



Rearranging formulae

Year 7 About 70 minutes No calculator 51 marks

Date _____

A Do Now

Quick questions to start.

- A1** Needed today [1 mark]

$y = 4x - 7$. Work out x when $y = 25$.

Answer

A2 Last lesson [1 mark]

Solve $2t^2 - 3 = 69$.

Answer

- A3** From chapter 14 [1 mark]

A circle has radius 5 cm. Write down its circumference in terms of π .

Answer

A4 From chapter 10 [1 mark]

Expand $3(2a - 5)$.

Answer

B Example, then your turn

Year 7

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

EXAMPLE 1

Make x the subject of $y = 3x - 7$.

Hint Undo the steps in reverse order: first add 7 to both sides, then divide by 3.

- B1** Make x the subject of $y = 5x + 2$. [2 marks]
- Answer

EXAMPLE 2

Here is a formula: $c = 5p + 2q$. Make p the subject.

Hint Treat $2q$ like a number: take it from both sides.

- B2** Here is a formula: $m = 4a - 5b$. Make a the subject. [2 marks]
- Answer

EXAMPLE 3

Here is a formula: $P = \frac{a+b}{2}$. Make a the subject.

Hint The right-hand side is divided by 2, so multiply both sides by 2 first.

B3 Here is a formula: $M = \frac{x-y}{3}$. [2 marks]

Make x the subject.

Answer

EXAMPLE 4

Here is a formula: $A = 3r^2$. Make r the subject.

Hint Get r^2 on its own first. Taking the square root is the last step.

B4 Here is a formula: [3 marks]

$T = 2m^2 + 9$. Make m the subject.

Answer

EXAMPLE 5

Here is a formula: $v = u + 6t$. Make t the subject. Then work out t when $v = 50$ and $u = 8$.

Hint Rearrange first, then put the numbers into your new formula.

B5 Here is a formula: $P = 2l + 2w$. [3 marks]

Make w the subject. Then work out w when $P = 46$ and $l = 15$.

Answer

c Practice

Year 7

C1 Make x the subject of [2 marks]
 $y = 15 - 3x$.

Answer

C2 The area of a trapezium is [2 marks]
 $A = \frac{(a+b)h}{2}$. Make h the subject.

Answer

C3 Make n the subject of [3 marks]
 $S = 3n^2 - 12$.

Answer

C4 A distance of m miles is about k [2 marks]
kilometres, where $k = \frac{8m}{5}$.
Make m the subject.

Answer

C5 Make y the subject of
 $3x + 2y = 18$.

[2 marks]

C6 Make x the subject of
 $y = 4(x - 3)$.

[2 marks]

Answer

Answer

D Exam-style questions

GCSE Foundation

D1 Ben makes u the subject of $v = u + 9t$. He writes: $u = v + 9t$.

[2 marks]

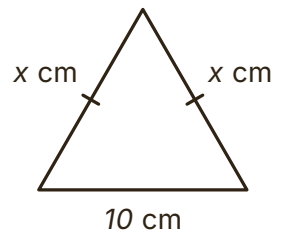
Ben is wrong. Explain the mistake and write the correct formula.

D2 The diagram shows an isosceles triangle. Its perimeter is p cm.

(a) Write down a formula for p in terms of x . [1 mark]

Answer

(b) Make x the subject of your formula. [2 marks]



Not drawn accurately

Answer

(c) The perimeter is 34 cm. Work out the value of x . [1 mark]

Answer

Total for D2: 4 marks

D3 Here are four formulae.

[3 marks]

$$A: y = 2(x + 3) \quad B: x = \frac{y - 6}{2} \quad C: x = \frac{y}{2} - 3 \quad D: x = \frac{y - 3}{2}$$

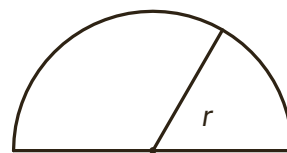
Three of them say the same thing. Which one is different? Show how you decide.

Answer

D4 The area of a semicircle with radius r is $A = \frac{1}{2}\pi r^2$.

(a) Make r the subject of the formula.

[2 marks]



Answer

(b) A semicircle has area $50\pi \text{ cm}^2$. Work out its diameter.

[2 marks]

Answer

Total for D4: 4 marks

D5 A stone is dropped from a cliff. After t seconds it has fallen d metres, where $d = 5t^2$.

(a) Work out how far the stone falls in the first 3 seconds.

[1 mark]

Answer

(b) Make t the subject of $d = 5t^2$.

[2 marks]

Answer

(c) The stone falls 80 m before it hits the sea. Use your answer to part (b) to work out how long it takes.

[2 marks]

Answer

(d) $t^2 = 16$ has two solutions. Explain why only one of them answers part (c).

[1 mark]

Total for D5: 6 marks

E Extension

Stretch

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

E1 Make x the subject of $px + 5 = 2x + q$.

[3 marks]

Answer

Extension hints

Cover these with paper. Uncover one at a time.

- E1** **Hint 1** x appears on both sides. Get both x terms on the same side, as you do when solving an equation.
- Hint 2** $px - 2x = q - 5$
- Hint 3** $px - 2x$ is $x(p - 2)$, so divide both sides by $p - 2$:
$$x = \frac{q - 5}{p - 2}.$$

How did it go?

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

- I can change the subject of a formula by undoing the steps in reverse order. ☐ ☐ ☒
- I can rearrange a formula with a fraction or a square in it. ☐ ☐ ☒
- I can rearrange a formula and then use it to work out a value. ☐ ☐ ☒
- I can check a new formula by putting numbers into both. ☐ ☐ ☒