3.9 Compound Measures: Speed, Density and Rates: 2-hour Pack

Calculators not allowed · about 120 minutes

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 A machine makes 360 bolts in 24 minutes. How many bolts does it make per minute?

(2)

2 A car travels 60 km in 1 hour 15 minutes. Work out its average speed in km/h.

(3)

3 A block has a mass of 185 g and a volume of 50 cm³. Work out its density in g/cm^3.

(2)

4 Mia runs 360 km in 3 hours. Work out her average speed in km/h.

(2)

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5 A liquid has a density of 1.8 g/cm^3. It has a mass of 9 g. Work out its volume.

(3)

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6 A metal has a density of 9.7 g/cm^3. Work out the mass of 20 cm³ of the metal.

(2)

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7 A car travels 288 km in 4 hours. Work out its average speed in km/h.

(2)

---

8 A car travels at 72 km/h. Convert this speed to metres per second.

(3)

---

9 A metal has a density of 6.1 g/cm^3. Work out the mass of 25 cm³ of the metal.

(2)

---

10 A block has a mass of 1110 g and a volume of 100 cm³. Work out its density in g/cm^3.

(2)

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11 A car travels at 126 km/h. Convert this speed to metres per second.

(3)

---

12 Mia runs 60 km in 1 hour 30 minutes. Work out her average speed in km/h.

(2)

---

13 A pump moves water at 5 litres per minute. How many litres does it move in one hour?

(2)

---

14 Mia runs 60 km in 30 minutes. Work out her average speed in km/h.

(2)

---

15 A car is driven 120 km in 1 hour 30 minutes. Meanwhile a train covers 300 km in 2 hours 15 minutes. Which is faster? Work out both speeds in km/h to 1 decimal place and state which is faster.

(4)

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16 A block has a mass of 190 g and a volume of 25 cm³. Work out its density in g/cm^3.

(2)

---

17 A car travels 15 km in 30 minutes. Work out its average speed in km/h.

(3)

---

18 A runner travels at 10 m/s. Convert this speed to km/h.

(3)

---

19 Mia runs 160 km in 2 hours 30 minutes. Work out her average speed in km/h.

(2)

---

20 A train travels at an average speed of 64 km/h for 2 hours. How far does it travel?

(2)

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21 A liquid has a density of 11 g/cm^3. It has a mass of 275 g. Work out its volume.

(3)

---

22 A tap fills a container at a rate of 6 litres per minute. How long does it take to put 60 litres into the container?

(2)

---

23 A car travels at 108 km/h. Convert this speed to metres per second.

(3)

---

24 A tap fills a container at a rate of 4 litres per minute. How long does it take to put 60 litres into the container?

(2)

---

25 A block has a mass of 1190 g and a volume of 100 cm³. Work out its density in g/cm^3.

(2)

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26 A runner travels at 25 m/s. Convert this speed to km/h.

(3)

---

27 A machine makes 120 bolts in 10 minutes. How many bolts does it make per minute?

(2)

---

28 A car travels at 90 km/h. Convert this speed to metres per second.

(3)

---

29 A block has a mass of 57 g and a volume of 5 cm³. Work out its density in g/cm^3.

(2)

---

30 A train travels at an average speed of 48 km/h for 30 minutes. How far does it travel?

(2)

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31 A runner travels at 5 m/s. Convert this speed to km/h.

(3)

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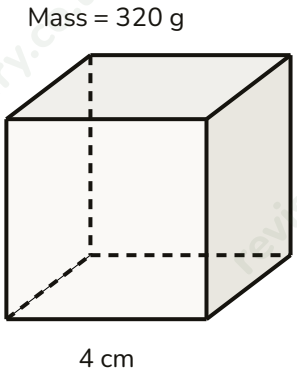
32 A gold bar has volume 25 cm³ and density 19.3 g/cm^3. Find its mass in grams. Give your answer to the nearest gram.

(2)

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33 A metal cube has side length 4 cm and mass 320 g. Work out the density of the metal in g/cm^3.

Diagram NOT accurately drawn



(2)

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34 A car travels for 45 minutes at an average speed of 60 km/h. Work out the distance travelled in km.

(2)

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35 A cyclist rides 18 km at 24 km/h, then rides a further 10 km at 20 km/h. Work out the total time taken for the whole journey, in hours. Give your answer as a decimal.

(3)

---

36 A container ship travels 350 km in 14 hours, then 240 km in the next 8 hours. Work out the average speed for the whole journey in km/h, giving your answer to 1 decimal place.

