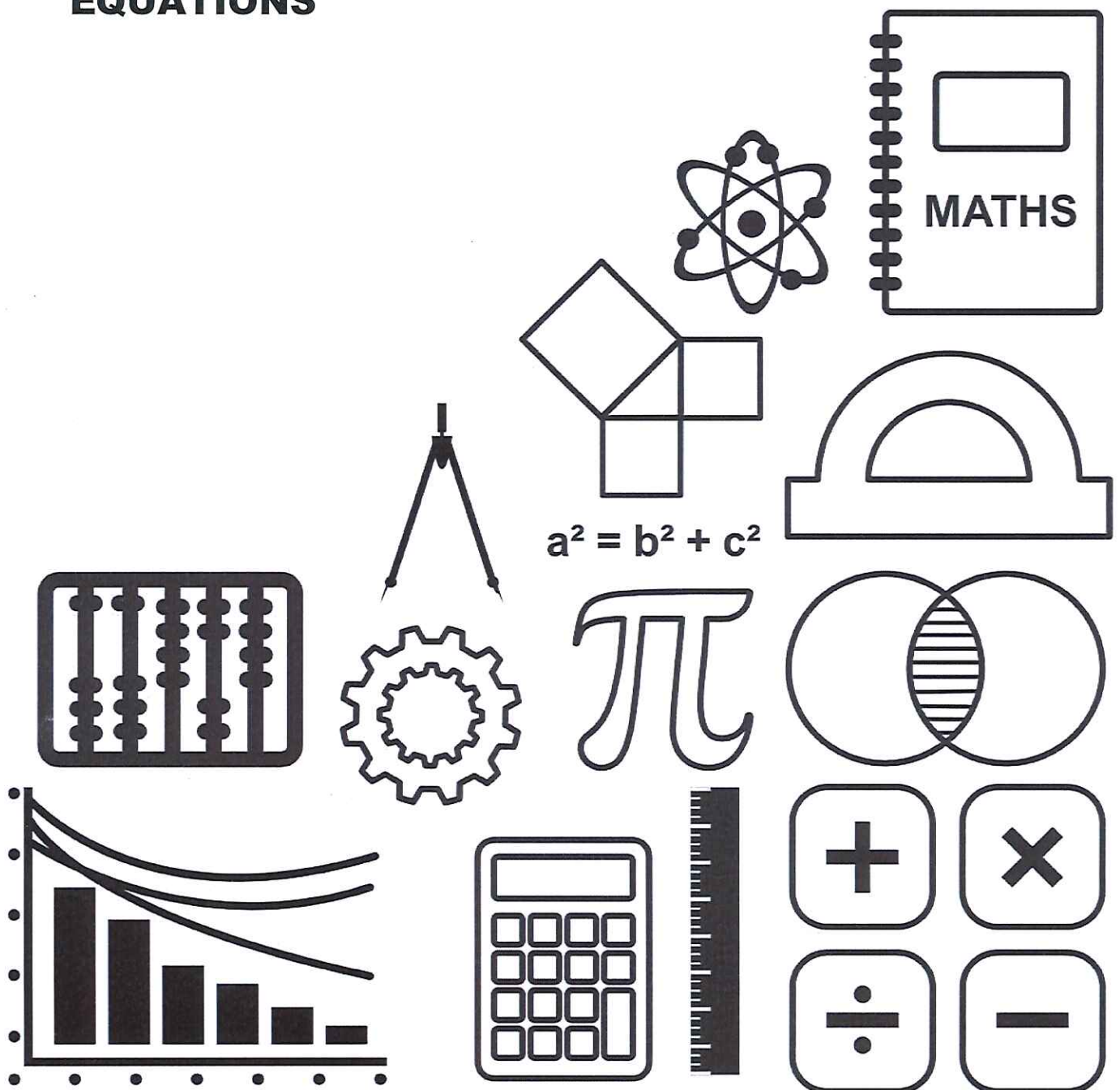


GCSE TOPIC BOOKLET EQUATIONS



- (a) Draw a line from each of the following equations to its solution.
The first one is done for you.

[3]

$a - 5 = 6$	$a = 5$
$a - 2 = 6$	$a = 3$
$a + a = 2$	$a = 11$
$a - 3 = 0$	$a = 1$
	$a = 4$
	$a = 8$

(Handwritten green lines connect $a - 5 = 6$ to $a = 11$, $a - 2 = 6$ to $a = 8$, $a + a = 2$ to $a = 1$, and $a - 3 = 0$ to $a = 3$.)

- (b) Write down an equation that gives the solution $x = 10$.

