



Changing the subject of a formula

About 50 minutes No calculator 45 marks

Date _____

A Do Now

The first question is what today's lesson needs. The others bring back earlier topics.

- A1** Needed today [2 marks]

Solve $\frac{x}{6} - \frac{x}{3} = 1$.

A2 Last lesson [2 marks]

Factorise $5x^2 - 7x - 6$.

Answer

Answer

- A3** From chapter 5 [2 marks]

Pip, Raj and Sian share some money in the ratio 6 : 1 : 9. Raj gets £19. How much more does Sian get than Pip?

A4 From chapter 8 [2 marks]

Expand and simplify $(x + 5)^2 - (x - 4)(x - 3)$.

Answer

Answer

B Example, then your turn

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

EXAMPLE 1

Make x the subject of $y = 4x - 9$.

Hint x was multiplied by 4, then 9 was taken away. Undo them in reverse order.

- B1** Make t the subject of $v = 6t + 11$. [2 marks]

Answer

EXAMPLE 2

Make r the subject of $A = 3r^2 - 4$.

Hint Get r^2 on its own first. The last step undoes the square with a square root.

- B2** Make h the subject of $W = 5h^2 + 2$. [2 marks]

Answer

EXAMPLE 3

Make x the subject of $y = \frac{x+2}{x-3}$.

Hint Multiply both sides by $(x-3)$, collect the x terms on one side, then factorise.

B3 Make p the subject of [4 marks]

$$q = \frac{2p+1}{p-4}$$

Answer

C Practice

C1 Make a the subject of $P = \frac{a}{5} + 3$. [2 marks]

Answer

C2 Make m the subject of $k = 3\sqrt{m}$. [2 marks]

Answer

C3 Make x the subject of [3 marks]
 $ax + 7 = bx$.

Answer

C4 $A = \frac{1}{2}(a+b)h$. Work out h when [2 marks]
 $A = 56$, $a = 5$ and $b = 9$.

Answer

C5 Make u the subject of [2 marks]
 $v^2 = u^2 + 2as$.

Answer

C6 Make x the subject of $y = \frac{5}{x+2}$. [2 marks]

Answer

D Exam-style questions

D1 Max makes x the subject of $y = 2x + 10$. He writes $x = \frac{y}{2} - 10$. [2 marks]

Explain why Max is wrong, and write the correct formula.

D2 A temperature of C degrees Celsius is F degrees Fahrenheit, where $F = 1.8C + 32$.

(a) Make C the subject of the formula. [2 marks]

Answer

(b) Work out the temperature in Celsius when it is 77 degrees Fahrenheit. [2 marks]

Answer

- (c) There is one temperature where C and F are the same number. Work it out. [2 marks]

Answer

Total for D2: 6 marks

D3 The distance, s metres, that an object travels in t seconds is $s = ut + \frac{1}{2}at^2$.

- (a) Make a the subject of the formula. [3 marks]

Answer

- (b) Work out a when $s = 50$, $u = 4$ and $t = 5$. [2 marks]

Answer

Total for D3: 5 marks

E Extension

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

- E1** Make v the subject of $\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$. [3 marks]

Answer

Extension hints

Cover these with paper. Uncover one at a time.

- E1** **Hint 1** Get $\frac{1}{v}$ on its own first.
Hint 2 $\frac{1}{v} = \frac{1}{f} - \frac{1}{u} = \frac{u-f}{uf}$.
Hint 3 Turn both sides upside down: $v = \frac{uf}{u-f}$.

How did it go?

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

I can undo a chain of operations in reverse order. ☐ ☐ ☐

I can undo a square with a square root. ☐ ☐ ☐

I can collect the subject when it appears twice. ☐ ☐ ☐