



More complex equations

Year 7 About 70 minutes No calculator 56 marks

Date _____

A Do Now

Quick questions to start.

- A1** Needed today [1 mark]

Write down both numbers whose square is 64.

Answer

A2 Last lesson [1 mark]

Solve $3(x + 2) = x + 14$.

Answer

- A3** From chapter 12 [1 mark]

Work out $\frac{2}{3}$ of 45.

Answer

A4 From chapter 4 [1 mark]

Increase £80 by 15%.

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 $3(t + 7) = 2(t - 4)$. Check your answer.

Hint Expand both brackets, then take $2t$ from both sides.

- B1** Solve $4(y + 6) = 3(y - 2)$. [3 marks]

Answer

EXAMPLE 2

Solve $\frac{3}{5}(x + 4) = x - 6$.

Hint Multiply both sides by 5. The right-hand side becomes $5(x - 6)$.

- B2** Solve $\frac{2}{7}(x + 9) = x - 3$. Give your answer as a mixed number. [3 marks]

Answer

EXAMPLE 3

Solve $\frac{1}{3}(x - 2) = \frac{1}{4}(x + 5)$.

Hint Multiply both sides by 12, a multiple of 3 and of 4.

- B3** Solve $\frac{x + 7}{2} = \frac{x + 22}{5}$. [3 marks]

Answer

EXAMPLE 4Solve $3t^2 - 7 = 68$.**Hint** Get t^2 on its own. A number has two square roots: one positive and one negative.**B4** Solve $6n^2 - 11 = 205$.

[3 marks]

Answer

EXAMPLE 5Lena is n years old. Four years ago, her age was two-thirds of what her age will be in six years' time. Write an equation and solve it to find Lena's age.**Hint** Four years ago she was $n - 4$. In six years she will be $n + 6$.**B5** Kai is k years old. Three years ago, his age was half of what his age will be in nine years' time. Write an equation and solve it to find Kai's age. [3 marks]

Answer

c Practice

Year 7

C1 Solve $5(10 - y) = 2(13 - y)$. [3 marks]

Answer

C2 Solve $\frac{r + 11}{3} = r - 5$. [2 marks]

Answer

C3 Solve $22 = 3k^2 - 5$. [2 marks]

Answer

C4 Write down all the solutions of each equation. If there are none, write "none". [3 marks]

(i) $x^2 - 81 = 0$

(ii) $9x^2 = 0$

(iii) $x^2 + 16 = 0$

Answer (i) (ii) (iii)

C5 Explain why the equation $4(x - 3) = 4x + 5$ has no solution. [2 marks]**C6** Solve $\frac{x^2}{2} - 3 = 47$. [2 marks]

Answer

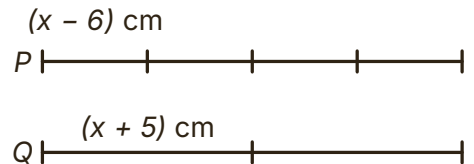
- D1** Zara solves $3x^2 = 147$. She writes: $x^2 = 49$, so $x = 7$. [2 marks]

Zara's answer is not complete. Explain why, and give the full answer.

Answer

- D2** Line P is split into 4 equal parts. Each part is $(x - 6)$ cm long. Line Q is split into 2 equal parts. Each part is $(x + 5)$ cm long. The two lines are the same length.

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



Answer

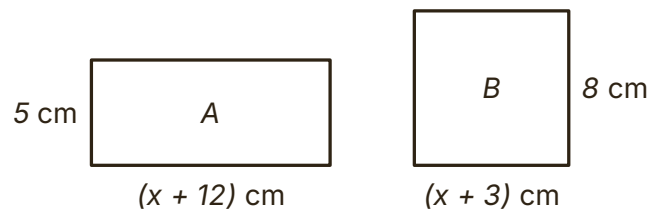
- (b) Work out the length of each line. [3 marks]

Not drawn accurately

Answer

Total for D2: 4 marks

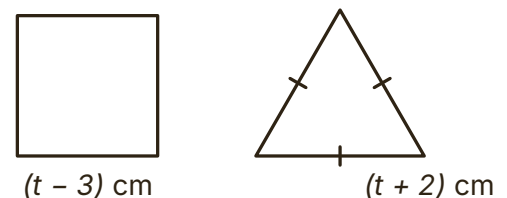
- D3** Rectangle A and rectangle B have the same area. Work out this area. You must show your working. [5 marks]



Not drawn accurately

Answer

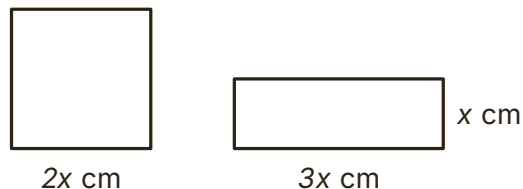
- D4** The square and the equilateral triangle have the same perimeter. Work out this perimeter. [4 marks]



Answer Not drawn accurately

D5 The area of the square is 25 cm^2 more than the area of the rectangle.

(a) Show that $x^2 = 25$. [2 marks]



(b) The equation $x^2 = 25$ has two solutions. Explain why only one of them is the value of x here. [1 mark]

Not drawn accurately

(c) Work out the perimeter of the rectangle. [2 marks]

Answer

Total for D5: 5 marks

E Extension

Stretch

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

E1 Solve $2(x^2 + 5) = 3x^2 - 6$. [3 marks]

Answer

Extension hints

Cover these with paper. Uncover one at a time.

- E1** **Hint 1** Expand the bracket, then collect the x^2 terms on one side, as you would with x terms.
- Hint 2** $2x^2 + 10 = 3x^2 - 6$
- Hint 3** Take $2x^2$ from both sides: $10 = x^2 - 6$, so $x^2 = 16$ and $x = 4$ or $x = -4$.

How did it go?

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

I can solve equations with brackets on both sides. ☐ ☐ ☐

I can clear fractions from an equation by multiplying. ☐ ☐ ☐

I can solve an equation with a square and give both solutions. ☐ ☐ ☐

I can write an equation from a shape or an age problem and solve it. ☐ ☐ ☐