and the gradient (easier than having to find the y - intercept).

$y - b = m(x - a)$ where m = gradient and (a, b) = coordinate

Multiply out and simplify your answer if you can.

Equation of a straight line in the form $y - b = m(x - a)$

Examples:

1. State the equation of the line that passes through (2, 3) with gradient 2

$y - b = m(x - a)$
 $y - 3 = 2(x - 2)$
 $y - 3 = 2x - 4$
 $y - 2x + 1 = 0$

2. State the equation of the line that passes through (-4, 1) and (3, -7)

$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-7 - 1}{3 - (-4)} = \frac{-8}{7}$

$y - b = m(x - a)$
 $y - 1 = -\frac{8}{7}(x + 4)$
 $7y - 7 = -8x - 32$
 $7y + 8x + 25 = 0$

Daily Practice 26.4.2016

- Q1. Multiply out and simplify $(7x - 1)(2x^2 + 3x - 1)$
 $14x^3 - 2x^2 + 21x^2 - 3x - 7x + 1$
 $14x^3 + 19x^2 - 10x + 1$
- Q2. State gradient of the line $4x - 2y = 5$
- Q3. Evaluate $\sqrt[3]{729}$ = $\sqrt[3]{729} = 9$
 $4x - 2y - 5 = 0$
 $2y + 5 = 4x$
 $y + \frac{5}{2} = 2x$
- Q4. Factorise $x^2 - 7x + 12 = (x-4)(x-3)$
 $y + \frac{5}{2} = 2x$
 $y = 2x - \frac{5}{2}$
- Q5. Write as a single fraction $\frac{2}{x+3} - \frac{3}{x}$
 $m=2$

$$\frac{2x}{x(x+3)} - \frac{3(x+3)}{x(x+3)} = \frac{2x - 3(x+3)}{x(x+3)}$$

$$\frac{2x - 3x - 9}{x(x+3)} = \frac{-x - 9}{x(x+3)}$$

Equation of a straight line in the form $y - b = m(x - a)$

Questions: Determine the equation for the line for each

- Gradient = 3 and passes through (2, 7)
- Gradient = 0.5 and passes through (4, 8)
- Passes through (-5, 3) and (2, -6)
- Passes through (-2, 3) and (2, 7)
- Passes through (-1, -4) and (3, 8)

Today we will be continuing to work out the equation of a straight line.

Equation of a straight line in the form $y - b = m(x - a)$

Questions: Determine the equation for the line for each

- Gradient = 3 and passes through (2, 7)
 $y - 7 = 3(x - 2)$
 $y = 3x + 1 \iff 3x - y + 1 = 0$
- Gradient = 0.5 and passes through (4, 8)
 $y - 8 = \frac{1}{2}(x - 4)$
 $2y - x - 12 = 0$
- Passes through (-5, 3) and (2, -6)
 $m = \frac{-6-3}{2-(-5)} = -\frac{9}{7}$
 $y - 3 = -\frac{9}{7}(x - (-5))$
 $7y - 21 = -9x - 45$
 $7y + 9x + 24 = 0$
- Passes through (-2, 3) and (2, 7)
 $m = \frac{7-3}{2-(-2)} = \frac{4}{4} = 1$
 $y - 7 = 1(x - 2)$
 $y = x + 5$
- Passes through (-1, -4) and (3, 8)
 $m = \frac{8-(-4)}{3-(-1)} = \frac{12}{4} = 3$
 $y - 8 = 3(x - 3)$
 $y = 3x - 1$

Stating the gradient/y-intercept given the equation 26.4.16

The equation has to be in the form $y = mx + c$ before you can state the gradient or y-intercept. You need to rearrange.

Example:

State the gradient and y - intercept of the equation $-3y + 4x = 3$

$$\begin{aligned} -3y + 4x &= 3 \\ -3 & \quad -3 \\ -3y + 4x - 3 &= 0 \\ +3y & \quad +3y \\ 4x - 3 &= 3y \\ \div 3 & \quad \div 3 \\ \frac{4}{3}x - 1 &= y \\ y &= \frac{4}{3}x - 1 \end{aligned}$$

gradient = $m = \frac{4}{3}$
 y-intercept = -1
 (0, -1)

Questions: Find the gradient and y - intercept for the following

- (a) $2x + 4y + 6 = 0$

(b) $3y - 3x + 1 = 0$

(c) $3y + 3 = x$

(d) $x + 2y - 1 = 0$

(e) $2y + 8 = 0.5x$

(f) $\frac{y+1}{5} = 3x$

Rearranging Equations

Questions: Find the gradient and y - intercept for the following

(a) $2x + 4y + 6 = 0$

$$y = -\frac{1}{2}x - \frac{3}{2}$$
$$m = -\frac{1}{2} \quad c = -\frac{3}{2}$$

(b) $3y - 3x + 1 = 0$

$$3y = 3x - 1$$
$$y = x - \frac{1}{3}$$
$$m = 1 \quad c = -\frac{1}{3}$$

(c) $3y + 3 = x$

$$3y = x - 3$$
$$y = \frac{1}{3}x - 1$$
$$m = \frac{1}{3} \quad c = -1$$

(d) $x + 2y - 1 = 0$

$$2y = -x + 1$$
$$y = -\frac{1}{2}x + \frac{1}{2}$$
$$m = -\frac{1}{2} \quad c = \frac{1}{2}$$

