



Rearranging when the subject appears twice

About 50 minutes Calculator allowed 42 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] **A2** From chapter 22 [2 marks]
- Make x the subject of $y = \frac{3x-11}{5}$.
- Answer

- A3** From chapter 1 [2 marks] **A4** Last lesson [2 marks]
- Work out $\frac{2.8 \times 1.3}{0.052}$.
- Answer
- Simplify fully $\frac{x^2+6x+5}{x^2-25}$.
- 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 $px + 7 = 3x + q$.**Hint** Get every x term on one side and everything else on the other. Then take x out as a factor.

- B1** Make x the subject of [3 marks]
- $ax - 4 = 2x + b$.
- Answer

EXAMPLE 2

Make x the subject of $y = \frac{3x+2}{x-5}$.**Hint** Multiply both sides by $(x-5)$ first, then expand the bracket.

- B2** Make t the subject of [3 marks]
- $P = \frac{2t+7}{t+4}$.
- Answer

C Practice

C1 Make m the subject of
 $5m + 3n = 2m - 9n$. [2 marks]

Answer

C2 Make h the subject of
 $wh - 3h = 2w + 5$. [2 marks]

Answer

C3 Make x the subject of
 $k(x - 2) = 3(x + k)$. [3 marks]

Answer

C4 Make y the subject of
 $\frac{2}{x} + \frac{3}{y} = 1$. [3 marks]

Answer

C5 A solid has volume
 $V = \pi r^2 h + 2\pi r^2$. Make r the
subject. Take r to be positive. [3 marks]

Answer

D Exam-style questions

D1 Sam makes y the subject of $3y + a = by - 5$. He writes $y = \frac{a+5}{b+3}$. [2 marks]

Explain the mistake Sam has made, and write down the correct answer.

D2 A jug holds 200 ml of a drink that is 20% fruit juice. Ella adds x ml of pure fruit juice. The percentage of fruit juice in the jug is now c , where $c = \frac{100(40+x)}{200+x}$.

(a) Make x the subject of the formula. You must show your working. [3 marks]

Answer

(b) Work out how much pure fruit juice Ella must add to make a drink that is 36% fruit juice. [2 marks]

Answer ml

- (c) Use your formula from part (a) to explain why the drink can never be 100% fruit juice. [1 mark]

Total for D2: 6 marks

D3 Show that making p the subject of $q = \frac{2p-3}{5-p}$ gives $p = \frac{5q+3}{q+2}$. [3 marks]

E Extension

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

E1 Make x the subject of $y = \sqrt{\frac{2x+5}{x-3}}$. [4 marks]

Answer

Extension hints

Cover these with paper. Uncover one at a time.

- E1** **Hint 1** Square both sides first, to get rid of the square root.
Hint 2 $y^2(x-3) = 2x+5$, so $xy^2 - 3y^2 = 2x+5$.
Hint 3 $x(y^2-2) = 3y^2+5$, then divide by (y^2-2) .

How did it go?

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

I can collect every term with the subject on one side and factorise it out. ☐ ☐ ☒

I can rearrange a formula with fractions, brackets, squares or roots in it. ☐ ☐ ☒

I can use a rearranged formula and say when it has no value. ☐ ☐ ☒