

Objective 12

Determine the units of a quantity in a formula

1. A city planner calculates the population density in planning the development of a city. She finds that 50,959 people live in an area of 389 km². In her calculation, she uses the formula for population density.

$$\text{Density} = \frac{\text{people}}{\text{area}} = \frac{50,959}{389} = 131$$

In what units should the population density of 131 be given?

[A] people/km² [B] km²/person [C] people/km [D] km/person

2. A manager calculates the production rate of a factory. He finds that employees make 1635 units in 3 months. In his calculation, he uses the formula for rate.

$$\text{Rate} = \frac{\text{quantity}}{\text{time}} = \frac{1635}{3} = 545$$

In what units should the rate of 545 be given?

3. A student wants to calculate the acceleration a of an object. He knows the object's mass m and the force F applied to the object. He uses a formula to calculate acceleration using mass and force.

$$a = \frac{F}{m} = \frac{45.9 \text{ kg} \cdot \text{m/s}^2}{15.6 \text{ kg}} \approx 2.94$$

In what units should the acceleration of 2.94 be given?

[A] s/m [B] s²/m [C] m/s [D] m/s²

4. A scientist calculates the velocity v of a wave over an interval of time in seconds. He measures the frequency f of the wave and its wave length λ . He uses a formula to calculate the velocity of the wave.

$$v = f\lambda = \left(12 \frac{1}{s}\right)(36 \text{ cm}) = 432$$

In what units should the velocity of 432 be given?

Additional Help:

<https://www.khanacademy.org/math/algebra/introduction-to-algebra/units-algebra/v/figuring-out-units-from-formula>