MATHEMATICS · GRADES 7-9

Rearranging formulas

Difficulty level: Intermediate

Mathematics: Grades 7-9

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Overview of the concept

This is how you flip a formula around to find the number you actually need, like working out how long a trip takes from the distance and your speed. A driver who knows the distance and the speed can work out the time, and a cook who knows the total and the servings can work out the amount per serving. A formula is a relationship between numbers, and rearranging it just asks that relationship a different question. Once you can flip a formula, one formula answers many questions instead of just one.



Rule

To make a letter the subject of a formula, undo the operations on it by doing the opposite operation to both sides, one step at a time.

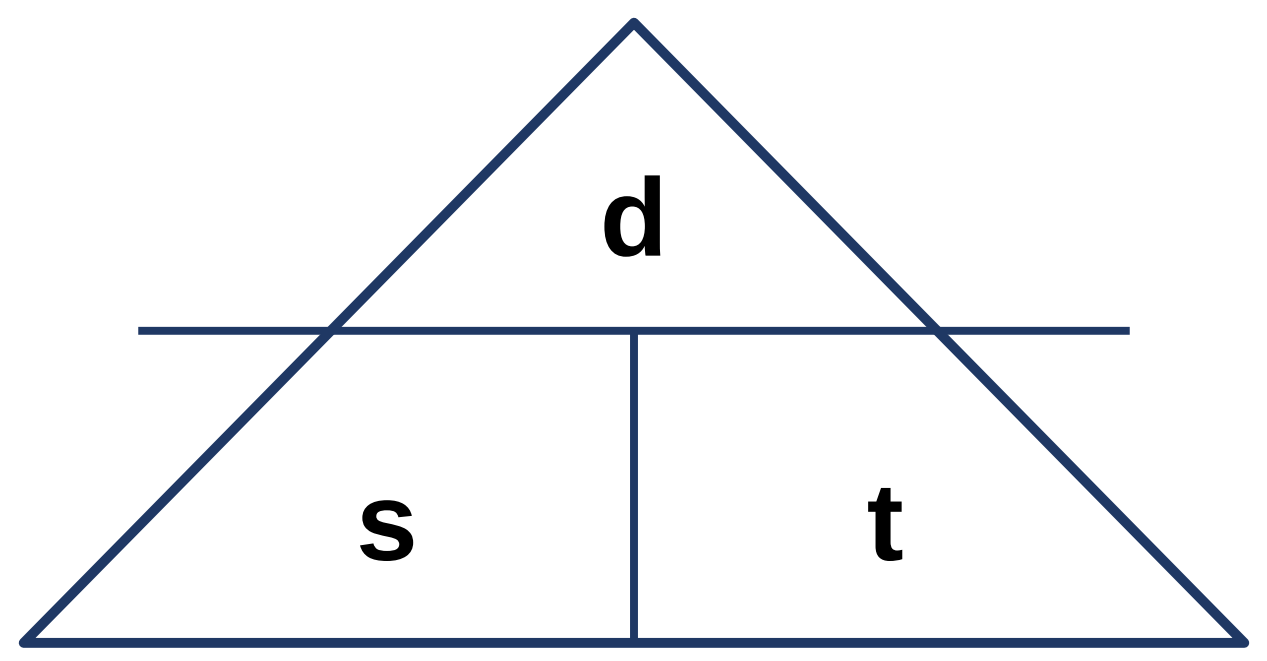
Do the same thing to both sides every time, until the letter stands alone.

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Worked examples

EXAMPLE 1

Q Rearrange d = s × t to make t the subject



SOLUTION

Picture it

Rearrange d = s × t to make t the subject

t is multiplied by s, so divide both sides by s to undo it:

