Several Quantities at Once

PR06-V1 · storyboard · PR06 Joint proportion. Read each picture with its sentences.

Picture 1

a is jointly proportional to b and c; $a = 4$ when $b = 8$ and $c = 9$. Find a when $b = 2$ and $c = 18$.

$$\frac{a}{bc} = \frac{4}{72} = \frac{1}{18}$$

$$a = \frac{1}{18} \times 2 \times 18 = 2$$

1. a is jointly proportional to b and c, and a is 4 when b is 8 and c is 9.
2. Find a when b is 2 and c is 18.
3. a over b c stays the same: 4 over 72, which is 1 over 18.
4. So a is 1 over 18 times 2 times 18: a is 2.

Picture 2

Trap $x = kyz$

$$\times \frac{a}{b+c}$$

$$\checkmark \frac{a}{bc}$$

5. Watch for the trap: adding.
6. Joint proportion multiplies.

Picture 3

For a gas, $\frac{PV}{T}$ stays the same. The volume is tripled and the pressure halved. What happens to T?

$$PV \times 3 \times \tfrac{1}{2} = PV \times \tfrac{3}{2}$$

$\boxed{T \times \frac{3}{2}}$ up by 50%

7. For a gas, P V over T stays the same.
8. The volume is tripled and the pressure is halved.
9. What happens to the temperature?
10. P V is multiplied by 3 times one half, that is three halves.
11. So T is multiplied by three halves too: up by 50 percent.

Picture 4

Trap $\dfrac{PV}{T} = k$

$\times\ T \times \dfrac{2}{3}$

$\checkmark\ T \times \dfrac{3}{2}$

12. Watch for the second trap: T goes with P V.
13. When P V grows, so does T.