

Solving One- and Two-Step Equations

Solutions

For AQA GCSE Mathematics (8300) • 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 $w + 9 = 23$

Subtract 9 from both sides.

$$w = 23 - 9 = 14$$

Answer: $w = 14$

(b) Solve $4x = 36$

$4x$ means $4 \times x$.

Divide both sides by 4.

$$x = 36 \div 4 = 9$$

Answer: $x = 9$

(c) Solve $15 - y = 6$

Add y to both sides: $15 = 6 + y$

Subtract 6 from both sides: $y = 15 - 6 = 9$

Check: $15 - 9 = 6$ ✓

Answer: $y = 9$

Tip: $15 + 6 = 21$ and $6 - 15 = -9$ are common wrong answers. Check your answer by putting it back into the equation.

2 (1 mark)

Which equation has the solution $x = \frac{3}{4}$?

Circle your answer.

Options: $3x = 4$, $4x = 3$, $x + 3 = 4$, $x - 4 = 3$

Solve each equation, or put $x = \frac{3}{4}$ into each one.

$$3x = 4 \text{ gives } x = 4 \div 3 = \frac{4}{3}$$

$$4x = 3 \text{ gives } x = 3 \div 4 = \frac{3}{4} \quad \checkmark$$

$$x + 3 = 4 \text{ gives } x = 1 \quad \text{and} \quad x - 4 = 3 \text{ gives } x = 7$$

Answer: $4x = 3$

Tip: The number you divide **by** goes on the bottom. $3x = 4$ gives $x = \frac{4}{3}$, not $\frac{3}{4}$.

3 (1 mark)

Which equation has a negative solution?

Tick one box.

Solve each equation.

$$x + 3 = 8 \text{ gives } x = 5$$

$$x - 3 = 8 \text{ gives } x = 11$$

$$x + 8 = 3 \text{ gives } x = 3 - 8 = -5 \quad \checkmark$$

$$8x = 3 \text{ gives } x = \frac{3}{8} \text{ (positive)}$$

Answer: $x + 8 = 3$

Tip: $3 - 8 = -5$, not 5. When you take a bigger number from a smaller one the answer is negative.

4 (2 marks)

(a) Solve $9 - e = 0$

Add e to both sides: $9 = e$

Check: $9 - 9 = 0$ ✓

Answer: $e = 9$

(b) Solve $4f = 0$

Divide both sides by 4.

$$f = 0 \div 4 = 0$$

Check: $4 \times 0 = 0$ ✓

Answer: $f = 0$

Tip: The answer is not 4 or -4 . Zero divided by any number is zero.

5 (2 marks)

(a) Solve $\frac{x}{4} = 6$

$\frac{x}{4}$ means $x \div 4$.

The inverse of $\div 4$ is $\times 4$.

Multiply both sides by 4: $x = 6 \times 4 = 24$

Answer: $x = 24$

Tip: Do not divide 6 by 4. To undo $\div 4$ you multiply by 4.

(b) Solve $\frac{w}{3} = -5$

Multiply both sides by 3.

$$w = -5 \times 3 = -15$$

Answer: $w = -15$

6 (2 marks)

Solve $4x - 7 = 21$

Add 7 to both sides: $4x = 28$

Divide both sides by 4: $x = 7$

Check: $4 \times 7 - 7 = 21$ ✓

Answer: $x = 7$

Tip: Write the value of x on the answer line. 28 is the value of $4x$, not x .

Marks: 1 mark for $4x = 28$. 1 mark for $x = 7$.

7 (2 marks)

Solve $5x + 4 = 39$

Subtract 4 from both sides: $5x = 35$

Divide both sides by 5: $x = 7$

Answer: $x = 7$

Marks: 1 mark for $5x = 35$. 1 mark for $x = 7$.

8 (2 marks)

Solve $4x - 3 = 7$

Add 3 to both sides: $4x = 10$

Divide both sides by 4: $x = \frac{10}{4}$

$$\frac{10}{4} = 2.5 \text{ (or } \frac{5}{2}\text{)}$$

Answer: $x = 2.5$

Marks: 1 mark for $4x = 10$. 1 mark for 2.5 (or $\frac{5}{2}$).

9 (2 marks)

Solve $\frac{x}{5} + 2 = 6$

Subtract 2 from both sides first: $\frac{x}{5} = 4$

Multiply both sides by 5: $x = 20$

Check: $20 \div 5 + 2 = 6$ ✓

Answer: $x = 20$

Tip: If you multiply by 5 first, you must multiply **every** term, including the 2: $x + 10 = 30$.

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

10 (2 marks)

Solve $20 - 3x = 8$

Add $3x$ to both sides: $20 = 8 + 3x$

Subtract 8 from both sides: $12 = 3x$

Divide both sides by 3: $x = 4$

Answer: $x = 4$

Tip: Adding $3x$ to both sides first keeps the x -term positive, so you avoid dividing by a negative.

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

11 (1 mark)

Mo solves $2x + 5 = 17$

$$2x = 22$$

$$x = 11$$

Is he correct? Tick a box.

Give a reason for your answer.

To undo +5, Mo should **subtract** 5, not add it.

$$2x = 17 - 5 = 12$$

$$\text{So } x = 6.$$

Check his answer: $2 \times 11 + 5 = 27$, not 17.

Answer: No. $2x = 12$, so $x = 6$.

12 (3 marks)

Ella thinks of a number.

She multiplies it by 4 and then subtracts 7

Her answer is 25

Work out the number Ella is thinking of.

Call Ella's number n .

Multiply by 4, then subtract 7: $4n - 7$

Her answer is 25, so $4n - 7 = 25$

Add 7 to both sides: $4n = 32$

Divide both sides by 4: $n = 8$

Check: $8 \times 4 - 7 = 25$ ✓

Answer: 8

Tip: Undo **both** steps, in reverse order: add 7 first, then divide by 4. On a calculator, $25 + 7 \div 4$ gives the wrong answer, so use brackets.

Marks: 1 mark for $4n - 7 = 25$ or $(25 + 7) \div 4$. 1 mark for $4n = 32$. 1 mark for 8.

13 (2 marks)

Solve $\frac{x+6}{3} = 5$

The whole of $x + 6$ is divided by 3.

Multiply both sides by 3: $x + 6 = 15$

Subtract 6 from both sides: $x = 9$

Answer: $x = 9$

Marks: 1 mark for $x + 6 = 15$. 1 mark for $x = 9$.

14 (2 marks)

Solve $7 = 2y - 9$

The unknown is on the right. That is fine.

Add 9 to both sides: $16 = 2y$

Divide both sides by 2: $8 = y$

Answer: $y = 8$

Marks: 1 mark for $2y = 16$. 1 mark for $y = 8$.

15 (2 marks)

Solve $6y + 11 = 2$

Subtract 11 from both sides: $6y = 2 - 11 = -9$

Divide both sides by 6: $y = -\frac{9}{6}$

$$-\frac{9}{6} = -1.5 \text{ (or } -\frac{3}{2}\text{)}$$

Answer: $y = -1.5$

Tip: $2 - 11 = -9$, not 9. A negative divided by a positive gives a negative answer.

Marks: 1 mark for $6y = -9$. 1 mark for -1.5 (or $-\frac{3}{2}$).