d = s × t

d ÷ s = s × t ÷ s

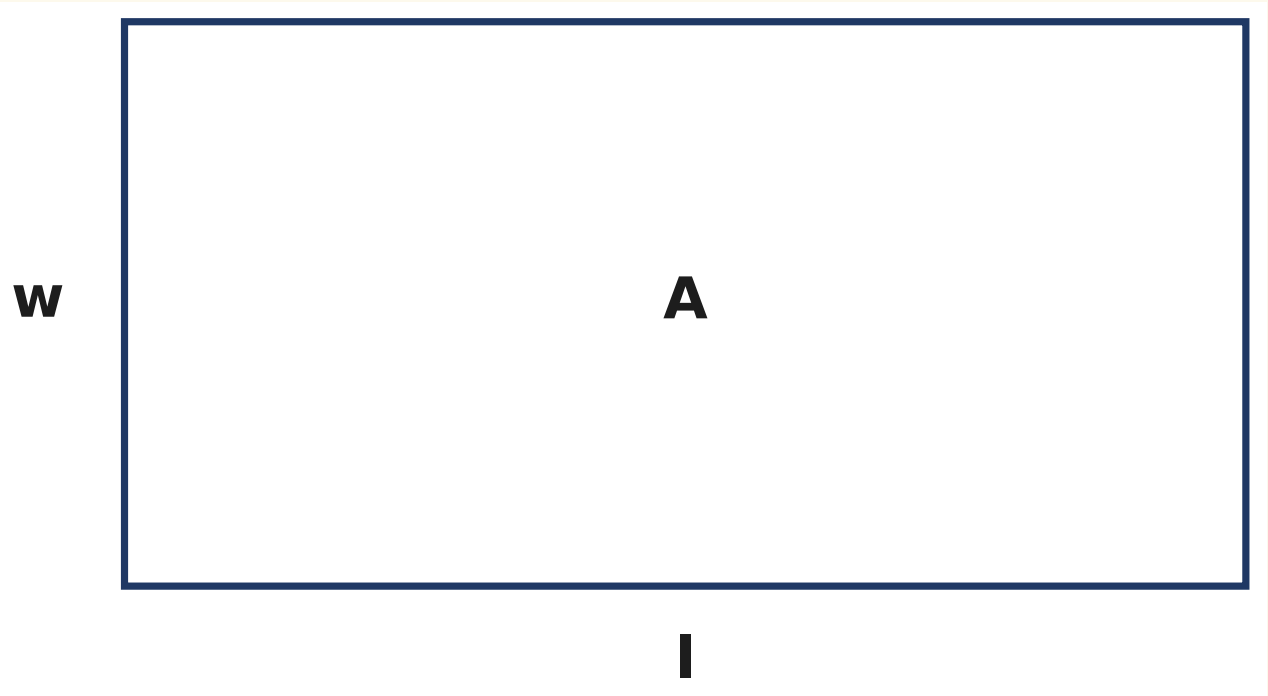
On the right, s ÷ s cancels to 1, leaving t on its own: s × t ÷ s = t

So t = d ÷ s

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EXAMPLE 2

Q Rearrange A = l × w to make w the subject



SOLUTION

Picture it

Rearrange A = l × w to make w the subject

w is multiplied by l, so divide both sides by l to undo it:

A = l × w

A ÷ l = l × w ÷ l

On the right, l ÷ l cancels to 1, leaving w on its own: l × w ÷ l = w

So w = A ÷ l

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Practice questions

1 Rearrange $v = u + a \times t$ to make a the subject.

- **A** $(v - u) \div t$
- **B** $(v + u) \div t$
- **C** $(v - u) \times t$
- **D** $v \div t - u$

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2 Rearrange $P = 2l + 2w$ to make l the subject.

- **A** $(P - 2w) \div 2$
- **B** $(P + 2w) \div 2$
- **C** $(P - 2w) \times 2$
- **D** $(P - w) \div 2$

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3 The area of a triangle is half the base times the height. Write the height h in terms of the area A and the base b.

- **A** 2A ÷ b
- **B** A ÷ (2 × b)
- **C** 2A × b
- **D** A ÷ b

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4 The distance around a circle is C = 2 × pi × r. Rearrange it to find the radius r.

- **A** C ÷ (2 × pi)
- **B** C × 2 × pi
- **C** (C × 2) ÷ pi
- **D** C ÷ pi

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5 A line is given by $y = mx + b$. Rearrange it to make x the subject.

- **A** $(y - b) \div m$
- **B** $(y + b) \div m$
- **C** $(y - b) \times m$
- **D** $y \div m - b$

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6 A box has volume $V = l \times w \times h$. Rearrange the formula to find its height h.

- **A** $V \div (l \times w)$
- **B** $V \times l \times w$
- **C** $(V \times l) \div w$
- **D** $V \div l - w$

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7 Speed is $s = d \div t$. Rearrange it to find the distance d.

- **A** $d \div t$
- **B** $s \times t$
- **C** $d \times t$
- **D** $t \div s$

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8 Simple interest is $I = P \times r \times t$. Rearrange it to find the interest rate r.

- **A** $I \div (P \times t)$
- **B** $I \times P \times t$
- **C** $(I \times P) \div t$
- **D** $I \div P - t$

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9 **A square has area $A = s^2$. Rearrange it to find the side length s (positive root).**

- A $\sqrt{A}$
- B A^2
- C $A \div 2$
- D $2A$

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10 **The area of a circle is $A = pi \times r^2$. Rearrange it to find the radius r.**

- A The square root of $(A \div pi)$
- B $A \div pi$
- C The square root of $A \times pi$
- D $A^2 \div pi$

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ANSWER KEY

1. (v - u) ÷ t

2. (P - 2w) ÷ 2

3. 2A ÷ b

4. C ÷ (2 × pi)

5. (y - b) ÷ m

6. V ÷ (l × w)

7. s × t

8. I ÷ (P × t)

9. $\sqrt{A}$

10. The square root of (A ÷ pi)

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