

Georgina is  $x$  years old, and 4 years older than Jessica. Angela is 3 times as old as Jessica. What is Angela's age in terms of  $x$ ?

Solve:

$$4 - d = 5d + 1$$

$$\begin{aligned} J &= x - 4 \\ A &= 3J \\ A &= 3(x - 4) \end{aligned}$$

$$d = \frac{1}{2}$$

Simplify:

$$(3a^3b)^3$$

Expand and simplify:

$$5p - 3(p - q)$$

$$27a^9b^3$$

$$2p + 3q$$

Factorise:

$$12pq^2r - 16p^3q$$

Expand and simplify:

$$(x + 2)(x - 3)$$

$$4pq(3qr - 4p^2)$$

$$x^2 - x - 6$$

Factorise:

$$x^2 - 5x - 36$$

Factorise:

$$25y^2 - 4$$

$$(x - 9)(x + 4)$$

Difference of two squares:

$$(5y + 2)(5y - 2)$$

Factorise:

$$(x + y)^2 - 6(x + y)$$

$$(x + y)(x + y - 6)$$

Expand:

$$(x + 3y)^2$$

$$x^2 + 6xy + 9y^2$$

Simplify:

$$(x + 1)^2 - (x - 1)^2$$

Difference of two squares:

$$\begin{aligned} &((x + 1) + (x - 1)) \times ((x + 1) - (x - 1)) \\ &\quad 2x \times 2 \\ &\quad 4x \end{aligned}$$

Factorise:

$$2n^2 - 15n + 18$$

$$(2n - 3)(n - 6)$$

The formula for a straight line is  $y = mx + c$ . What do  $m$  and  $c$  denote?

$m$  = gradient of the line

$c$  = intercept on  $y$ -axis

How do you calculate the gradient of a straight line?

$$\frac{\text{vertical change}}{\text{horizontal change}} = \frac{y_2 - y_1}{x_2 - x_1}$$

What is the equation of the line with gradient 3 which passes through the point  $(0, 6)$ ?

$$m = 3$$

$$c = 6$$

$$\text{Therefore } y = 3x + 6$$

$$y = 4x + 3$$

State the gradient of any line which is:  
a) parallel                      b) perpendicular.

a) 4

b)  $-\frac{1}{4}$

<p>Give the equation of any line which is perpendicular to the line <math>y = \frac{1}{2}x + 4</math>.</p>	<p>State the equation of a line which has gradient <math>\frac{1}{2}</math> and passes through the point <math>(6, -2)</math>.</p>
<p>e.g. <math>y = -2x + 3</math> or any other line where <math>m = -2</math>.</p>	<p>Using points <math>(6, -2)</math> and <math>(0, c)</math>:</p> $\frac{-2 - c}{6 - 0} = \frac{1}{2}$ $c = -5$ <p>Therefore <math>y = \frac{1}{2}x - 5</math></p>
<p>Complete the square: <math>x^2 + 6x + 2</math></p>	<p>Rearrange <math>3x = 4x^2 - 7</math> to find the values of <math>a</math>, <math>b</math> and <math>c</math>, and hence find the value of <math>\sqrt{b^2 - 4ac}</math>.</p>
<p><math>(x + 3)^2 - 7</math></p>	<p><math>4x^2 - 3x - 7 = 0</math> so <math>a = 4</math>, <math>b = -3</math>, <math>c = -7</math></p> $\sqrt{b^2 - 4ac} = \sqrt{(-3)^2 - 4 \times 4 \times -7}$ $= \sqrt{9 + 112}$ $= \sqrt{121}$ $= 11$
<p>Make <math>b</math> the subject of the formula: <math>P = 2(a + b)</math></p>	<p>Solve the inequality: <math>3x \leq 2 - x</math></p>
<p><math>b = \frac{P}{2} - a</math> or <math>b = \frac{P - 2a}{2}</math></p>	<p><math>x \leq \frac{1}{2}</math></p>
<p>Solve: <math>3x + 2y = 7</math> <math>5x - 4y = 8</math></p>	<p>The first 5 terms of an arithmetic sequence are <math>-1, 3, 7, 11, 15</math>. What is the <math>n^{\text{th}}</math> term of the sequence?</p>
<p>Multiply first equation by 2: <math>6x + 4y = 14</math> <math>5x - 4y = 8</math> Add to eliminate <math>y</math>: <math>11x = 22</math> So <math>x = 2</math>, <math>y = \frac{1}{2}</math></p>	<p><math>4n - 5</math></p>

Solve:

$$\frac{2x-1}{2} - \frac{x-5}{3} = \frac{5}{4}$$

$$\begin{aligned} \frac{3(2x-1) - 2(x-5)}{6} &= \frac{5}{4} \\ \frac{4x+7}{6} &= \frac{5}{4} \\ 16x+28 &= 30 \\ x &= \frac{1}{8} \end{aligned}$$

The expression  $x^2 - 8x$  can be written in the form  $(x+p)^2 + q$  for all values of  $x$ . Find the values of  $p$  and  $q$ .

$$\begin{aligned} x^2 - 8x &= (x-4)^2 - 16 \\ p &= -4 \text{ and } q = -16 \end{aligned}$$

Express 19.25454545... as a mixed fraction in its simplest form.

$$\begin{aligned} x &= 19.25454545\dots \\ 100x &= 1925.454545\dots \\ 99x &= 1906.2 = \frac{9531}{5} \\ x &= \frac{1059}{55} = 19\frac{14}{55} \end{aligned}$$

Prove that the sum of any three consecutive numbers is a multiple of 3.

$$\begin{aligned} n + (n+1) + (n+2) &= 3n + 3 \\ &= 3(n+1) \end{aligned}$$

3 is always a factor.

The sides of a triangle are  $2s + 1$ ,  $3s$  and  $5s - 3$ , and the perimeter is 38cm. Find the length of the shortest side.

$$\begin{aligned} 2s + 1 + 3s + 5s - 3 &= 38 \\ 10s - 2 &= 38 \\ s &= 4 \\ \text{Shortest side} &= 2s + 1 \\ &= 9\text{cm} \end{aligned}$$

Find the lengths of the two parallel sides of a trapezium, if they are in the ratio 1:2, the distance between them is 6cm, and the area is  $24\text{cm}^2$ .

$$\begin{aligned} 24 &= \frac{1}{2}(a + 2a) \times 6 \\ 3a &= 8 \\ a &= \frac{8}{3} \end{aligned}$$

The sides measure  $2\frac{2}{3}\text{cm}$  and  $5\frac{1}{3}\text{cm}$ .