

KESH TUTORS

Solving Equations & Inequalities

GCSE Maths Foundation · Revision Booklet

Topic 1 Solving one-step equations

Topic 2 Solving two-step equations

Topic 3 Solving equations with fractions

Topic 4 Unknowns on both sides

Topic 5 Solving inequalities

Topic 6 Solving double inequalities

3 sets per topic · Bronze → Silver → Gold · 15 minutes per set · answers and marking notes at the back

Name: _____ **Date:** _____

How to use this booklet

1. Read the Key Ideas page before you start each topic.
2. Set a timer for 15 minutes for each set. Work without a calculator.
3. Check every equation answer by substituting it back into the question.
4. Mark your work using the answers at the back. Read the "Watch out" notes for anything you got wrong.
5. Record your score and confidence in the tracker. Move up a level when you score at least 80%.

My progress

Set	Level	Focus	Score	Time	Confidence
1A	Bronze	Solving one-step equations Whole-number answers	/ 12	min	☐ Not yet Secure ☐ Nearly ☐
1B	Silver	Solving one-step equations Negatives, decimals and reversed equations	/ 12	min	☐ Not yet Secure ☐ Nearly ☐
1C	Gold	Solving one-step equations Form and solve	/ 15	min	☐ Not yet Secure ☐ Nearly ☐
2A	Bronze	Solving two-step equations Two-step equations	/ 12	min	☐ Not yet Secure ☐ Nearly ☐
2B	Silver	Solving two-step equations Brackets, negatives and fractions	/ 10	min	☐ Not yet Secure ☐ Nearly ☐
2C	Gold	Solving two-step equations Form and solve	/ 16	min	☐ Not yet Secure ☐ Nearly ☐
3A	Bronze	Solving equations with fractions One fraction	/ 12	min	☐ Not yet Secure ☐ Nearly ☐
3B	Silver	Solving equations with fractions Harder fractions	/ 10	min	☐ Not yet Secure ☐ Nearly ☐
3C	Gold	Solving equations with fractions Two fractions and problems	/ 19	min	☐ Not yet Secure ☐ Nearly ☐
4A	Bronze	Unknowns on both sides Unknowns on both sides	/ 10	min	☐ Not yet Secure ☐ Nearly ☐
4B	Silver	Unknowns on both sides Negatives and brackets	/ 10	min	☐ Not yet Secure ☐ Nearly ☐
4C	Gold	Unknowns on both sides Problems with unknowns on both sides	/ 18	min	☐ Not yet Secure ☐ Nearly ☐
5A	Bronze	Solving inequalities Solve and represent	/ 10	min	☐ Not yet Secure ☐ Nearly ☐
5B	Silver	Solving inequalities Negatives and x on both sides	/ 13	min	☐ Not yet Secure ☐ Nearly ☐
5C	Gold	Solving inequalities Harder inequalities and problems	/ 18	min	☐ Not yet Secure ☐ Nearly ☐
6A	Bronze	Solving double inequalities Read, list and solve	/ 14	min	☐ Not yet Secure ☐ Nearly ☐
6B	Silver	Solving double inequalities Two-step double inequalities	/ 13	min	☐ Not yet Secure ☐ Nearly ☐
6C	Gold	Solving double inequalities Harder problems	/ 18	min	☐ Not yet Secure ☐ Nearly ☐

Topic 1 · Solving one-step equations

Key ideas

Do the same to both sides.

Use the inverse (opposite) operation to get the letter on its own: $+$ ↔ $-$ $\times$ ↔ $\div$

Worked examples

Solve $x - 4 = 9$

$$x - 4 = 9$$

$$x = 9 + 4 = 13 \quad (+4 \text{ both sides})$$

Solve $\frac{x}{4} = 5$

$$\frac{x}{4} = 5$$

$$x = 5 \times 4 = 20 \quad (\times 4 \text{ both sides})$$

Solve $3x = 18$

$$3x = 18$$

$$x = 18 \div 3 = 6 \quad (\div 3 \text{ both sides})$$

Watch out

- Check by substituting: $3 \times 6 = 18$ ✓
- Answers can be negative, decimal or a fraction: $x + 9 = 4$ gives $x = -5$; $3x = 1$ gives $x = \frac{1}{3}$.
- The letter can be on the right: $15 = x - 4$ means $x = 19$.

Set 1A · BRONZE

Topic 1: Solving one-step equations

Whole-number answers

Aim: Undo one operation using its inverse.

Target time: 15 minutes · Total: 12 marks · No calculator

Start time: _____ Finish time: _____

Solve each equation.

Q	Question	Working and answer
1	$x + 5 = 12$ [1]	
2	$x - 4 = 9$ [1]	
3	$3x = 18$ [1]	
4	$\frac{x}{4} = 5$ [1]	
5	$y + 8 = 20$ [1]	
6	$m - 7 = 3$ [1]	
7	$5p = 35$ [1]	
8	$\frac{n}{3} = 6$ [1]	
9	$12 + a = 19$ [1]	
10	$w - 9 = 0$ [1]	
11	$7k = 63$ [1]	
12	$\frac{t}{2} = 11$ [1]	

Score: _____ / 12 Time taken: _____ min

Confidence: ☐ Not yet ☐ Nearly ☐ Secure 80%+ ? Move up a level!

