MULTIPLICATIVE REASONING

Answer all of these questions. Remember to show your working out in all questions.

MAIN QUESTIONS

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1. If y is directly proportional to x and y = 15 when x = 3, find y when x = 7
   y = 35

2. Convert £45 to euros at an exchange rate of £1 = €1.17
   €52.65

3. Convert 5km to miles using 8km = 5 miles
   3.125 miles

4. If 4 pencils cost £1.20, find the cost of 7 pencils
   £2.10

5. A recipe uses 300g flour for 12 cakes. How much flour for 20 cakes?
   500g

6. If 5 workers complete a job in 8 days, how long for 8 workers?
   5 days

7. Convert 25cm to inches using 2.5cm = 1 inch
   10 inches

8. If $y \propto x$ and y = 24 when x = 6, find x when y = 36
   x = 9

9. Convert 3.5kg to pounds using 1kg = 2.2lb
   7.7lb

10. A map scale is 1:25000. What is 8cm on the map in real life?
    2km

11. If 8 litres of paint covers 40m^2, how much for 65m^2?
    13 litres

12. Convert 55mph to km/h using 5 miles = 8km
    88km/h

13. Two similar triangles have scale factor 3:5. If the smaller area is 27cm², find the larger area | $75cm^2$

14. If $P \propto Q^2$ and P = 48 when Q = 4, find P when Q = 6 | $P = 108$

15. Convert 15 gallons to litres using 1 gallon = 4.5 litres | 67.5 litres

16. A car uses 6 litres for 90km. How much for 150km? | 10 litres

17. Two similar shapes have lengths in ratio 2:7. Find the ratio of their volumes | 8:343

18. If $y \propto \sqrt{x}$ and y = 8 when x = 16, find y when x = 64 | $y = 16$

19. Convert 40°C to Fahrenheit using F = 1.8C + 32 | 104°F

20. A recipe for 6 requires 450g meat. How much for 10 people? | 750g

21. Two similar cylinders have heights 5cm and 8cm. Find the ratio of their surface areas | 25:64

22. If $A \propto B^3$ and A = 54 when B = 3, find A when B = 5 | $A = 250$

23. Convert 12 stone to kg using 1 stone = 6.35kg | 76.2kg

24. A machine makes 240 items in 3 hours. How many in 7 hours? | 560 items

25. Two similar pyramids have volumes 64cm³ and 216cm³. Find the ratio of their heights | 4:6 or 2:3

26. If $y \propto 1/x$ and y = 12 when x = 2, find y when x = 6 | $y = 4$

27. Convert 30m/s to km/h — 108km/h

28. A tap fills a tank in 15 minutes. How long for 3 taps? — 5 minutes

29. Two similar cones have surface areas 36π cm² and 64π cm². Find the ratio of their volumes — 27:64

30. If $P \propto Q$ and P = 28 when Q = 7, and $R \propto Q^2$ and R = 63 when Q = 3, find P when R = 112 — P = 16

MASTER QUESTIONS

M1. A recipe for chocolate mousse requires 200g chocolate for 4 servings. If I want to make 10 servings and chocolate costs £3.50 per 100g, how much will the chocolate cost? — £17.50

M2. Two similar statues have heights of 1.2m and 2.4m. The smaller statue weighs 15kg. Calculate the weight of the larger statue, assuming they are made of the same material. — 120kg

M3. A car's fuel consumption is 12km per litre when driving in the city and 16km per litre on the motorway. If the car travels 60km in the city and 120km on the motorway, and fuel costs £1.45 per litre, calculate the total fuel cost. — £21.75

M4. A map has a scale of 1:50000. Two towns are 8.5cm apart on the map. Calculate the actual distance between them in kilometres. — 4.25km

M5. A company's profit is directly proportional to the square of its advertising budget. When they spend £2000 on advertising, their profit is £8000. What profit would they make if they spent £3500 on advertising? — £24500

M6. A swimming pool is filled by two pipes. Pipe A alone fills it in 6 hours, pipe B alone fills it in 4 hours. How long will it take to fill the pool if both pipes are used together?

| 2.4 hours or 2 hours 24 minutes

M7. The intensity of light from a bulb is inversely proportional to the square of the distance from the bulb. At 2m from the bulb, the intensity is 80 lux. What is the intensity at 5m from the bulb?

| 12.8 lux

M8. A rectangular photograph measuring 15cm by 10cm is enlarged so that the longer side becomes 27cm. What is the area of the enlarged photograph?

| 486cm²

M9. A car hire company charges £45 per day plus 15p per mile. Mr Jones hires a car for 3 days and drives 280 miles. Calculate the total cost.

| £177

M10. The time taken to complete a journey is inversely proportional to the average speed. A journey takes 4 hours at an average speed of 60km/h. How long would the same journey take at an average speed of 75km/h?

| 3.2 hours or 3 hours 12 minutes