



1 Solve $4x + 3 = x + 18$

(2 marks)

$$\begin{array}{rcl}
 4x + 3 & = & x + 18 \\
 -x & & -x \\
 \hline
 3x + 3 & = & 18 \\
 -3 & & -3 \\
 \hline
 3x & = & 15 \\
 \div 3 & & \div 3 \\
 \hline
 x & = & 5
 \end{array}$$

$$x = 5$$

2 Solve $5x - 8 = 2x + 10$

(3 marks)

$$\begin{array}{rcl}
 5x - 8 & = & 2x + 10 \\
 -2x & & -2x \\
 \hline
 3x - 8 & = & 10 \\
 +8 & & +8 \\
 \hline
 3x & = & 18 \\
 \div 3 & & \div 3 \\
 \hline
 x & = & 6
 \end{array}$$

$$x = 6$$

3 Solve $7x - 5 = 3x + 23$

(3 marks)

$$\begin{array}{rcl}
 -3x & & -3x \\
 4x - 5 & = & 23 \\
 +5 & & +5 \\
 \hline
 4x & = & 28 \\
 \div 4 & & \div 4 \\
 \hline
 x & = & 7
 \end{array}$$

Check

$$7(7) - 5 = 44 \text{ and } 3(7) + 23 = 44$$

$$x = 7$$

4 Solve $2x + 9 = 5x + 21$

(3 marks)

$$\begin{array}{rcl}
 2x + 9 & = & 5x + 21 \\
 -2x & & -2x \\
 9 & = & 3x + 21 \\
 -21 & & -21 \\
 -12 & = & 3x \\
 \div 3 & & \div 3 \\
 -4 & = & x
 \end{array}$$

$$x = -4$$

5 Solve $5(x - 2) = 3x + 8$

(3 marks)

Expand the bracket

$$\begin{array}{rcl}
 5x - 10 & = & 3x + 8 \\
 -3x & & -3x \\
 2x - 10 & = & 8 \\
 +10 & & +10 \\
 2x & = & 18 \\
 \div 2 & & \div 2 \\
 x & = & 9
 \end{array}$$

Check

$$5(9 - 2) = 35 \text{ and } 3(9) + 8 = 35$$

$$x = 9$$

6 Solve $\frac{4x + 1}{3} = x + 3$

(3 marks)

$$\begin{array}{rcl}
 \times 3 & & \times 3 \\
 4x + 1 & = & 3x + 9 \\
 -3x & & -3x \\
 x + 1 & = & 9 \\
 -1 & & -1 \\
 x & = & 8
 \end{array}$$

Check

$$\frac{32 + 1}{3} = 11 \text{ and } 8 + 3 = 11$$

$$x = 8$$

7

Sam and Tia each think of the same number.

Sam multiplies his number by 4 and then subtracts 7.

Tia multiplies her number by 2 and then adds 9.

They both get the same answer. Work out their number.

(3 marks)

Let the number be x

$$\begin{array}{rcl}
 4x - 7 & = & 2x + 9 \\
 -2x & & -2x \\
 \hline
 2x - 7 & = & 9 \\
 +7 & & +7 \\
 \hline
 2x & = & 16 \\
 \div 2 & & \div 2 \\
 \hline
 x & = & 8
 \end{array}$$

8

8

a. Solve $2(3x + 4) = 5x + 17$

b. Factorise fully $6y^2 + 9y$

(4 marks)

a) Expand

$$\begin{array}{rcl}
 6x + 8 & = & 5x + 17 \\
 -5x & & -5x \\
 \hline
 x + 8 & = & 17, \text{ so } x = 9
 \end{array}$$

Check

$$2(27 + 4) = 62 \text{ and } 5(9) + 17 = 62$$

b) The highest common factor of $6y$ squared and $9y$ is $3y$

$$6y^2 + 9y = 3y(2y + 3)$$

9

a. Solve $9 - 2x = 3(x - 7)$

b. Simplify $(m^5)^2 \div m^3$

(4 marks)

a) Expand

$$\begin{array}{rcl}
 9 - 2x & = & 3x - 21 \\
 +2x & & \\
 \hline
 9 & = & 5x - 21 \\
 +21 & & \\
 \hline
 30 & = & 5x, \text{ so } x = 6
 \end{array}$$

Check

$$9 - 12 = -3 \text{ and } 3(6 - 7) = -3$$

b) $(m^5)^2 = m^{10}$

$$m^{10} \text{ divided by } m^3 = m^7$$

The original fraction requires $m \neq 0$; keep this restriction after simplifying

10

a. Simplify $4a + 3b - a + 5b$

b. Solve $\frac{5x - 4}{2} = 18$

c. Solve $4(y + 3) = 2y + 22$

(5 marks)

a) $4a - a = 3a$ and $3b + 5b = 8b$, so the answer is $3a + 8b$

b) Multiply both sides by 2

$$5x - 4 = 36$$

Add 4

$$5x = 40, \text{ so } x = 8$$

c) Expand

$$4y + 12 = 2y + 22$$

Subtract $2y$

$$2y + 12 = 22$$

Subtract 12

$$2y = 10, \text{ so } y = 5$$

Check

$$4(5 + 3) = 32 \text{ and } 2(5) + 22 = 32$$

11

A square has sides of length $(3x + 2)$ cm. A regular pentagon has sides of length $(x + 10)$ cm.

The square and the pentagon have the same perimeter.

Work out the length of one side of the square.

(4 marks)

$$\begin{array}{lcl} 4(3x + 2) & = & 5(x + 10) \\ \text{expand} & & \text{expand} \\ 12x + 8 & = & 5x + 50 \\ -5x & & -5x \\ 7x + 8 & = & 50 \\ -8 & & -8 \\ 7x & = & 42 \\ \div 7 & & \div 7 \\ x & = & 6 \end{array}$$

$$\text{side} = 3 \times 6 + 2 = 20$$

20 cm