Set 1B · SILVER

Topic 1: Solving one-step equations**Negatives, decimals and reversed equations****Aim:** Solve one-step equations with negative, decimal or fraction answers.**Target time: 15 minutes** · Total: 12 marks · No calculator

Start time: _____ Finish time: _____

Solve each equation.

Q	Question	Working and answer
1	$x + 9 = 4$ [1]	
2	$y - 6 = -2$ [1]	
3	$4x = -20$ [1]	
4	$-3x = 12$ [1]	
5	$\frac{x}{5} = -2$ [1]	
6	$2x = 7$ [1]	
7	$x + 2.5 = 6.1$ [1]	
8	$10x = 3$ [1]	
9	$15 = x - 4$ [1]	
10	$24 = 6y$ [1]	
11	$-x = 8$ [1]	
12	$0.5x = 6$ [1]	

Score: _____ / 12 **Time taken:** _____ min**Confidence:** ☐ Not yet ☐ Nearly ☐ Secure 80%+ ? Move up a level!

Set 1C · GOLD

Topic 1: Solving one-step equations**Form and solve****Aim:** Write your own one-step equation from words and solve it.**Target time: 15 minutes** · Total: 15 marks · No calculator

Start time: _____ Finish time: _____

Answer every question. Show your working.

Q	Question	Working and answer
1	I think of a number and add 13. The answer is 5. Write an equation and find my number. [2]	
2	The perimeter of a square is 36 cm. Each side is x cm. Write an equation and solve it to find x. [2]	
3	Two angles on a straight line are x and 125°. Write an equation and find x. [2]	
4	6 identical pens cost £4.20 altogether. One pen costs £p. Write an equation and find p. [2]	
5	Ali solves $\frac{x}{3} = 12$ and writes $x = 4$. Explain Ali's mistake and give the correct answer. [2]	
6	The temperature was t °C. It fell by 7 degrees to -3 °C. Write an equation and find t. [2]	
7	Solve:	
(a)	$3x = 1$ [1]	
(b)	$-5 = y + 8$ [1]	
(c)	$\frac{x}{4} = 2.5$ [1]	

Score: _____ / 15 **Time taken:** _____ min**Confidence:** ☐ Not yet ☐ Nearly ☐ Secure

Topic 2 · Solving two-step equations

Key ideas

Undo + or – FIRST, then undo $\times$ or $\div$.

You are undoing what was done to x, in reverse order.

Worked examples

Solve $3x - 5 = 10$

$$3x = 15 \quad (+5 \text{ both sides})$$

$$x = 5 \quad (\div 3 \text{ both sides})$$

Solve $2(x + 3) = 14$

$$2x + 6 = 14 \quad (\text{expand the bracket})$$

$$2x = 8 \quad (-6)$$

$$x = 4 \quad (\div 2)$$

Solve $20 - 3x = 8$

$$-3x = -12 \quad (-20 \text{ both sides})$$

$$x = 4 \quad (\div -3: \text{negative} \div \text{negative} = \text{positive})$$

Watch out

- With $\frac{x}{2} + 3 = 8$, subtract 3 first, THEN multiply by 2.
- $x = 0$ is a perfectly good answer.

Set 2A · BRONZE

Topic 2: Solving two-step equations

Two-step equations

Aim: Undo + or – first, then $\times$ or $\div$.

Target time: 15 minutes · Total: 12 marks · No calculator

Start time: _____ Finish time: _____

Solve each equation.

Q	Question	Working and answer
1	$2x + 3 = 11$ [1]	
2	$3x - 5 = 10$ [1]	
3	$4x + 1 = 29$ [1]	
4	$5x - 2 = 13$ [1]	
5	$6y - 4 = 20$ [1]	
6	$\frac{x}{2} + 3 = 8$ [1]	
7	$\frac{x}{3} - 1 = 4$ [1]	
8	$10 + 3m = 25$ [1]	
9	$7p - 9 = 40$ [1]	
10	$3 + 2t = 19$ [1]	
11	$2x + 7 = 7$ [1]	
12	$8x + 5 = 53$ [1]	

Score: _____ / 12 Time taken: _____ min

Confidence: ☐ Not yet ☐ Nearly ☐ Secure 80%+ ? Move up a level!

Set 2B · SILVER

Topic 2: Solving two-step equations**Brackets, negatives and fractions****Aim:** Solve two-step equations that include brackets or negative numbers.**Target time: 15 minutes** · Total: 10 marks · No calculator

Start time: _____ Finish time: _____

Solve each equation.

Q	Question	Working and answer
1	$2(x + 3) = 14$ [1]	
2	$3(x - 2) = 21$ [1]	
3	$5(2x + 1) = 35$ [1]	
4	$4x + 9 = 1$ [1]	
5	$3x + 10 = -5$ [1]	
6	$20 - 3x = 8$ [1]	
7	$7 - 2x = 15$ [1]	
8	$2x + 5 = 12$ [1]	
9	$4(y - 3) = -8$ [1]	
10	$15 = 3(2x - 1)$ [1]	

Score: _____ / 10 **Time taken:** _____ min**Confidence:** ☐ Not yet ☐ Nearly ☐ Secure 80%+ ? Move up a level!