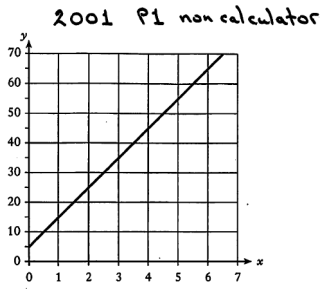
(e) $2y + 8 = 0.5x$

$$2y = \frac{1}{2}x - 8$$
$$y = \frac{1}{4}x - 4$$
$$m = \frac{1}{4} \quad c = -4$$

(f) $\frac{y+1}{5} = 3x$

$$y + 1 = 15x$$
$$y = 15x - 1$$
$$m = 15 \quad c = -1$$

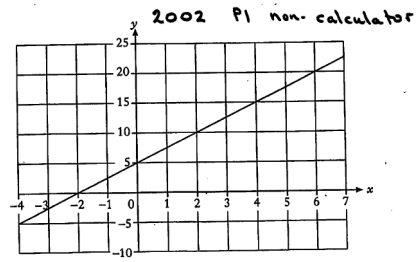
2.



Find the equation of the straight line.

3

2.

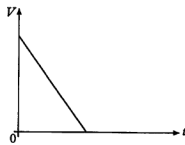


Find the equation of the straight line shown in the diagram.

3

2003 P2 calculator

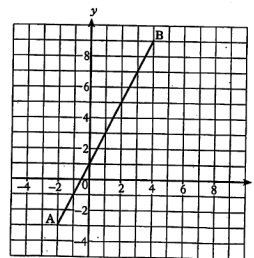
A bath contains 150 litres of water.
 Water is drained from the bath at a steady rate of 30 litres per minute.
 The graph of the volume, V litres, of water in the bath against the time, t minutes, is shown below.



Write down an equation connecting V and t .

3

2004 P1 Non-Calculator



Find the equation of the straight line AB.

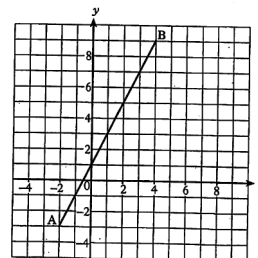
3

Find the equation of the line joining the points $(-2, 5)$ and $(3, 15)$.
 Give the equation in its simplest form.

3

2.

2004 P1 non-calculator



Find the equation of the straight line AB.

3

A straight line is represented by the equation $2y + x = 6$.

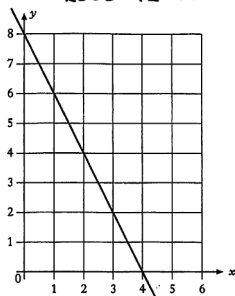
- (a) Find the gradient of this line. 2
- (b) This line crosses the y-axis at $(0, c)$.
Find the value of c . 1

A straight line has equation $y = 4x + 5$.
State the gradient of this line. 1

- (a) A straight line has equation $4x + 3y = 12$.
Find the gradient of this line. 2

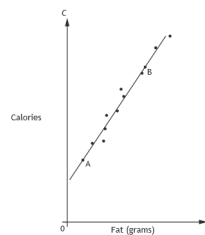
Today we will be continuing to practise questions on the straight line.

- (b) Find the coordinates of the point where this line crosses the x-axis. 2



- (a) Find the equation of the straight line shown in the diagram. 3
- (b) Find the coordinates of the point where the line $y = 2x$ meets this line. 2

McGregor's Burgers sells fast food.
The graph shows the relationship between the amount of fat, F grams, and the number of calories, C , in some of their sandwiches.



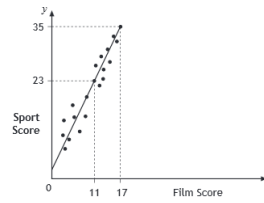
- (a) Find the equation of the line of best fit in terms of F and C . 3
- (b) A Super Deluxe sandwich contains 40 grams of fat.
Use your answer to part (a) to estimate the number of calories this sandwich contains.
Show your working. 1

A line of best fit has been drawn.
Point A represents a sandwich which has 5 grams of fat and 200 calories.
Point B represents a sandwich which has 25 grams of fat and 500 calories.

A straight line is represented by the equation $y = mx + c$.
 Sketch a possible straight line graph to illustrate this equation when $m > 0$ and $c < 0$.

2

Teams in a quiz answer questions on film and sport.
 This scattergraph shows the scores of some of the teams.



A line of best fit is drawn as shown.

(a) Find the equation of this straight line.

3

(b) Use this equation to estimate the sports score for a team with a film score of 8.

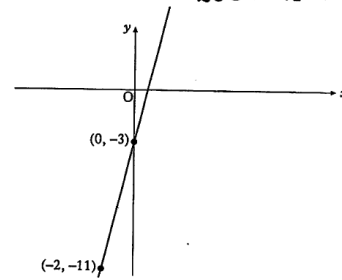
Total marks 4

A straight line is represented by the equation $x + y = 5$.
 Find the gradient of this line.

2

4, 2.

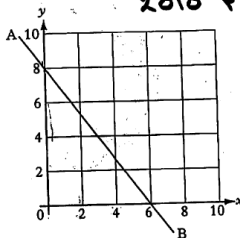
2007 P1 non-calculator



Find the equation of the straight line passing through the points $(0, -3)$ and $(-2, -11)$.

3

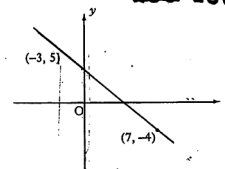
2010 P1



Find the equation of the straight line AB shown in the diagram.

3

2011 P2



Calculate the gradient of the straight line passing through the points $(-3, 5)$ and $(7, -4)$.

1