Compound Measures Critical Thinking

Example

A delivery van covers 360 kilometres in 6 hours. What is its average speed in km/h? Show your calculations and explain why average speed is considered a compound measure.

Solution:

Average speed = distance / time = 360 km / 6 h = 60 km/h.

Average speed is a compound measure because it combines two different quantities—distance and time—into a single value, showing how much distance is covered per unit of time.

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1. A car travels 180 km in 2 hours 15 minutes. Calculate its average speed in km/h and explain the steps you took to convert the time to hours.
2. A factory uses 120 litres of paint to cover 480 square metres of wall. What is the rate of paint used per square metre? Discuss why this compound measure is useful in planning.
3. If a cyclist maintains a speed of 18 km/h, how far will they travel in 40 minutes? Explain your reasoning and any conversions you made.
4. Water flows from a tap at a rate of 0.08 litres per second. How much water will be released in 5 minutes? Explain how you arrived at your answer.
5. A recipe uses 350 grams of flour to make 14 cookies. Calculate the amount of flour used per cookie and discuss how this compound measure helps in scaling recipes.
6. A bus travels 210 km using 28 litres of fuel. What is the fuel efficiency in km per litre? Why might this compound measure be important for drivers?
7. A tank is being filled at a rate of 12 litres per minute. How long will it take to fill a 540-litre tank? Explain the importance of understanding rates in this context.
8. A runner completes a 400-metre lap in 56 seconds. What is the runner's average speed in metres per second? Discuss why average speed is a compound measure.
9. Electricity is supplied at a rate of 1500 watts for 3 hours. Calculate the total energy used in kilowatt-hours (kWh). Explain the steps and conversions involved.
10. A printer produces 240 pages in 8 minutes. What is its printing rate in pages per minute, and how could this compound measure help in an office setting?

Answer Key

Example: Average speed = 360 km / 6 h = 60 km/h. Average speed is a compound measure because it relates distance to time.

1. Average speed = distance/time = 180 km / 2.25 h = 80 km/h. Time converted: 2 h 15 min = 2 + 15/60 = 2.25 hours.
2. Paint per square metre = 120 litres / 480 m^2 = 0.25 litres/m^2. Useful for estimating total paint needed for any area.
3. Distance = speed × time = 18 km/h × (40/60) h = 18 × 0.6667 ≈ 12 km. Conversion: 40 min = 2/3 hour.
4. Water in 5 min = 0.08 L/s × 300 s = 24 litres. 5 minutes × 60 = 300 seconds.
5. Flour per cookie = 350 g / 14 = 25 g per cookie. Helps adjust quantities for more or fewer cookies.
6. Fuel efficiency = 210 km / 28 L = 7.5 km/L. Important for cost and environmental reasons.
7. Time = total volume/rate = 540 L / 12 L/min = 45 minutes. Understanding rates helps plan filling time.
8. Average speed = 400 m / 56 s ≈ 7.14 m/s. Average speed combines distance and time, making it a compound measure.
9. Energy = power × time = 1500 W × 3 h = 4500 Wh = 4.5 kWh. Convert watts to kilowatts (1500 W = 1.5 kW), then multiply by hours.
10. Printing rate = 240 pages / 8 min = 30 pages/min. Useful for estimating job completion time in an office.