

FORMING EQUATIONS - PRACTICE QUESTIONS



metatutor

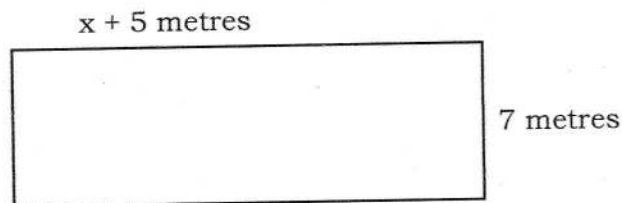
1.
 Adrian is x years old.
 Beth is 5 years older than Adrian.
 Corey is 9 years younger than Adrian.
 Their total age is 62 years.
 Work out each person's age.

$$\begin{aligned} \text{Adrian} &= x \\ \text{Beth} &= x + 5 \\ \text{Corey} &= x - 9 \end{aligned}$$

$$\begin{aligned} x + x + 5 + x - 9 &= 62 \\ 3x - 4 &= 62 & +4 \\ 3x &= 66 & \div 3 \\ x &= 22 \end{aligned}$$

$$\text{Adrian} = 22, \text{Beth} = 27, \text{Corey} = 13$$

2.



The perimeter of the above rectangle is 46 metres.
 Find x .

$$\begin{aligned} x + 5 + x + 5 + 7 + 7 &= 46 \\ 2x + 24 &= 46 & -24 \\ 2x &= 22 & \div 2 \\ x &= 11 \end{aligned}$$

3.

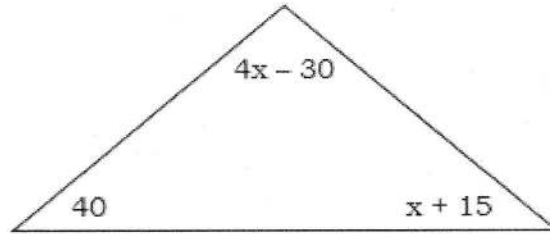
Francesca has x marbles.
 Graham has three times as many marbles as Francesca.
 Harry has 3 more marbles than Francesca.
 They have a total of 73 marbles.
 Work out how many marbles each person has.

$$\begin{aligned} \text{Francesca} &= x \\ \text{Graham} &= 3x \\ \text{Harry} &= x + 3 \end{aligned}$$

$$\begin{aligned} x + 3x + x + 3 &= 73 \\ 5x + 3 &= 73 & -3 \\ 5x &= 70 & \div 5 \\ x &= 14 \end{aligned}$$

$$\text{Francesca} = 14, \text{Graham} = 42, \text{Harry} = 17$$

4.
Find x.



$$\begin{aligned}
 4x - 30 + 40 + x + 15 &= 180 \\
 5x + 25 &= 180 \\
 -25 & \\
 5x &= 155 \\
 \div 5 & \\
 x &= 31
 \end{aligned}$$

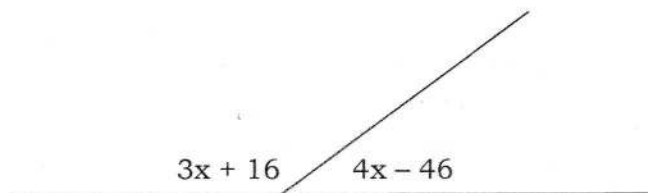
5.
The mean of the following group of numbers is 10.

$$x + 7 \qquad 4x - 1 \qquad 3x + 11 \qquad 7$$

Find x.

$$\begin{aligned}
 \underline{x + 7 + 4x - 1 + 3x + 11 + 7} &= 10 \\
 4 & \\
 x + 7 + 4x - 1 + 3x + 11 + 7 &= 40 \\
 8x + 24 &= 40 \\
 -24 & \\
 8x &= 16 \\
 \div 8 & \\
 x &= 2
 \end{aligned}$$

6.
Find x.



$$\begin{aligned}
 3x + 16 + 4x - 46 &= 180 \\
 7x - 30 &= 180 \\
 +30 & \\
 7x &= 210 \\
 \div 7 & \\
 x &= 30
 \end{aligned}$$

7.

Isaac, Jasmine and Kerry have 70 sweets between them.

Jasmine has 6 more sweets than Isaac.

Kerry has twice as many sweets as Jasmine.

