

Solving One- and Two-Step Equations

Solutions

For Pearson Edexcel GCSE Mathematics (1MA1) • Foundation tier

Each question is shown in grey, followed by the working, one step per line. The final answer is in a box. *Marks* shows how the marks are usually given in the exam, and **Tip** points out a common mistake.

1 (3 marks)

(a) Solve $x + 7 = 12$

Subtract 7 from both sides.

$$x = 12 - 7 = 5$$

Answer: $x = 5$

(b) Solve $4y = 28$

$4y$ means $4 \times y$.

Divide both sides by 4.

$$y = 28 \div 4 = 7$$

Answer: $y = 7$

Tip: Do not multiply (4×28) or subtract ($28 - 4$). To undo $\times 4$, divide by 4.

(c) Solve $\frac{p}{5} = 3$

$\frac{p}{5}$ means $p \div 5$.

Multiply both sides by 5.

$$p = 3 \times 5 = 15$$

Answer: $p = 15$

2 (2 marks)

Solve $6k - 5 = 31$

Add 5 to both sides: $6k = 36$

Divide both sides by 6: $k = 6$

Check: $6 \times 6 - 5 = 31$ ✓

Answer: $k = 6$

Tip: To undo -5 you **add** 5 to both sides. Subtracting 5 gives $6k = 26$, which is wrong.

Marks: 1 mark for $6k = 36$. 1 mark for $k = 6$.

3 (2 marks)

Solve $\frac{2y}{3} = 8$

Multiply both sides by 3: $2y = 24$

Divide both sides by 2: $y = 12$

Check: $2 \times 12 = 24$ and $24 \div 3 = 8$ ✓

Answer: $y = 12$

Tip: Multiply the **whole** of each side by 3, and then divide by 2. Do not stop at $2y = 24$ and write 24.

Marks: 1 mark for $2y = 24$. 1 mark for $y = 12$.

4 (2 marks)

Solve $7x + 3 = -11$

Subtract 3 from both sides: $7x = -11 - 3 = -14$

Divide both sides by 7: $x = -2$

Answer: $x = -2$

Marks: 1 mark for $7x = -14$. 1 mark for $x = -2$.

5 (2 marks)

Solve $9 - 2x = 1$

Add $2x$ to both sides: $9 = 1 + 2x$

Subtract 1 from both sides: $8 = 2x$

Divide both sides by 2: $x = 4$

Check: $9 - 2 \times 4 = 1$ ✓

Answer: $x = 4$

Tip: $x = 10$ and $x = 5$ are common wrong answers. Adding $2x$ to both sides first avoids working with $-2x$.

Marks: 1 mark for $2x = 8$. 1 mark for $x = 4$.

6 (2 marks)

Solve $\frac{x}{4} - 3 = 2$

Add 3 to both sides first: $\frac{x}{4} = 5$

Multiply both sides by 4: $x = 20$

Answer: $x = 20$

Marks: 1 mark for $\frac{x}{4} = 5$. 1 mark for $x = 20$.

7 (2 marks)

Solve $\frac{x - 5}{2} = 9$

The whole of $x - 5$ is divided by 2.

Multiply both sides by 2: $x - 5 = 18$

Add 5 to both sides: $x = 23$

Answer: $x = 23$

Marks: 1 mark for $x - 5 = 18$. 1 mark for $x = 23$.

8 (2 marks)

Solve $8w + 5 = 9$

Subtract 5 from both sides: $8w = 4$

Divide both sides by 8: $w = \frac{4}{8}$

$$\frac{4}{8} = 0.5 \text{ (or } \frac{1}{2})$$

Answer: $w = 0.5$

Tip: $4 \div 8 = \frac{4}{8} = 0.5$. Do not work out $8 \div 4 = 2$ by mistake.

Marks: 1 mark for $8w = 4$. 1 mark for 0.5 (or $\frac{1}{2}$).

9 (2 marks)

ABC is a straight line.

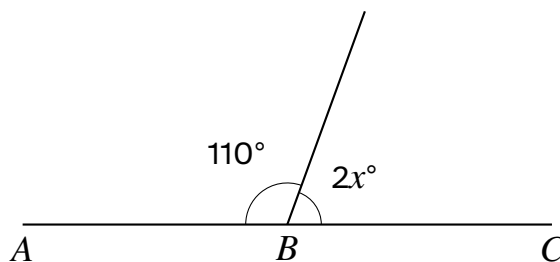


Diagram **NOT** accurately drawn

Work out the value of x .

Angles on a straight line add up to 180° .

So $2x + 110 = 180$

Subtract 110 from both sides: $2x = 70$

Divide both sides by 2: $x = 35$

Answer: $x = 35$

Marks: 1 mark for $2x + 110 = 180$. 1 mark for $x = 35$.

10 (3 marks)

An equilateral triangle has sides of length $(x + 3)$ cm.

The perimeter of the triangle is 42 cm.

Work out the value of x .

An equilateral triangle has three equal sides.

Each side is $x + 3$, so the perimeter is $3(x + 3)$.

So $3(x + 3) = 42$

Expand the bracket: $3x + 9 = 42$

Subtract 9 from both sides: $3x = 33$

Divide both sides by 3: $x = 11$

Check: each side is 14 cm, and $3 \times 14 = 42$ ✓

Answer: $x = 11$

Tip: Another way: $42 \div 3 = 14$ is one side, so $x + 3 = 14$ and $x = 11$. Do not give 14 as the answer.

Marks: 1 mark for $3(x + 3)$ or $3x + 9$. 1 mark for $3x = 33$. 1 mark for $x = 11$.

11 (1 mark)

Jess solves $\frac{x}{3} + 2 = 5$

$$x + 2 = 15$$

$$x = 13$$

Explain the mistake Jess has made.

Jess multiplied $\frac{x}{3}$ by 3, but she did not multiply the 2 by 3.

The correct way is to subtract 2 first: $\frac{x}{3} = 3$

Then multiply by 3: $x = 9$

Answer: She did not multiply the 2 by 3. (She should subtract 2 first, giving $x = 9$.)

12 (3 marks)

Sam buys 4 pens and a ruler.

Each pen costs $\pounds p$ and the ruler costs $\pounds 3$

Sam pays $\pounds 11$ in total.

Work out the cost of one pen.

4 pens cost $4p$ pounds.

Add the ruler: $4p + 3$

The total is $\pounds 11$, so $4p + 3 = 11$

Subtract 3 from both sides: $4p = 8$

Divide both sides by 4: $p = 2$

Answer: £2

Marks: 1 mark for $4p + 3 = 11$. 1 mark for $4p = 8$. 1 mark for 2.

13 (2 marks)

Solve $5 = 17 - 3y$

Add $3y$ to both sides: $5 + 3y = 17$

Subtract 5 from both sides: $3y = 12$

Divide both sides by 3: $y = 4$

Check: $17 - 3 \times 4 = 5$ ✓

Answer: $y = 4$

Marks: 1 mark for $3y = 12$. 1 mark for $y = 4$.
