



Equations with the variable on both sides

Year 7 About 60 minutes No calculator 53 marks

Date _____

A Do Now

Quick questions to start.

- A1** Needed today [1 mark] **A2** Needed today [1 mark]
Solve $5x - 8 = 27$. Simplify $9x + 4 - 6x - 10$.

Answer

Answer

- A3** Last lesson [1 mark] **A4** From chapter 14 [1 mark]
Solve $4(x - 6) = 10$. A circle has diameter 8 cm. Work out its circumference. Give your answer in terms of π .

Answer

Answer

B Example, then your turn

Year 7

Your teacher works through each example with you. Then try the one beside it.

EXAMPLE 1

Solve $5x + 9 = 2x + 30$. Check your answer.

Hint Subtract $2x$ from both sides, so that x is on one side only.

- B1** Solve $7x - 11 = 3x + 13$. [2 marks]

Answer

EXAMPLE 2

Solve $3x - 5 = 31 - x$.

Hint The right-hand side has $-x$. Add x to both sides.

- B2** Solve $2x + 9 = 44 - 3x$. [2 marks]

Answer

EXAMPLE 3

Solve $3(x + 6) = 9x - 12$. Use two different methods.

Hint Method 1: expand the bracket. Method 2: 3 divides $9x$ and 12, so divide both sides by 3 first.

- B3** Solve $4(x - 2) = 6x - 19$. [3 marks]

Answer

EXAMPLE 4Solve $5(x - 3) = 2(x + 6)$.**Hint** Expand both brackets first.**B4** Solve $3(2x + 1) = 4(x + 5)$. [3 marks]

Answer

EXAMPLE 5

Mia thinks of a number. She multiplies it by 5 and subtracts 8. She gets the same answer when she multiplies the number by 3 and adds 11. Write an equation and solve it to find Mia's number.

Hint Call the number n . Write each instruction as an expression in n , and set the two expressions equal.**B5** Tom thinks of a number. He adds 4 and then multiplies by 3. He gets the same answer when he doubles the number and adds 27. Write an equation and solve it to find Tom's number. [3 marks]

Answer

c Practice

Year 7

C1 Solve $9 + 2x = 4x - 15$. [2 marks]

Answer

C2 Solve $3x + 20 = 5 - 2x$. [2 marks]

Answer

C3 Solve $6x - 4 = 2x + 7$. Give your answer as a mixed number. [2 marks]

Answer

C4 Solve $18 - 3x = 2 - x$. [2 marks]

Answer

C5 Solve $2(x - 7) = 5x + 4$. [3 marks]

Answer

C6 Is $x = 4$ the solution of $7x - 9 = 3x + 5$? Show how you decide. [2 marks]

Answer Yes / No

D1

Priya solves $6x + 5 = 2x + 21$. She writes: $6x - 2x = 21 + 5$, so $4x = 26$ and $x = 6.5$.

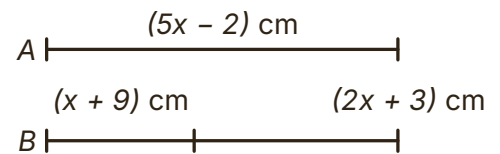
[3 marks]

Priya's answer is wrong. Explain the mistake she made, and solve the equation correctly.

Answer

D2 Line A and line B are the same length. Line B is made of two parts.

(a) Write down an equation in x . [1 mark]



Answer

(b) Work out the length of line A . [3 marks]

Not drawn accurately

Answer

Total for D2: 4 marks

D3 The rectangle and the square have the same perimeter.

(a) Show that [2 marks]

$$6x + 4 = 4x + 16.$$

$(x - 1)$ cm



$(2x + 3)$ cm



$(x + 4)$ cm

Not drawn accurately

(b) Work out the value of x . [1 mark]

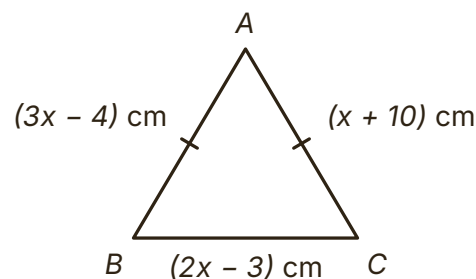
Answer

(c) Which shape has the larger area? You must show your working. [2 marks]

Answer

Total for D3: 5 marks

- D4** ABC is an isosceles triangle with $AB = AC$. Work out the perimeter of the triangle. [4 marks]



Answer

Not drawn accurately

- D5** A gym has two plans. Plan A costs £20 to join and then £6 for each visit. Plan B costs £44 to join and then £3 for each visit. For how many visits do the two plans cost the same? You must show your working. [3 marks]

Answer

E Extension

Stretch

No route is given. The hints are at the end of the sheet. Use one at a time.

- E1** Amir is three times as old as his sister Bella. In 12 years' time, Amir will be twice as old as Bella. How old are Amir and Bella now? [4 marks]

Answer Amir Bella

Extension hints

Cover these with paper. Uncover one at a time.

- E1** **Hint 1** Call Bella's age now b . Write Amir's age now, and both ages in 12 years, in terms of b .
- Hint 2** In 12 years Amir is $3b + 12$ and Bella is $b + 12$, so $3b + 12 = 2(b + 12)$.
- Hint 3** $3b + 12 = 2b + 24$, so $b = 12$. Bella is 12 and Amir is 36. Check: in 12 years they are 48 and 24.

How did it go?

Colour one circle on each line: not yet, nearly, yes.

- I can solve an equation with the unknown on both sides. ☐ ☐ ☐
- I can solve such equations when they have brackets. ☐ ☐ ☐
- I can check a solution by substituting it into both sides. ☐ ☐ ☐
- I can write an equation from a problem and solve it. ☐ ☐ ☐