How many more sweets does Kerry have than Isaac?

$$\begin{aligned} \text{Isaac} &= x \\ \text{Jasmine} &= x + 6 \\ \text{Kerry} &= 2(x + 6) \end{aligned}$$

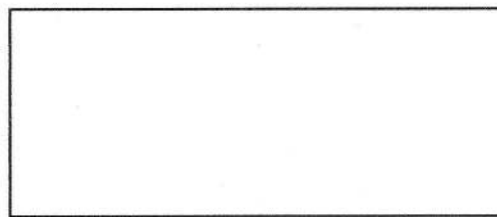
$$\begin{aligned} x + x + 6 + 2(x + 6) &= 70 \\ x + x + 6 + 2x + 12 &= 70 \\ 4x + 18 &= 70 \\ -18 & & -18 \\ 4x &= 52 \\ \div 4 & & \div 4 \\ x &= 13 \end{aligned}$$

Isaac has 13
Kerry has 38

$$38 - 13 = \textcircled{25}$$

8.

The rectangle below has a perimeter of 36 cm.



$$2x - 3 \text{ cm} = 5 \text{ cm}$$

$$3x + 1 \text{ cm} = 13 \text{ cm}$$

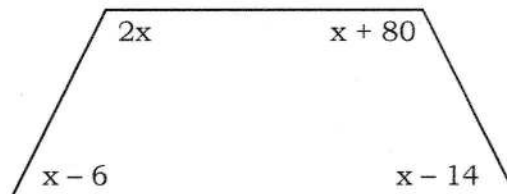
Find the area of the rectangle.

$$\begin{aligned} 2x - 3 + 2x - 3 + 3x + 1 + 3x + 1 &= 36 \\ 10x - 4 &= 36 \\ +4 & & +4 \\ 10x &= 40 \\ \div 10 & & \div 10 \\ x &= 4 \end{aligned}$$

$$13 \times 5 = \underline{65 \text{ cm}^2}$$

9.

Find x.

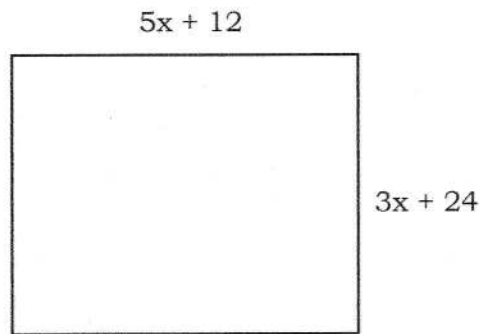


$$\begin{aligned} 2x + x + 80 + x - 6 + x - 14 &= 360 \\ 5x + 60 &= 360 \\ -60 & & -60 \\ 5x &= 300 \\ \div 5 & & \div 5 \\ x &= 60 \end{aligned}$$

10.

The shape below is a square.

Find x .



$$\begin{array}{r}
 5x + 12 = 3x + 24 \\
 -3x \quad \quad \quad -3x \\
 \hline
 2x + 12 = 24 \\
 -12 \quad \quad \quad -12 \\
 \hline
 2x = 12 \\
 \div 2 \quad \quad \quad \div 2 \\
 \hline
 x = 6
 \end{array}$$

11.

A bakery has baked some desserts - cookies, muffins and cakes.

They baked four times as many cookies as muffins.

They baked 12 cakes.

Overall, they baked 52 desserts.

Work out the ratio of muffins to cookies to cakes baked. Give your answer in its simplest form.

$$\begin{array}{l}
 \text{Muffins} = x = 8 \\
 \text{Cookies} = 4x = 32 \\
 \text{Cakes} = 12
 \end{array}$$

$$\begin{array}{r}
 x + 4x + 12 = 52 \\
 5x + 12 = 52 \\
 -12 \quad \quad \quad -12 \\
 \hline
 5x = 40 \\
 \div 5 \quad \quad \quad \div 5 \\
 \hline
 x = 8
 \end{array}$$

$$\begin{array}{l}
 8:32:12 \\
 \hline
 2:8:3
 \end{array}$$

12.

The mean of the following group of numbers is 5.

$$6 \quad x + 4 \quad x - 5 \quad 3x \quad 2$$

Find the median of the numbers.

$$\frac{6 + x + 4 + x - 5 + 3x + 2}{5} = 5$$

$$\begin{array}{r}
 6 + x + 4 + x - 5 + 3x + 2 = 25 \\
 5x + 7 = 25 \\
 -7 \quad \quad \quad -7 \\
 \hline
 5x = 18 \\
 \div 5 \quad \quad \quad \div 5 \\
 \hline
 x = 3.6
 \end{array}$$

$$6, 7.6, -1.4, 10.8, 2$$

$$-1.4, 2, 6, 7.6, 10.8$$

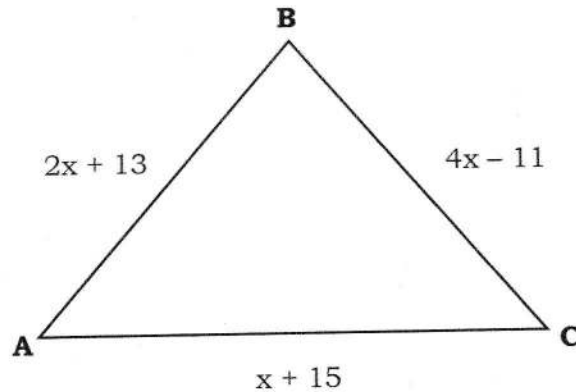
$$(6)$$

13.