Set 2C · GOLD

Topic 2: Solving two-step equations**Form and solve****Aim:** Form two-step equations from words and diagrams.**Target time: 15 minutes** · Total: 16 marks · No calculator

Start time: _____ Finish time: _____

Answer every question. Show your working.

Q	Question	Working and answer
1	I think of a number, multiply it by 4 and subtract 7. The answer is 25. Find my number. [2]	
2	The angles in a triangle are x , $2x$ and 60° . Find the value of x . [3]	
3	A taxi charges £3 plus £2 per mile. A journey costs £17. How many miles was the journey? [3]	
4	A rectangle has length $(2x + 3)$ cm and width 5 cm. Its perimeter is 30 cm. Find x . [3]	
5	Jo solves $3x + 4 = 19$ and writes $3x = 23$. Explain Jo's mistake and solve the equation correctly. [2]	
6	Solve:	
(a)	$5(x - 3) + 2 = 12$ [1]	
(b)	$3(2x - 5) = -3$ [1]	
(c)	$6 - \frac{x}{4} = 2$ [1]	

Score: _____ / 16 **Time taken:** _____ min**Confidence:** ☐ Not yet ☐ Nearly ☐ Secure

Topic 3 · Solving equations with fractions

Key ideas

Get rid of the fraction by multiplying by the denominator.

If there are two fractions, multiply EVERY term by the lowest common multiple of the denominators.

Worked examples

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

$$x + 2 = 12 \quad (\times 4 \text{ both sides})$$

$$x = 10 \quad (-2)$$

Solve $\frac{x}{3} + 2 = 7$

$$\frac{x}{3} = 5 \quad (-2 \text{ first})$$

$$x = 15 \quad (\times 3)$$

Solve $\frac{x}{2} + \frac{x}{3} = 10$

$$3x + 2x = 60 \quad (\times 6, \text{ the LCM of 2 and 3 – every term})$$

$$5x = 60, \quad x = 12$$

Watch out

- Multiply the WHOLE other side: $\frac{5x-1}{3} = x + 3$ becomes $5x - 1 = 3x + 9$.
- A bar in a fraction acts like a bracket: $\frac{x+2}{4}$ means $(x + 2) \div 4$.

Set 3A · BRONZE

Topic 3: Solving equations with fractions

One fraction

Aim: Multiply by the denominator to clear the fraction.

Target time: 15 minutes · Total: 12 marks · No calculator

Start time: _____ Finish time: _____

Solve each equation.

Q	Question	Working and answer
1	$\frac{x}{5} = 4$ [1]	
2	$\frac{x}{3} + 2 = 7$ [1]	
3	$\frac{x+2}{4} = 3$ [1]	
4	$\frac{x-5}{2} = 6$ [1]	
5	$\frac{2x}{3} = 8$ [1]	
6	$\frac{3x}{4} = 15$ [1]	
7	$\frac{2x+1}{3} = 5$ [1]	
8	$\frac{x}{6} - 4 = 1$ [1]	
9	$\frac{x+7}{5} = 2$ [1]	
10	$\frac{3x-2}{4} = 4$ [1]	
11	$10 = \frac{x}{2} + 3$ [1]	
12	$\frac{x}{4} = -3$ [1]	

Score: _____ / 12 Time taken: _____ min

Confidence: ☐ Not yet ☐ Nearly ☐ Secure 80%+ ? Move up a level!

Set 3B · SILVER

Topic 3: Solving equations with fractions**Harder fractions****Aim:** Clear fractions when the answer is negative, a decimal, or x is in the denominator.**Target time: 15 minutes** · Total: 10 marks · No calculator

Start time: _____ Finish time: _____

Solve each equation.

Q	Question	Working and answer
1	$\frac{2x-3}{5} = -1$ [1]	
2	$\frac{x+4}{3} = -2$ [1]	
3	$\frac{5x}{2} - 1 = 9$ [1]	
4	$\frac{3x+1}{2} = 8$ [1]	
5	$\frac{x-3}{4} + 2 = 5$ [1]	
6	$\frac{3(x+1)}{4} = 6$ [1]	
7	$\frac{2x+5}{3} = 4$ [1]	
8	$\frac{6-x}{2} = 5$ [1]	
9	$\frac{12}{x} = 3$ [1]	
10	$\frac{x}{4} + \frac{x}{4} = 6$ [1]	

Score: _____ / 10 **Time taken:** _____ min**Confidence:** ☐ Not yet ☐ Nearly ☐ Secure 80%+ ? Move up a level!

Set 3C · GOLD

Topic 3: Solving equations with fractions**Two fractions and problems****Aim:** Solve equations with two fractions and form equations in context.**Target time: 15 minutes** · Total: 19 marks · No calculator

Start time: _____ Finish time: _____

Answer every question. Show your working.

Q	Question	Working and answer
1	$\frac{x}{2} + \frac{x}{3} = 10$ [3]	
2	$\frac{x+1}{3} = \frac{x-1}{2}$ [3]	
3	$\frac{x+3}{2} + \frac{x-1}{4} = 5$ [3]	
4	$\frac{5x-1}{3} = x + 3$ [3]	
5	Half of a number plus 7 is 19. Find the number. [2]	
6	Ben solves $\frac{x+5}{2} = 9$ and writes $x + 5 = 4.5$. Explain Ben's mistake and find the correct answer. [2]	
7	The mean of x , $x + 2$ and 10 is 8. Find x . [3]	

Score: _____ / 19 **Time taken:** _____ min**Confidence:** ☐ Not yet ☐ Nearly ☐ Secure

Topic 4 · Unknowns on both sides

Key ideas

Collect the letters on one side and the numbers on the other.