[1]

eg $2x = 20$ or $x - 1 = 9$
 $x = 10$ $x = 10$ etc

- (c) Write down an equation that gives the solution $t = -4$.

[1]

eg $t + 6 = 2$ or $\frac{t}{2} = -2$
 $t = 2 - 6$ $t = -4$
 $t = -4$

2.

In the following table, the letters a , b , c and d represent different numbers. The total for each row is given at the side of the table. Find the values of a , b , c and d .

①	a	a	a	a	16
②	a	b	b	a	18
③	a	c	c	c	13
④	a	b	c	d	14

From ① $4a = 16$, $a = 4$

From ② $2a + 2b = 18$, $8 + 2b = 18$, $2b = 10$, $b = 5$

From ③ $a + 3c = 13$, $4 + 3c = 13$, $3c = 9$, $c = 3$

From ④ $a + b + c + d = 14$, $4 + 5 + 3 + d = 14$, $d = 2$

$a = 4$

$b = 5$

$c = 3$

$d = 2$

[4]

3.

Solve

(a) $x + 3 = 19$

$x = 19 - 3$

$x = 16$

[1]

(b) $3x = 18$

$x = \frac{18}{3}$

$x = 6$

[1]

(c) $\frac{x}{7} = 8$

$x = 8 \times 7$

$x = 56$

[1]

(d) $3x + 5 = 17$

$3x = 17 - 5$

$3x = 12$

$x = \frac{12}{3}$

[2]

$x = 4$

4.

(a) Solve $x - 7 = 16$.

$$x = 16 + 7$$

[1]

$$\underline{\underline{x = 23}}$$

(b) Solve $5x = 20$.

$$x = 20 \div 5$$

[1]

$$\underline{\underline{x = 4}}$$

(c) Solve $\frac{y}{8} = 9$.

$$y = 9 \times 8$$

[1]

$$\underline{\underline{y = 72}}$$

(d) Solve $4a + 3 = 39$.

$$4a = 39 - 3$$

[2]

$$4a = 36$$

$$a = 36 \div 4$$

$$\underline{\underline{a = 9}}$$

5.

(a) Solve $4x = 16$.

$$x = 16 \div 4$$

[1]

$$\underline{x = 4}$$

(b) Solve $\frac{y}{5} = 4$.

$$y = 4 \times 5$$

[1]

$$\underline{y = 20}$$

(c) Solve $5a - 8 = 17$.

$$5a = 17 + 8$$

[2]

$$5a = 25$$

$$a = 25 \div 5$$

$$\underline{a = 5}$$

(d) Solve $\frac{20}{b} = 5$.

[1]

$$20 = 5 \times b$$

$$20 = 5b$$

$$\frac{20}{5} = b, \quad \underline{b = 4}$$

(e) The cost of a cup of tea is the same as the cost of a cup of coffee.
Two cups of tea and three cups of coffee cost £8 in total.
Find the cost of one cup of tea.

[3]

$$\underline{t = c}$$

$$\underline{2t + 3c = 800p}$$

$$\text{but } t = c$$

$$\underline{5c = 800p}$$

$$c = \frac{800}{5}$$

$$5 \overline{) 800} \quad \begin{array}{r} 160p \\ \underline{500} \\ 300 \end{array}$$

$$\underline{c = £1.60 = t}$$

One cup of tea costs £1.60

6.

Solve each of the following equations.

(a) $8 + x = 21$

$x = 21 - 8$

$x = 13$

[1]

(b) $x - 3 = -7$

$x = -7 + 3$

$x = -4$

[1]

(c) $8x = 32$

$x = 32 \div 8$

$x = 4$

[1]

(d) $2x - 5 = 9$

$2x = 9 + 5$

$2x = 14$

$x = 14 \div 2$

$x = 7$

[2]

7.

Jacob's teacher gives him the following homework task:

Write 2 equations that
have a solution of
 $x = 5$

Write 2 possible equations that Jacob could use in his homework.

[2]

Equation 1:

$2x = 10$

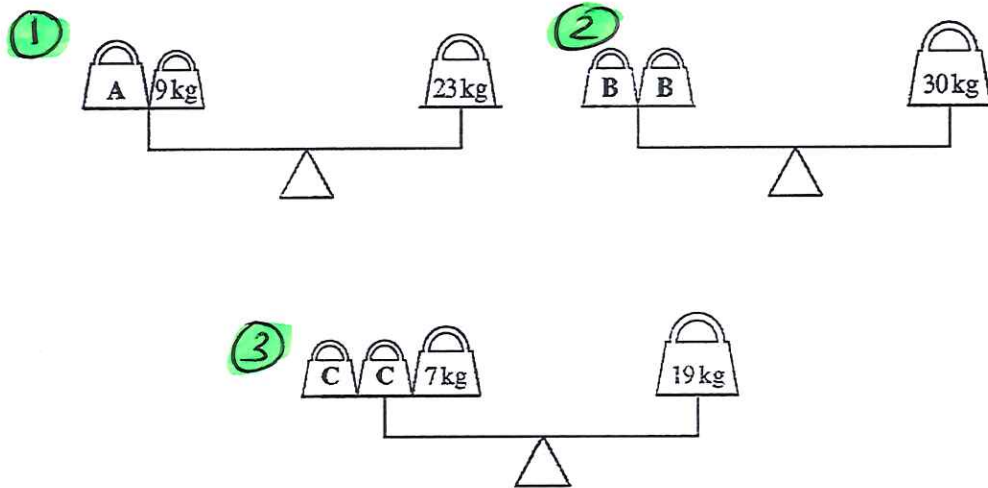
Equation 2:

$x + 1 = 6$

These are only
examples that
work. There are
lots and lots of
other possibilities.

8.

Each diagram represents a balance with the total weight on each side being equal.
Find the value of A, B and C.



From ① $A + 9 = 23$, $A = 23 - 9$, $A = 14$

From ② $2B = 30$, $B = 30 \div 2$, $B = 15$

From ③ $2C + 7 = 19$

$2C = 19 - 7$

$2C = 12$

$C = 6$

A = 14 kg B = 15 kg C = 6 kg

[4]

9.

(a) Solve $\frac{x}{7} = 7$.

$$x = 7 \times 7$$

[1]

$$\underline{x = 49}$$

(b) Solve $5y - 6 = 49$.

$$5y = 49 + 6$$

$$5y = 55$$

$$y = 55 \div 5$$

$$\underline{y = 11}$$

[2]

(c) (i) Find the values of x and y when $4x = 20$ and $x + y = 4$.

[2]

$$x = 20 \div 4$$

$$\underline{x = 5}$$

$$y = 4 - x$$

$$y = 4 - 5$$

$$\underline{y = -1}$$

(ii) Use your answers to find the value of $2x + 3y$.

[2]

$$= 2(5) + 3(-1)$$

$$= 10 - 3 = \underline{7}$$

10.

Solve $8x - 9 = 21 + 5x$.

[3]

$$\downarrow$$

$$-5x$$

$$\downarrow$$

$$-5x$$

$$3x - 9 = 21$$

$$\downarrow$$

$$+9$$

$$\downarrow$$

$$+9$$

$$3x = 30$$

$$\downarrow$$

$$\div 3$$

$$\downarrow$$

$$\div 3$$

$$x = 30 \div 3$$

$$\underline{x = 10}$$

11.

Pria was given 3 equations to solve.

$$a + 9 = 2$$

$$3b = 240$$

$$c - 5 = -1$$

Solve the 3 equations for Pria.

[3]

• $a + 9 = 2$

$$a = 2 - 9$$

$$\underline{a = -7}$$

• $3b = 240$

$$b = 240 \div 3$$

$$\underline{b = 80}$$

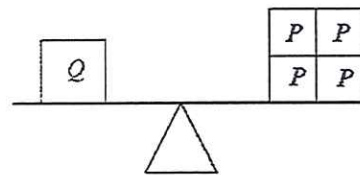
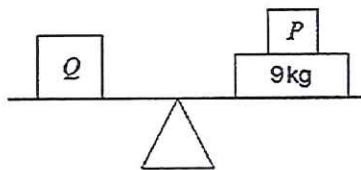
• $c - 5 = -1$

$$c = -1 + 5$$

$$\underline{c = 4}$$

12.

Packages P and Q balance as shown in the diagrams below.



Find the weight of package P and the weight of package Q .

[4]

$$\underline{P + 9 = 4P}$$

$$9 = 3P$$

$$\underline{3 = P}$$

$$\underline{Q = P + 9}$$

$$Q = 3 + 9$$

$$\underline{Q = 12}$$

13.

(a) Solve $a + 6 = 19$.

[1]

$$a = 19 - 6$$

$$\underline{a = 13}$$

(b) Solve $6b = 42$.

$$b = 42 \div 6$$

[1]

$$\underline{b = 7}$$

14.

Megan and Ellis play a game called "I think of a number".

(a) Megan says

I think of a number.
When I add together 4 lots of
my number the answer is 28.

n

$$n + n + n + n = 28$$

$$4n = 28$$

Set up an equation, using the information that Megan has given.
Use the letter n for the number that Megan thought of.
Solve your equation to find the value of n .