ABC is an isosceles triangle, with side lengths measured in centimetres.

AB = BC.

Find the length of AC.



$$AB = BC$$

$$2x + 13 = 4x - 11$$

$$\begin{array}{r} -2x \\ 2x + 13 = 4x - 11 \\ \hline \end{array}$$

$$13 = 2x - 11$$

$$\begin{array}{r} +11 \\ 13 = 2x - 11 \\ \hline \end{array}$$

$$24 = 2x$$

$$\begin{array}{r} \div 2 \\ 24 = 2x \\ \hline \end{array}$$

$$x = 12$$

$$AC = x + 15$$

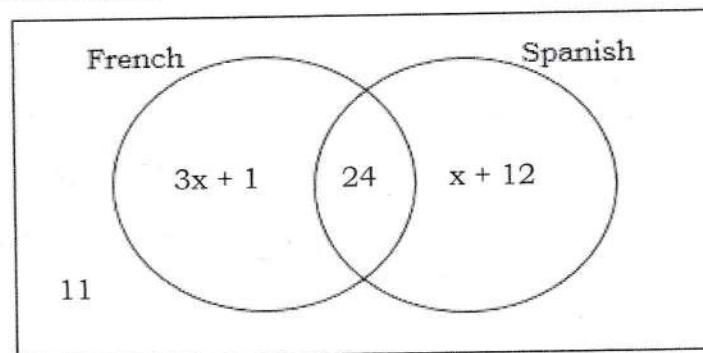
$$= 12 + 15$$

$$AC = 27 \text{ cm}$$

14.

The Venn diagram below shows the number of students at a school who study Spanish and French.

There are 120 students in total.



How many of the students study French?

$$11 + 3x + 1 + 24 + x + 12 = 120$$

$$\begin{array}{r} 4x + 48 = 120 \\ -48 \\ \hline \end{array}$$

$$\begin{array}{r} 4x = 72 \\ \div 4 \\ \hline \end{array}$$

$$x = 18$$

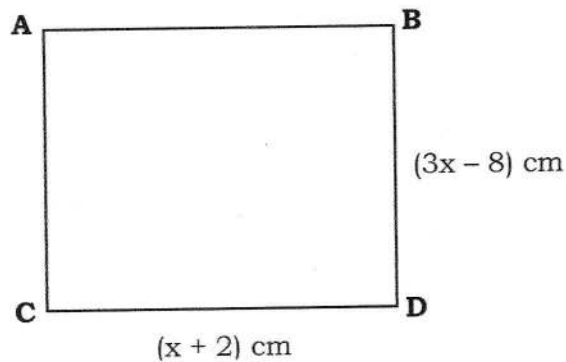
$$\text{French} = 3x + 1 + 24$$

$$= 3 \times 18 + 1 + 24 = 79 \text{ students}$$

15.

ABCD is a square.

Find the area of ABCD, in cm^2 .



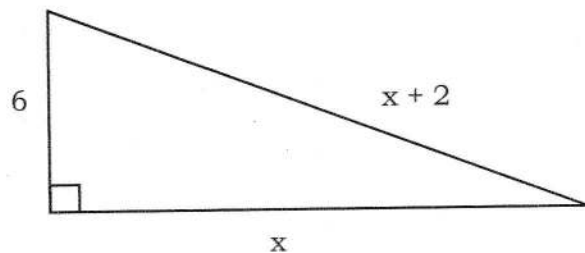
$$\begin{aligned} 3x - 8 &= x + 2 \\ -x & \quad -x \\ 2x - 8 &= 2 \\ +8 & \quad +8 \\ 2x &= 10 \\ \div 2 & \quad \div 2 \\ x &= 5 \end{aligned}$$

$$\begin{aligned} BD &= 3x - 8 \\ &= 3 \times 5 - 8 \\ &= 15 - 8 \\ &= 7 \text{ cm} \end{aligned}$$

$$\text{Area} = 7^2 = 49 \text{ cm}^2$$

16.

Find x .



$$\begin{aligned} \text{Pythagoras' theorem: } 6^2 + x^2 &= (x + 2)^2 \\ 36 + x^2 &= x^2 + 4x + 4 \\ -x^2 & \quad -x^2 \\ 36 &= 4x + 4 \\ -4 & \quad -4 \\ 32 &= 4x \\ \div 4 & \quad \div 4 \\ x &= 8 \end{aligned}$$