Tip: move the SMALLER x term, so you keep a positive number of x.

Worked examples

Solve $7x - 4 = 3x + 16$

$$4x - 4 = 16 \quad (-3x \text{ both sides})$$

$$4x = 20 \quad (+4)$$

$$x = 5 \quad (\div 4)$$

Solve $2x + 15 = 5x + 3$

$$15 = 3x + 3 \quad (-2x: \text{more } x \text{ on the right})$$

$$12 = 3x, \quad x = 4$$

Solve $2(x + 5) = 5(x - 1)$

$$2x + 10 = 5x - 5 \quad (\text{expand both brackets})$$

$$15 = 3x, \quad x = 5$$

Watch out

- Subtract the x term – don't add it. $5x + 4 = 2x + 19 \rightarrow 3x + 4 = 19$.
- If the x terms cancel and leave something false (e.g. $6 = 5$), there is no solution.

Set 4A · BRONZE

Topic 4: Unknowns on both sides**Unknowns on both sides****Aim:** Collect the x terms on the side with more x.**Target time: 15 minutes** · Total: 10 marks · No calculator

Start time: _____ Finish time: _____

Solve each equation.

Q	Question	Working and answer
1	$5x + 3 = 2x + 12$ [1]	
2	$7x - 4 = 3x + 16$ [1]	
3	$4x + 1 = x + 19$ [1]	
4	$6x - 2 = 2x + 14$ [1]	
5	$9x + 5 = 4x + 40$ [1]	
6	$3x + 11 = x + 15$ [1]	
7	$8x - 3 = 5x + 9$ [1]	
8	$5y + 2 = 3y + 20$ [1]	
9	$10x - 7 = 6x + 13$ [1]	
10	$2x + 20 = 6x$ [1]	

Score: _____ / 10 **Time taken:** _____ min**Confidence:** ☐ Not yet ☐ Nearly ☐ Secure 80%+ ? Move up a level!

Set 4B · SILVER

Topic 4: Unknowns on both sides**Negatives and brackets****Aim:** Solve when x is bigger on the right, answers are negative, or there are brackets.**Target time: 15 minutes** · Total: 10 marks · No calculator

Start time: _____ Finish time: _____

Solve each equation.

Q	Question	Working and answer
1	$2x + 15 = 5x + 3$ [1]	
2	$3x - 4 = 7x + 8$ [1]	
3	$12 - x = 3x - 4$ [1]	
4	$5 - 2x = x - 10$ [1]	
5	$6x + 7 = 2x - 5$ [1]	
6	$9 - 3x = 2x - 11$ [1]	
7	$4(x + 1) = 2x + 10$ [1]	
8	$3(2x - 1) = 4x + 5$ [1]	
9	$2(x + 5) = 5(x - 1)$ [1]	
10	$5(x - 2) = 3(x + 4)$ [1]	

Score: _____ / 10 **Time taken:** _____ min**Confidence:** ☐ Not yet ☐ Nearly ☐ Secure 80%+ ? Move up a level!

Set 4C · GOLD

Topic 4: Unknowns on both sides**Problems with unknowns on both sides****Aim:** Form equations with x on both sides and reason about solutions.**Target time:** 15 minutes · Total: 18 marks · No calculator

Start time: _____ Finish time: _____

Answer every question. Show your working.

Q	Question	Working and answer
1	$7x + 2 = 3x + 4$ [2]	
2	$4(2x - 1) = 3(x + 7)$ [3]	
3	$\frac{x+3}{2} = x - 1$ [3]	
4	Ann and Bob start with the same number. Ann multiplies it by 5 and subtracts 8. Bob multiplies it by 3 and adds 6. They get the same answer. Find the number. [3]	
5	Opposite sides of a rectangle are $(4x - 3)$ cm and $(2x + 9)$ cm. Find x and the length of the side. [3]	
6	Kim solves $5x + 4 = 2x + 19$ and writes $7x = 23$. Explain Kim's mistake and solve the equation correctly. [2]	
7	Show that the equation $2(x + 3) = 2x + 5$ has no solution. [2]	

Score: _____ / 18 **Time taken:** _____ min**Confidence:** ☐ Not yet ☐ Nearly ☐ Secure

Topic 5 · Solving inequalities

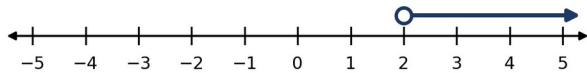
Key ideas

Solve an inequality just like an equation – but the answer is a range of values.

