

Re-arranging formula



Re-arrange a formula to make a different letter the subject, using the same inverse operations as solving an equation.

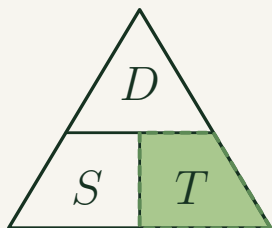
Name _____

Date _____

Cover the subject

In a product formula like $D = S \times T$, cover the letter you want: cover the top and multiply the other two; cover a bottom letter and divide the top by the other one.

Worked example The formula for distance is $D = S \times T$. Make T the subject.



Cover T : the triangle shows T over the divide line, under D , next to S .

$$\text{So } T = \frac{D}{S}.$$

1. The triangle shows $A = l \times w$. Use it to make w the subject.



Solution

$$w = \frac{A}{l}.$$

2. The formula for speed is $S = \frac{D}{T}$. Make D the subject.

Solution

$$D = ST.$$

3. Given $y = x + 9$, make x the subject.

Solution

$$x = y - 9.$$

4. The formula for force is $F = ma$. Make a the subject.

Solution

$$a = \frac{F}{m}.$$

5. The triangle shows $V = I \times R$. Use it to make I the subject.



Solution

$$I = \frac{V}{R}.$$

6. Given $y = 5x$, make x the subject.

Solution

$$x = \frac{y}{5}.$$

7. $P = 2L + 2W$. Make L the subject.

Solution

$$2L = \frac{P - 2W}{2}.$$

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

Solution

$$3x = y + 7.$$

$$x = \frac{y + 7}{3}.$$

9. A student re-arranges $y = 2x + 6$ to get $x = y + \frac{6}{2}$. Explain the error and give the correct re-arrangement.

Solution

Should subtract 6 first, not add.

$$x = \frac{y - 6}{2}.$$

Re-arranging formula (continued)



Re-arrange a formula to make a different letter the subject, using the same inverse operations as solving an equation.

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10. $F = \frac{9}{5}C + 32$. Make C the subject.

Solution

$$F - 32 = \frac{9}{5}C.$$
$$C = \frac{5(F - 32)}{9}.$$

11. $A = \frac{1}{2}bh$. Make b the subject.

Solution

$$2A = bh.$$
$$b = \frac{2A}{h}.$$

12. Check: if $P = 2L + 2W$ with $L = 7$ and $W = 3$, is $P = 20$?

Solution

$$\text{Yes: } 2(7) + 2(3) = 14 + 6 = 20.$$

13. The cost of hiring a kayak is $C = 20 + 8h$, where h is hours. Re-arrange to make h the subject, then find h when $C = \$60$.

Solution

$$h = \frac{C - 20}{8}.$$
$$h = \frac{60 - 20}{8} = 5 \text{ hours.}$$

14. $y = \frac{x - 4}{3}$. Make x the subject.

Solution

$$3y = x - 4.$$
$$x = 3y + 4.$$

15. $I = PRT$. Make R the subject.

Solution

$$R = \frac{I}{PT}.$$

16. The perimeter of a rectangle is $P = 2l + 2w$. A rectangle has $P = 30$ cm and $w = 4$ cm. Re-arrange to make l the subject, then find l .

Solution

$$l = \frac{P - 2w}{2}.$$
$$l = \frac{30 - 8}{2} = 11 \text{ cm.}$$

17. A student re-arranges $A = \frac{1}{2}bh$ to get $b = \frac{A}{2h}$. Explain the error and give the correct re-arrangement.

Solution

The 2 must multiply A , not h .

$$\text{Correct: } b = \frac{2A}{h}.$$

18. Why does re-arranging a formula use the same steps as solving an equation?

Solution

A formula is an equation with letters. The same inverse-operation rules isolate any letter as the subject.