(4)

---

37 A cylindrical metal rod has volume 250 cm³ and is made from a metal of density 7.8 g/cm^3. Work out the mass of the rod in kilograms, giving your answer to 2 decimal places. (1 kg = 1000 g)

(4)

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Mark scheme · 3.9 Compound Measures: Speed, Density and Rates: 2-hour Pack

Question 1

360 ÷ 24	M1
15 cao	A1

Answer: **15**

Question 2

converts the time to hours	M1
60 ÷ 1.25	M1
48 km/h cao	A1

Answer: **48 km/h**

Question 3

185 ÷ 50	M1
3.7 g/cm^3 cao	A1

Answer: **3.7 g/cm^3**

Question 4

360 ÷ 3	M1
120 km/h cao	A1

Answer: **120 km/h**

Question 5

volume = mass ÷ density	M1
9 ÷ 1.8	M1
5 cm³ cao	A1

Answer: **5 cm^3**

Question 6

9.7 x 20	M1
194 g cao	A1

Answer: **194 g**

Question 7

288 ÷ 4	M1
72 km/h cao	A1

Answer: **72 km/h**

Question 8

72 x 1000 = 72000 m per hour	M1
÷ 3600	M1
20 m/s cao	A1

Answer: **20 m/s**

Question 9

6.1 x 25	M1
152.5 g cao	A1

Answer: **152.5 g**

Question 10

1110 ÷ 100	M1
11.1 g/cm^3 cao	A1

Answer: **11.1 g/cm^3**

Question 11

126 x 1000 = 126000 m per hour	M1
÷ 3600	M1
35 m/s cao	A1

Answer: **35 m/s**

Question 12

60 ÷ 1.5	M1
40 km/h cao	A1

Answer: **40 km/h**

Question 13

5 x 60	M1
300 litres cao	A1

Answer: **300 litres**

Question 14

60 ÷ 0.5	M1
120 km/h cao	A1

Answer: **120 km/h**

Question 15

calculate car speed: 120 km / 1.5 h	M1
calculate train speed: 300 km / 2.25 h	M1
car 80.0 km/h, train 133.3 km/h to 1 d.p. cao	A1
state train is faster	A1

Answer: **Car 80.0 km/h; Train 133.3 km/h; Train is faster**

Question 16

190 ÷ 25	M1
7.6 g/cm^3 cao	A1

Answer: **7.6 g/cm^3**

Question 17

converts the time to hours	M1
15 ÷ 0.5	M1
30 km/h cao	A1

Answer: **30 km/h**

Question 18

10 x 3600	M1
÷ 1000	M1
36 km/h cao	A1

Answer: **36 km/h**

Question 19

160 ÷ 2.5	M1
64 km/h cao	A1

Answer: **64 km/h**

Question 20

64 x 2	M1
128 km cao	A1

Answer: **128 km**

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Question 21

volume = mass ÷ density **M1**
275 ÷ 11 **M1**
25 cm³ cao **A1**
Answer: **25 cm^3**

Question 22

60 ÷ 6 **M1**
10 minutes cao **A1**
Answer: **10 minutes**

Question 23

108 x 1000 = 108000 m per hour **M1**
÷ 3600 **M1**
30 m/s cao **A1**
Answer: **30 m/s**

Question 24

60 ÷ 4 **M1**
15 minutes cao **A1**
Answer: **15 minutes**

Question 25

1190 ÷ 100 **M1**
11.9 g/cm^3 cao **A1**
Answer: **11.9 g/cm^3**

Question 26

25 x 3600 **M1**
÷ 1000 **M1**
90 km/h cao **A1**
Answer: **90 km/h**

Question 27

120 ÷ 10 **M1**
12 cao **A1**
Answer: **12**

Question 28

90 x 1000 = 90000 m per hour **M1**
÷ 3600 **M1**
25 m/s cao **A1**
Answer: **25 m/s**

Question 29

57 ÷ 5 **M1**
11.4 g/cm^3 cao **A1**
Answer: **11.4 g/cm^3**

Question 30

48 x 0.5 **M1**
24 km cao **A1**
Answer: **24 km**

Question 31

5 x 3600 **M1**
÷ 1000 **M1**
18 km/h cao **A1**
Answer: **18 km/h**

Question 32

mass = density x volume method used **M1**
483 g cao **A1**
Answer: **483**

Question 33

find volume = 4^3 = 64 cm³ **M1**
5 g/cm^3 cao **A1**
Answer: **5 g/cm^3**

Question 34

convert 45 minutes to hours: 45/60 = 0.75 h **M1**
45 km cao **A1**
Answer: **45 km**

Question 35

find time for first stage: 18/24 = 0.75 h **M1**
find time for second stage: 10/20 = 0.5 h **M1**
1.25 hours cao **A1**
Answer: **1.25 hours**

Question 36

find total distance: 350+240 = 590 km **M1**
find total time: 14+8 = 22 hours **M1**
use average speed = total distance/total time = 590/22 **M1**
26.8 km/h cao (26.81... to 1 d.p.) **A1**
Answer: **26.8 km/h**

Question 37

use mass = density*volume **M1**
substitute: 7.8*250 = 1950 g **M1**
convert to kg: 1950/1000 **M1**
1.95 kg cao **A1**
Answer: **1.95 kg**

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