< less than > greater than ≤ less than or equal to ≥ greater than or equal to

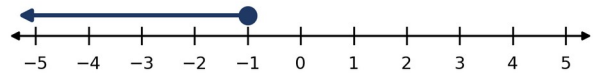
Number lines

Open circle ○ for < or > (number NOT included)



$$x > 2$$

Filled circle ● for ≤ or ≥ (number included)



$$x \leq -1$$

Worked examples

Solve $2x + 1 > 7$

$$2x > 6 \quad (-1)$$

$$x > 3 \quad (\div 2)$$

Solve $-2x < 6$

$$x > -3 \quad (\div -2 \text{ and REVERSE the sign})$$

Watch out

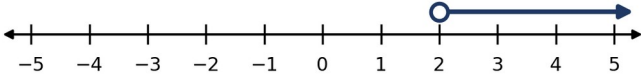
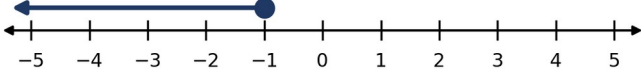
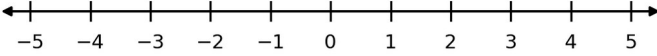
- Multiplying or dividing by a **NEGATIVE** number reverses the inequality sign.
- Integer questions: if $x > 5$ the smallest integer is 6, because 5 itself is not included.

Set 5A · BRONZE

Topic 5: Solving inequalities**Solve and represent****Aim:** Read, draw and solve simple inequalities.**Target time:** 15 minutes · Total: 10 marks · No calculator

Start time: _____ Finish time: _____

Answer every question.

Q	Question	Working and answer
1	Write down the inequality shown on the number line. 	Answer: _____ [1]
2	Write down the inequality shown on the number line. 	Answer: _____ [1]
3	Show the inequality $x < 3$ on the number line. 	[2]
4	$x + 4 > 9$ [1]	
5	$3x < 12$ [1]	
6	$\frac{x}{2} \geq 5$ [1]	
7	$2x + 1 > 7$ [1]	
8	x is an integer and $x > 5$. Write down the smallest possible value of x . [1]	
9	Is $x = 4$ a solution of $3x + 2 > 14$? Give a reason. [1]	

Score: _____ / 10 Time taken: _____ min

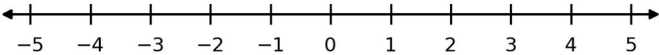
Confidence: ☐ Not yet ☐ Nearly ☐ Secure 80%+ ? Move up a level!

Set 5B · SILVER

Topic 5: Solving inequalities**Negatives and x on both sides****Aim:** Solve inequalities with negatives, brackets and x on both sides.**Target time: 15 minutes** · Total: 13 marks · No calculator

Start time: _____ Finish time: _____

Solve each inequality.

Q	Question	Working and answer
1	$5x + 2 \geq -8$ [1]	
2	$3(x - 2) < 9$ [1]	
3	$\frac{x+3}{2} \leq 4$ [1]	
4	$7x - 5 > 2x + 10$ [1]	
5	$4x + 1 \leq x + 13$ [1]	
6	$2x + 7 > 3$ [1]	
7	$-2x < 6$ [1]	
8	$10 - x \geq 4$ [1]	
9	x is an integer and $3x - 1 < 11$. Find the largest possible value of x. [2]	
10	Solve $2x - 3 \geq 1$ Show your answer on the number line. Working: 	[3]

Score: _____ / 13 **Time taken:** _____ min**Confidence:** ☐ Not yet ☐ Nearly ☐ Secure 80%+ ? Move up a level!

Set 5C · GOLD

Topic 5: Solving inequalities**Harder inequalities and problems****Aim:** Solve harder inequalities and use them in context.**Target time: 15 minutes** · Total: 18 marks · No calculator

Start time: _____ Finish time: _____

Answer every question. Show your working.

Q	Question	Working and answer
1	$5 - 3x > 11$ [2]	
2	$2(3x + 1) \leq 4x + 9$ [3]	
3	$3x + 4 \leq 5x - 6$ [2]	
4	$\frac{2x-1}{3} > x - 2$ [3]	
5	Cinema tickets cost £7 each. Mo has £40. Write an inequality and find the greatest number of tickets Mo can buy. [3]	
6	Jay solves $-4x \geq 12$ and writes $x \geq -3$. Explain Jay's mistake and write the correct answer. [2]	
7	x is an integer. Find the smallest value of x such that $4(x + 2) > 2x + 15$. [3]	

Score: _____ / 18 **Time taken:** _____ min**Confidence:** ☐ Not yet ☐ Nearly ☐ Secure

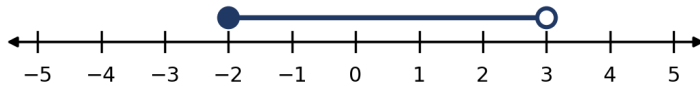
Topic 6 · Solving double inequalities

Key ideas

$a < x < b$ means x is **BETWEEN** a and b .

Do the same thing to ALL THREE parts.

Number line



$-2 \leq x < 3$ (filled at -2 , open at 3)

Worked examples

Solve $1 < 2x + 3 < 11$

$-2 < 2x < 8$ (-3 from all three parts)

$-1 < x < 4$ ($\div 2$)

Integers: 0, 1, 2, 3 (-1 and 4 are not included)

Solve $-5 < 1 - 2x \leq 7$

$-6 < -2x \leq 6$ (-1)

$3 > x \geq -3$ ($\div -2$ reverses BOTH signs)

$-3 \leq x < 3$ (rewrite smallest first)

Watch out

- Adding to only one part is a very common mistake.
- When listing integers, check whether each end is included ($\leq$) or not ($<$).

