

Fix it 1 What is done to the subject

Rearranging formulae · ANSWERS

Start with the subject. List what happens to it in BIDMAS order: brackets, powers, multiplying and dividing, then adding and subtracting.

EXAMPLE

$y = 4x - 3$. What is done to x , in order?

1. Start with x .
2. Multiply by 4: $4x$.
3. Then subtract 3: $4x - 3$.

YOUR TURN

1 $y = \frac{x}{2} + 9$. What is done to x , in order?

divide by 2, then add 9

2 $y = 5(x + 1)$. What is done to x , in order?

add 1, then multiply by 5

3 $y = 3x^2 - 4$. What is done to x , in order?

square, multiply by 3, then subtract 4

Check: Put $x = 2$ into the formula, then run 2 through your steps. You must get the same number.

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Fix it 2 Undo adding and subtracting

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Do the opposite to both sides. Undo adding by subtracting, and undo subtracting by adding.

EXAMPLE

Make a the subject of $P = a + 15$.

1. 15 is added to a .
2. Subtract 15 from both sides.
3. $a = P - 15$

YOUR TURN

1 Make k the subject of $m = k - 8$.

$k =$ *$m + 8$*

2 Make x the subject of $y = x + c$.

$x =$ *$y - c$*

3 Make h the subject of $T = 20 - h$.

$h =$ *$20 - T$*

Check: Pick a number for the subject, work out the other side, then put that into your answer. You get your number back.

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Fix it 3 The subject as the numerator

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Undo dividing by multiplying both sides. Undo multiplying by dividing both sides.

EXAMPLE

$0.6 = \frac{x}{5}$. Find x .

1. x is the numerator, divided by 5.
2. Multiply both sides by 5.
3. $x = 0.6 \times 5 = 3$

YOUR TURN

1 $0.7 = \frac{x}{9}$. Find x .

$x = \underline{\quad 6.3 \quad}$

2 Make x the subject of $y = 7x$.

$x = \underline{\quad \frac{y}{7} \quad}$

3 Make v the subject of $w = \frac{v}{u}$.

$v = \underline{\quad uw \quad}$

Check: Put your answer back into the fraction. It must give the number you started with.

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Fix it 4 The subject as the denominator

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Multiply both sides by the subject, so it is no longer the denominator. Then divide both sides by what it is multiplied by.

EXAMPLE

$0.6 = \frac{3}{x}$. Find x .

1. x is the denominator: multiply both sides by x .
2. $0.6x = 3$
3. Divide both sides by 0.6.
4. $x = \frac{3}{0.6} = 5$

YOUR TURN

1 $2 = \frac{10}{x}$. Find x .

$x = \underline{\quad 5 \quad}$

2 $0.8 = \frac{6}{x}$. Find x .

$x = \underline{\quad 7.5 \quad}$

3 Make t the subject of $k = \frac{m}{t}$.

$t = \underline{\quad \frac{m}{k} \quad}$

Check: Put your answer in as the denominator. The fraction must equal the number on the other side.

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Fix it 5 Two steps: undo in reverse

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Undo the last thing done to the subject first. Adding or subtracting is usually undone before multiplying or dividing.

EXAMPLE

Make x the subject of $y = 3x + 5$.

1. x is multiplied by 3, then 5 is added.
2. Undo the last step first: $y - 5 = 3x$
3. Divide both sides by 3: $x = \frac{y-5}{3}$

YOUR TURN

- 1 Make x the subject of $y = 2x - 7$.

$$x = \frac{y+7}{2}$$

- 2 Make n the subject of $m = \frac{n}{4} + 3$.

$$n = 4(m-3)$$

- 3 Make t the subject of $v = u + at$.

$$t = \frac{v-u}{a}$$

Check: Pick a number for the subject, work out the other side, then put that into your answer. You get your number back.

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Fix it 6 Brackets

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Divide the whole of the other side by the number outside the bracket. Or expand the bracket first, then undo two steps.

EXAMPLE

Make x the subject of $y = 4(x - 2)$.

1. The bracket is worked out first, so it is undone last.
2. Divide both sides by 4: $\frac{y}{4} = x - 2$
3. Add 2: $x = \frac{y}{4} + 2$

YOUR TURN

- 1 Make k the subject of $A = 3(k + 5)$.

$$k = \frac{A}{3} - 5$$

- 2 Make h the subject of $P = 2(h + w)$.

$$h = \frac{P}{2} - w$$

- 3 Make n the subject of $T = 3(2n - 1)$.

$$n = \frac{T+3}{6}$$

Check: Pick a number for the subject, work out the other side, then put that into your answer. You get your number back.

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Undo a square with a square root, and a square root by squaring. Undo the steps in reverse order, as before.

EXAMPLE

Make r the subject of $A = \pi r^2$.

1. r is squared, then multiplied by π .
2. Divide both sides by π : $\frac{A}{\pi} = r^2$
3. Square root both sides: $r = \sqrt{\frac{A}{\pi}}$

YOUR TURN

- 1 Make x the subject of $y = x^2 + 6$.

$$x = \sqrt{y - 6}$$

- 2 Make x the subject of $y = \sqrt{x} - 2$.

$$x = (y + 2)^2$$

- 3 Make t the subject of $h = 5t^2$.

$$t = \sqrt{\frac{h}{5}}$$

Check: Pick 3 for the subject, work out the other side, then put that into your answer. You get 3 back.

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