[2]

$$4n = 28$$

$$n = 28 \div 4$$

$$\underline{n = 7}$$

(b) Ellis says

I think of a number.
When I divide it by 6 the
answer is 12.

$$\frac{m}{6} = 12$$

Set up an equation, using the information that Ellis has given.
Use the letter m for the number that Ellis thought of.
Solve your equation to find the value of m .

[2]

$$\underline{m} = 12$$

$$6$$

$$m = 12 \times 6$$

$$\underline{m = 72}$$

15.

Solve each of the following equations.

(a) $x - 4 = 3$

$x = 3 + 4$

$x = 7$

[1]

(b) $4x = 36$

$x = 36 \div 4$

$x = 9$

[1]

(c) $5x - 4 = 31$

$5x = 31 + 4$

$5x = 35$

$x = 35 \div 5$

$x = 7$

[2]

16.

Solve.

(a) $6x + 7 = 4(x + 6)$

$6x + 7 = 4x + 24$

$-4x$

$-4x$

$2x + 7 = 24$

-7

-7

$2x = 17$

$x = \frac{17}{2}$

$x = 8.5$

[3]

(b) $\frac{x}{5} + 4 = 13$

-4

-4

$\frac{x}{5} = 9$

$\times 5$

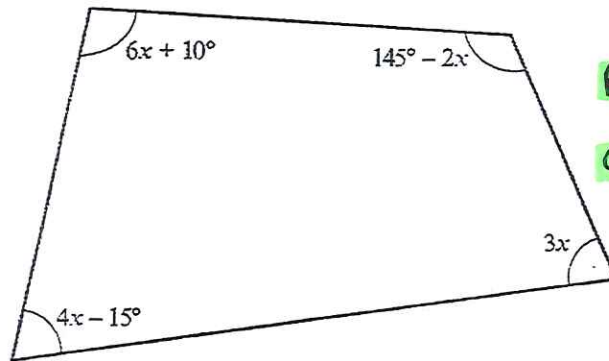
$\times 5$

$x = 9 \times 5$

$x = 45$

[2]

17.



Remember angles in a quadrilateral add upto 360°

Diagram not drawn to scale

In this quadrilateral all the angles are measured in degrees.
Find the value of x which satisfies this diagram.
You must show all your working.

[4]

$$6x + 10 + 145 - 2x + 3x + 4x - 15 = 360$$

$$11x + 140 = 360$$

$$11x = 220$$

$$x = 220 \div 11$$

$$\underline{x = 20}$$

18.

Solve the equation $8a + 7 = 2a + 34$.

[3]

$$\begin{array}{r} \downarrow \quad \downarrow \\ -2a \quad -2a \end{array}$$

$$6a + 7 = 34$$

$$\begin{array}{r} \downarrow \quad \downarrow \\ -7 \quad -7 \end{array}$$

$$6a = 27$$

$$\begin{array}{r} \downarrow \quad \downarrow \\ \div 6 \quad \div 6 \end{array}$$

$$a = 27 \div 6$$

$$\underline{\underline{a = 4.5}}$$

19.

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

$$6x - 21 = 2x + 9$$

$$\downarrow \quad \downarrow$$

$$-2x \quad -2x$$

$$4x - 21 = 9$$

$$\downarrow \quad \downarrow$$

$$+21 \quad +21$$

$$4x = 30$$

$$\downarrow \quad \downarrow$$

$$\div 4 \quad \div 4$$

$$x = 30 \div 4$$

$$\underline{\underline{x = 7.5}}$$

[3]

20.

Solve the equation $3(x - 2) = x + 2$.

[3]

$$3x - 6 = x + 2$$

$$\downarrow \quad \downarrow$$

$$-x \quad -x$$

$$2x - 6 = 2$$

$$\downarrow \quad \downarrow$$

$$+6 \quad +6$$

$$2x = 8$$

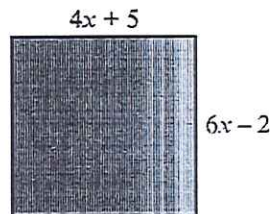
$$\downarrow \quad \downarrow$$

$$\div 2 \quad \div 2$$

$$\underline{\underline{x = 4}}$$

21.

The diagram shows a square.



Find the length of the side of the square.

$$4x + 5 = 6x - 2$$

$$\downarrow \quad \downarrow$$

$$-4x \quad -4x$$

$$5 = 2x - 2$$

$$\downarrow \quad \downarrow$$

$$+2 \quad +2$$

$$7 = 2x$$

$$\downarrow \quad \downarrow$$

$$\div 2 \quad \div 2$$

$$\underline{\underline{3.5 = x}}$$

[5]