Set 6A · BRONZE

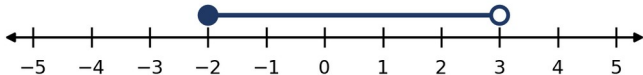
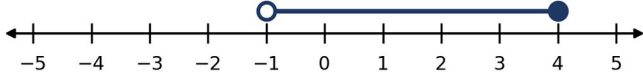
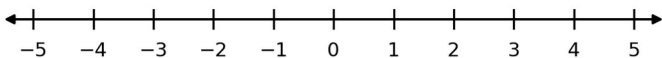
Topic 6: Solving double inequalities

Read, list and solve

Aim: Understand double inequalities and list integers.**Target time: 15 minutes** · Total: 14 marks · No calculator

Start time: _____ Finish time: _____

Answer every question.

Q	Question	Working and answer
1	n is an integer. $-2 < n \leq 3$ List all the possible values of n. [2]	
2	n is an integer. $0 \leq n < 4$ List all the possible values of n. [2]	
3	n is an integer. $-3 \leq n \leq 1$ List all the possible values of n. [2]	
4	Write down the inequality shown on the number line.  Answer: _____ [1]	
5	Write down the inequality shown on the number line.  Answer: _____ [1]	
6	Show the inequality $-3 < x \leq 2$ on the number line.  [2]	
7	$3 < x + 2 < 8$ [1]	
8	$4 \leq 2x \leq 10$ [1]	
9	$-6 < 3x \leq 9$ [1]	
10	$5 < x - 1 \leq 9$ [1]	

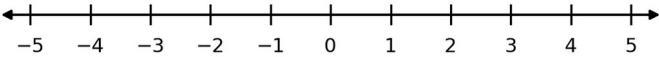
Score: _____ / 14 **Time taken:** _____ min**Confidence:** ☐ Not yet ☐ Nearly ☐ Secure 80%+ ? Move up a level!

Set 6B · SILVER

Topic 6: Solving double inequalities**Two-step double inequalities****Aim:** Solve two-step double inequalities and list integer solutions.**Target time:** 15 minutes · Total: 13 marks · No calculator

Start time: _____ Finish time: _____

Answer every question.

Q	Question	Working and answer
1	$1 < 2x + 3 < 11$ [1]	
2	$5 \leq 3x - 1 < 14$ [1]	
3	$-7 < 2x - 1 \leq 5$ [1]	
4	$2 \leq 4x - 6 \leq 18$ [1]	
5	$0 \leq \frac{x+2}{3} < 2$ [1]	
6	$-4 \leq \frac{x}{2} + 1 < 3$ [1]	
7	n is an integer. $-9 < 3n \leq 6$ List all the possible values of n. [2]	
8	n is an integer. $3 < 5n + 8 \leq 23$ List all the possible values of n. [2]	
9	Solve $-2 < 2x \leq 6$ Show your answer on the number line. Working: 	[3]

Score: _____ / 13 **Time taken:** _____ min**Confidence:** ☐ Not yet ☐ Nearly ☐ Secure 80%+ ? Move up a level!

Set 6C · GOLD

Topic 6: Solving double inequalities**Harder problems****Aim:** Tackle negative coefficients, combined conditions and context.**Target time: 15 minutes** · Total: 18 marks · No calculator

Start time: _____ Finish time: _____

Answer every question. Show your working.

Q	Question	Working and answer
1	$-5 < 1 - 2x \leq 7$ [3]	
2	$-3 \leq 5 - 2x < 9$ [3]	
3	Mia solves $2 < 3x - 4 < 11$ and writes $6 < 3x < 11$. Explain Mia's mistake and solve the inequality correctly. [3]	
4	x is an integer. $x + 3 > 5$ and $2x - 1 \leq 9$. List all the possible values of x. [3]	
5	A rectangle has sides x cm and 3 cm. Its perimeter is more than 14 cm but less than 20 cm. x is a whole number. Find all possible values of x. [3]	
6	x is an integer and $4 \leq \frac{3x+2}{2} < 10$. Write down the smallest and largest possible values of x. [3]	

Score: _____ / 18 **Time taken:** _____ min**Confidence:** ☐ Not yet ☐ Nearly ☐ Secure

Answers and marking notes

Award the marks shown. In multi-mark questions give 1 mark for a correct first step (e.g. a correctly formed equation or inequality) even if the final answer is wrong. Accept equivalent answers (e.g. 3.5, $\frac{7}{2}$ or $3\frac{1}{2}$).

Set 1A · Bronze · Solving one-step equations (12 marks)

Q	Answer	Mark	Watch out for
1	$x = 7$	1	
2	$x = 13$	1	
3	$x = 6$	1	
4	$x = 20$	1	Divide $\leftrightarrow$ multiply: $5 \times 4 = 20$, not $5 \div 4$.
5	$y = 12$	1	
6	$m = 10$	1	
7	$p = 7$	1	
8	$n = 18$	1	
9	$a = 7$	1	
10	$w = 9$	1	
11	$k = 9$	1	
12	$t = 22$	1	

Set 1B · Silver · Solving one-step equations (12 marks)

Q	Answer	Mark	Watch out for
1	$x = -5$	1	$4 - 9 = -5$. A common slip is $x = 5$.
2	$y = 4$	1	
3	$x = -5$	1	
4	$x = -4$	1	Divide by -3 , keeping the sign.
5	$x = -10$	1	
6	$x = 3.5$	1	Accept $\frac{7}{2}$ or $3\frac{1}{2}$.
7	$x = 3.6$	1	
8	$x = 0.3$	1	
9	$x = 19$	1	The unknown can be on the right – solve it the same way.
10	$y = 4$	1	
11	$x = -8$	1	
12	$x = 12$	1	Dividing by 0.5 is the same as doubling.

