Speed, Density and Pressure

GCSE Mathematics • **Foundation Tier** • Grades 4–6 • Non-calculator

WORKED SOLUTIONS

Name: worked example Class: _____ Total: 59 / 59

Show all your working. Marks are given for correct method as well as the final answer.

1. A car travels 150 km in 2 hours. Work out its average speed. **[2 marks]**

speed = distance ÷ time
150 ÷ 2 = 75

Answer: 75 **km/h**

2. A train travels at 96 km/h for 3 hours. Work out the distance. **[2 marks]**

distance = speed × time
96 × 3 = 288

Answer: 288 **km**

3. A cyclist covers 42 km at 14 km/h. Work out the time taken. **[2 marks]**

time = distance ÷ speed
42 ÷ 14 = 3

Answer: 3 **hours**

4. A runner covers 9 km in 45 minutes. Work out the speed in km/h. **[3 marks]**

45 min = 0.75 hours
km/h needs the time in HOURS
9 ÷ 0.75 = 12

Answer: 12 **km/h**

5. A car travels 30 km in 24 minutes. Work out the speed in km/h. **[3 marks]**

24 min = 24 ÷ 60 = 0.4 hours
30 ÷ 0.4 = 75

Answer: 75 **km/h**

6. Change 20 m/s into km/h. **[3 marks]**

20 m in 1 s → 20 × 3600 = 72 000 m in 1 h
72 000 m = 72 km

Answer: 72 **km/h**

7. Change 90 km/h into m/s. **[3 marks]**

90 km = 90 000 m in 3600 s
90 000 ÷ 3600 = 25
or divide km/h by 3.6

Answer: 25 **m/s**

8. A journey of 180 km takes 2 hours 30 minutes. Work out the average speed. **[3 marks]**

2 h 30 min = 2.5 hours
2.5, NOT 2.3
180 ÷ 2.5 = 72

Answer: 72 **km/h**

9. A car drives 60 km at 60 km/h then 60 km at 120 km/h. Work out the average speed for the whole journey. **[4 marks]**

first leg: 60 ÷ 60 = 1 hour
second leg: 60 ÷ 120 = 0.5 hours
total 120 km in 1.5 hours
NOT 90 -- you cannot average the speeds
120 ÷ 1.5 = 80

Answer: 80 **km/h**

10. A block has mass 240 g and volume 30 cm^3. Work out its density. **[2 marks]**

density = mass ÷ volume
240 ÷ 30 = 8

Answer: 8 **g/cm^3**

11. A metal has density 7.8 g/cm^3. Work out the mass of 50 cm^3 of it. **[2 marks]**

mass = density × volume
7.8 × 50 = 390

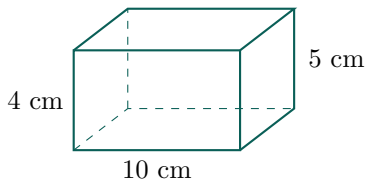
Answer: 390 **g**

12. A liquid has density 1.2 g/cm^3 and mass 540 g. Work out its volume. **[2 marks]**

volume = mass ÷ density
540 ÷ 1.2 = 450

Answer: 450 **cm^3**

13. Work out the density of this block, which has mass 1 200 g. **[3 marks]**



volume = 10 × 5 × 4 = 200 cm^3
1200 ÷ 200 = 6

Answer: 6 **g/cm^3**

14. Gold has density 19.3 g/cm^3. Work out the volume of 1 kg of gold, to 1 d.p. **[3 marks]**

1 kg = 1000 g
the density is in GRAMS, so convert
1000 ÷ 19.3 = 51.81...
= 51.8

Answer: 51.8 **cm^3**

15. A force of 60 N acts on an area of 4 m^2. Work out the pressure. **[2 marks]**

pressure = force ÷ area
60 ÷ 4 = 15

Answer: 15 **N/m^2**

16. A pressure of 25 N/m^2 acts over 6 m^2. Work out the force. **[2 marks]**

force = pressure × area
25 × 6 = 150

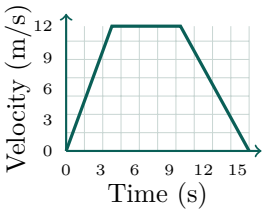
Answer: 150 **N**

17. A force of 900 N gives a pressure of 300 N/m^2. Work out the area. **[2 marks]**

area = force ÷ pressure
900 ÷ 300 = 3

Answer: 3 **m^2**

18. The graph shows a car's velocity.



(a) Write down the maximum velocity. **[1 mark]**

read the flat section
12 m/s

(b) Work out the acceleration over the first 4 seconds. **[3 marks]**

acceleration = change in velocity ÷ time
12 ÷ 4
= 3 m/s^2

Answer: 12 m/s ; 3 m/s^2

19. A train covers 240 km. For the first 90 km it averages 60 km/h; for the rest it averages 100 km/h.

(a) Work out the total time for the journey. **[4 marks]**

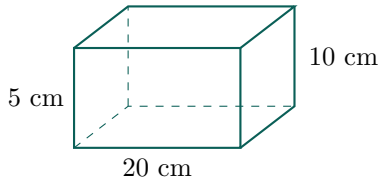
first: 90 ÷ 60 = 1.5 hours
rest = 240 − 90 = 150 km
150 ÷ 100 = 1.5 hours
total = 3 hours

(b) Work out the average speed for the whole journey, to 1 d.p. **[3 marks]**

240 ÷ 3
= 80.0 km/h

Answer: 3 hours ; 80.0 km/h

20. A solid cuboid of ice has density 0.92 g/cm^3.



(a) Work out its volume. **[2 marks]**

$20 \times 10 \times 5$

$= 1000\ cm^3$

(b) Work out its mass in kilograms. **[3 marks]**

mass $= 0.92 \times 1000 = 920\ g$

$920 \div 1000 = 0.92\ kg$

Answer: ____ $1000\ cm^3$; $0.92\ kg$ ____

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