Set 1C · Gold · Solving one-step equations (15 marks)

Q	Answer	Mark	Watch out for
1	$n + 13 = 5$, $n = -8$	2	
2	$4x = 36$, $x = 9$	2	

Q	Answer	Mark	Watch out for
3	$x + 125 = 180$, $x = 55^\circ$	2	Angles on a straight line add to 180° .
4	$6p = 4.20$, $p = £0.70$ (70p)	2	
5	Ali divided by 3 instead of multiplying. $x = 36$	2	
6	$t - 7 = -3$, $t = 4^\circ\text{C}$	2	
7(a)	$x = \frac{1}{3}$	1	Leave as a fraction – 0.33 is not exact.
7(b)	$y = -13$	1	
7(c)	$x = 10$	1	

Set 2A · Bronze · Solving two-step equations (12 marks)

Q	Answer	Mark	Watch out for
1	$x = 4$	1	
2	$x = 5$	1	
3	$x = 7$	1	
4	$x = 3$	1	
5	$y = 4$	1	
6	$x = 10$	1	Subtract 3 first, then multiply by 2.
7	$x = 15$	1	
8	$m = 5$	1	
9	$p = 7$	1	
10	$t = 8$	1	
11	$x = 0$	1	$x = 0$ is a valid answer.
12	$x = 6$	1	

Set 2B · Silver · Solving two-step equations (10 marks)

Q	Answer	Mark	Watch out for
1	$x = 4$	1	Either expand first, or divide both sides by 2 first.
2	$x = 9$	1	
3	$x = 3$	1	
4	$x = -2$	1	
5	$x = -5$	1	
6	$x = 4$	1	$-3x = -12$, so $x = 4$. Watch the sign.
7	$x = -4$	1	
8	$x = 3.5$	1	
9	$y = 1$	1	
10	$x = 3$	1	

Set 2C · Gold · Solving two-step equations (16 marks)

Q	Answer	Mark	Watch out for
1	$4n - 7 = 25$, $n = 8$	2	
2	$x + 2x + 60 = 180$, $x = 40^\circ$	3	
3	$3 + 2m = 17$, $m = 7$ miles	3	
4	$2(2x + 3) + 2 \times 5 = 30$, $4x + 16 = 30$, $x = 3.5$	3	
5	Jo added 4 instead of subtracting it. $3x = 15$, $x = 5$	2	
6(a)	$x = 5$	1	
6(b)	$x = 2$	1	
6(c)	$x = 16$	1	

Set 3A · Bronze · Solving equations with fractions (12 marks)

Q	Answer	Mark	Watch out for
1	$x = 20$	1	
2	$x = 15$	1	
3	$x = 10$	1	Multiply by 4 first: $x + 2 = 12$.
4	$x = 17$	1	
5	$x = 12$	1	
6	$x = 20$	1	
7	$x = 7$	1	
8	$x = 30$	1	
9	$x = 3$	1	
10	$x = 6$	1	
11	$x = 14$	1	
12	$x = -12$	1	

Set 3B · Silver · Solving equations with fractions (10 marks)

Q	Answer	Mark	Watch out for
1	$x = -1$	1	
2	$x = -10$	1	
3	$x = 4$	1	
4	$x = 5$	1	
5	$x = 15$	1	Subtract 2 BEFORE multiplying by 4.
6	$x = 7$	1	
7	$x = 3.5$	1	
8	$x = -4$	1	
9	$x = 4$	1	Multiply both sides by x: $12 = 3x$.

Q	Answer	Mark	Watch out for
10	$x = 12$	1	

Set 3C · Gold · Solving equations with fractions (19 marks)

Q	Answer	Mark	Watch out for
1	$x = 12$	3	Multiply every term by 6: $3x + 2x = 60$.
2	$x = 5$	3	Cross-multiply: $2(x + 1) = 3(x - 1)$.
3	$x = 5$	3	$\times 4$: $2(x + 3) + (x - 1) = 20$.
4	$x = 5$	3	Multiply the WHOLE right side by 3.
5	$\frac{n}{2} + 7 = 19$, $n = 24$	2	
6	Ben divided by 2 instead of multiplying. $x + 5 = 18$, $x = 13$	2	
7	$\frac{2x+12}{3} = 8$, $x = 6$	3	

Set 4A · Bronze · Unknowns on both sides (10 marks)

Q	Answer	Mark	Watch out for
1	$x = 3$	1	
2	$x = 5$	1	
3	$x = 6$	1	
4	$x = 4$	1	
5	$x = 7$	1	
6	$x = 2$	1	
7	$x = 4$	1	
8	$y = 9$	1	
9	$x = 5$	1	
10	$x = 5$	1	Take $2x$ from both sides: $20 = 4x$.

Set 4B · Silver · Unknowns on both sides (10 marks)

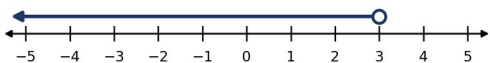
Q	Answer	Mark	Watch out for
1	$x = 4$	1	More x on the right – collect there: $12 = 3x$.
2	$x = -3$	1	
3	$x = 4$	1	
4	$x = 5$	1	
5	$x = -3$	1	
6	$x = 4$	1	
7	$x = 3$	1	
8	$x = 4$	1	
9	$x = 5$	1	

Q	Answer	Mark	Watch out for
10	$x = 11$	1	

Set 4C · Gold · Unknowns on both sides (18 marks)

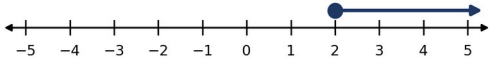
Q	Answer	Mark	Watch out for
1	$x = \frac{1}{2}$	2	Accept 0.5.
2	$x = 5$	3	
3	$x = 5$	3	
4	$5n - 8 = 3n + 6$, $n = 7$	3	
5	$4x - 3 = 2x + 9$, $x = 6$, side = 21 cm	3	
6	Kim added $2x$ instead of subtracting it. $3x = 15$, $x = 5$	2	
7	$2x + 6 = 2x + 5$ gives $6 = 5$, which is impossible, so there is no solution.	2	

Set 5A · Bronze · Solving inequalities (10 marks)

Q	Answer	Mark	Watch out for
1	$x > 2$	1	
2	$x \leq -1$	1	Filled circle means the number IS included ($\leq$).
3	See number line 	2	
4	$x > 5$	1	
5	$x < 4$	1	
6	$x \geq 10$	1	
7	$x > 3$	1	
8	6	1	5 is NOT included – the circle is open.
9	No – $3 \times 4 + 2 = 14$, and 14 is not greater than 14.	1	

Set 5B · Silver · Solving inequalities (13 marks)

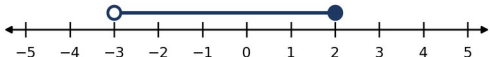
Q	Answer	Mark	Watch out for
1	$x \geq -2$	1	
2	$x < 5$	1	
3	$x \leq 5$	1	
4	$x > 3$	1	
5	$x \leq 4$	1	
6	$x > -2$	1	
7	$x > -3$	1	Dividing by a negative number REVERSES the inequality sign.

Q	Answer	Mark	Watch out for
8	$x \leq 6$	1	$-x \geq -6$, so $x \leq 6$ (sign reverses).
9	$x < 4$, so $x = 3$	2	
10	$x \geq 2$ 	3	

Set 5C · Gold · Solving inequalities (18 marks)

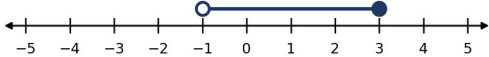
Q	Answer	Mark	Watch out for
1	$x < -2$	2	$-3x > 6 \rightarrow$ divide by -3 and reverse: $x < -2$.
2	$x \leq 3.5$	3	
3	$x \geq 5$	2	Collect x on the right: $10 \leq 2x$, so $5 \leq x$ ($x \geq 5$).
4	$x < 5$	3	
5	$7n \leq 40$, $n \leq 5.71\dots$, so 5 tickets	3	Round DOWN – Mo cannot afford 6.
6	Dividing by -4 should reverse the sign. $x \leq -3$	2	
7	$2x > 7$, $x > 3.5$, so $x = 4$	3	

Set 6A · Bronze · Solving double inequalities (14 marks)

Q	Answer	Mark	Watch out for
1	$-1, 0, 1, 2, 3$	2	-2 is NOT included; 3 IS included.
2	$0, 1, 2, 3$	2	
3	$-3, -2, -1, 0, 1$	2	
4	$-2 \leq x < 3$	1	
5	$-1 < x \leq 4$	1	
6	See number line 	2	
7	$1 < x < 6$	1	Do the same to ALL THREE parts.
8	$2 \leq x \leq 5$	1	
9	$-2 < x \leq 3$	1	
10	$6 < x \leq 10$	1	

Set 6B · Silver · Solving double inequalities (13 marks)

Q	Answer	Mark	Watch out for
1	$-1 < x < 4$	1	
2	$2 \leq x < 5$	1	
3	$-3 < x \leq 3$	1	
4	$2 \leq x \leq 6$	1	
5	$-2 \leq x < 4$	1	

Q	Answer	Mark	Watch out for
6	$-10 \leq x < 4$	1	
7	-2, -1, 0, 1, 2	2	Solve first: $-3 < n \leq 2$.
8	0, 1, 2, 3	2	$-1 < n \leq 3$.
9	$-1 < x \leq 3$ 	3	

Set 6C · Gold · Solving double inequalities (18 marks)

Q	Answer	Mark	Watch out for
1	$-3 \leq x < 3$	3	Dividing by -2 reverses BOTH signs: $3 > x \geq -3$.
2	$-2 < x \leq 4$	3	
3	She only added 4 to the left part – add 4 to all three parts. $6 < 3x < 15$, so $2 < x < 5$	3	
4	$x > 2$ and $x \leq 5$, so 3, 4, 5	3	
5	$14 < 2x + 6 < 20$, $4 < x < 7$, so $x = 5$ or 6	3	
6	$8 \leq 3x + 2 < 20$, $2 \leq x < 6$. Smallest 2, largest 5	3	