

Topic test 10

Ratios and rates

- Time allowed: 45 minutes.
- Part A: 20 multiple-choice questions (40 marks)
- Part B: 16 free-response questions (60 marks)


Name: _____

Part A

20 multiple-choice questions

2 marks each: 40 marks

Circle the correct answer.

- 1 What is the ratio of shaded parts to unshaded parts in this rectangle?
- 
- A 3 : 2 B 5 : 3
C 5 : 8 D 3 : 5
- 2 Simplify 28 : 40.
A 3 : 7 B 2 : 5
C 4 : 7 D 7 : 10
- 3 What number goes in the blank?
5 : 3 = 35 : _____
A 10 B 21
C 24 D 30
- 4 A pancake recipe for 6 people requires $\frac{3}{4}$ cup of milk. How many cups of milk are needed to make pancakes for 8 people?
A 1 B $\frac{9}{16}$
C $1\frac{1}{4}$ D 6
- 5 Simplify 33 : 6.
A 11 : 2 B 5 : 2
C 6 : 1 D 11 : 3
- 6 Simplify 1.6 : 4.
A 1 : 4 B 1 : 5
C 2 : 5 D 4 : 1
- 7 Haresh and Adrian share a prize of \$4500 in the ratio 7 : 8. What is Adrian's share?
A \$3000 B \$2500
C \$2250 D \$2400
- 8 Simplify 35 mins : 1 hour.
A 2 : 3 B 7 : 10
C 7 : 20 D 7 : 12
- 9 The ratio of dogs to cats at the RSPCA was 5 : 3. If there were 75 dogs, how many cats were there?
A 15 B 28
C 120 D 45

- 10 A car travels 423 km in 4.5 hours. What is its average speed?

A 97 km/h B 94 km/h
C 106 km/h D 96 km/h

- 11 Simplify $\frac{7}{10} : \frac{3}{4}$.

A 9 : 10 B 9 : 15
C 14 : 15 D 2 : 3

- 12 Which one of these ratios is not equivalent to 2 : 8?

A 10 : 16 B 1 : 4
C 12 : 48 D 6 : 24

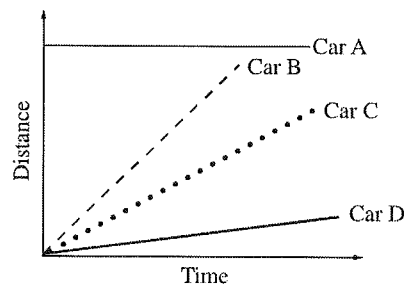
- 13 Melissa earned \$91.28 for working from 9:00am to 5:00pm on Friday. What was her hourly rate of pay?

A \$13.04 B \$15.21
C \$10.14 D \$11.41

- 14 If 3 girls can unload a truck in 24 minutes, how long will it take 7 girls working at the same rate to unload the truck?

A 8 minutes B 10 minutes
C 3 minutes D 24 minutes

- 15 Which car is travelling at the highest speed on this travel graph?



- 16 How long will it take a truck travelling at 98 km/h to travel 640 km?

A 7 hours B 6.5 hours
C 5.5 hours D 8 hours

- 17 Santi runs 100 metres in 14 seconds. How far can she run in one minute at the same speed?

A 387 m B 429 m
C 233 m D 443 m

Topic test 10: Ratios and rates *continued*

- 18 Gina uses 52 litres of water in a 4-minute shower. How much water does she use in a 9-minute shower?
A 109 L B 121 L
C 114 L D 117 L
- 19 On a travel graph, if the slope changes from pointing upwards to pointing downwards, this indicates a change in:
A height B transport
C speed D direction
- 20 A water tank of capacity 80 litres takes 18 minutes to fill. At what rate is the tank being filled?
A 2.25 L/min B 1.44 L/min
C 3.2 L/min D 4.4 L/min
- 25 (4 marks) Simplify each ratio:
a 16 : 10
b 24 : 30 : 9
- 26 (2 marks) The ratio of male to female teachers at Westvale College is 3 : 5. If there are 72 teachers, how many male teachers are there?
- 27 (4 marks) For each scale drawing below, measure the length of the object and use the scale to calculate its actual length.
a Car 1 : 50

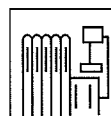
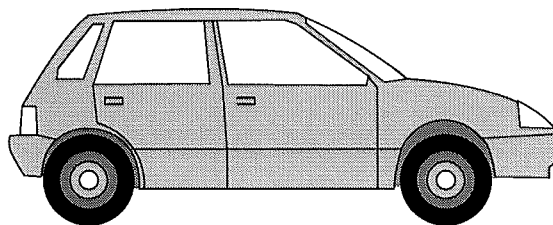
Part B

16 free-response questions

60 marks

Show working where appropriate.

- 21 (6 marks) At the school excursion, there were 3 teachers, 40 boys and 44 girls. Express in simplest terms the ratio of:
a teachers to students
b girls to boys
c boys to everybody.
- 22 (4 marks) Complete each pair of equivalent ratios.
a $7 : 9 = 35 : \underline{\hspace{2cm}}$
b $18 : 12 = \underline{\hspace{2cm}} : 4$
- 23 (2 marks) A TV screen has a length : height ratio of 4 : 3. If its length is 38 cm, what is its height?
- 24 (2 marks) Petrol costs 96.1 cents per litre. How many litres did Peter buy for \$42.30?
- 28 (4 marks) Name the units used to measure each rate:
a the cost of apples
b mobile phone call charges
- 29 (4 marks) One home used 1284 kilowatt-hours (kWh) of electricity over 97 days and paid \$141.24.
a Express the cost of electricity in cents/kWh.
b Calculate the average usage of electricity in kWh/day correct to one decimal place.



Topic test 10: Ratios and rates *continued*

30 (2 marks) In a statistical survey, there were 154 Labor voters and 126 Liberal voters. What was the ratio of Labor to Liberal voters?

31 (2 marks) Troy made 42 runs in 8 overs of cricket. Calculate his run rate in runs per over.

32 (4 marks) Simplify these ratios.

a 75 mm : 10 cm

b 4 years : 8 months

33 (4 marks) This is the scale shown on a street map.

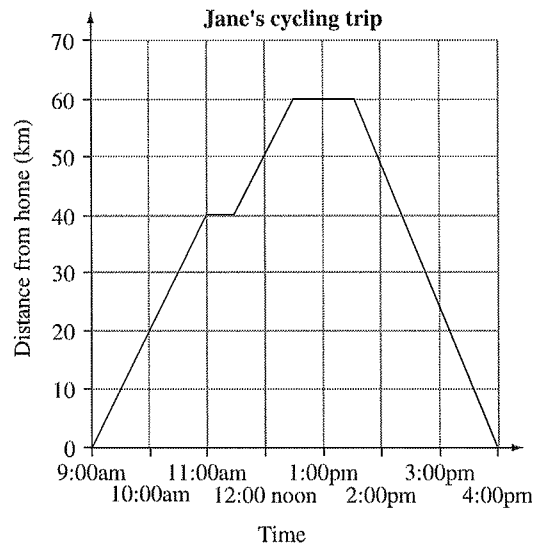


a Express this scale as a simplified ratio.

b What does a scaled distance of 10 cm on this map represent?

34 (2 marks) To make concrete, you mix 3 parts gravel to 2 parts sand to 1 part cement. How much concrete can be made with 30 kg of sand?

35 (10 marks) This travel graph describes Jane's cycling trip.



a How far was Jane from home at 12:30pm?

b How many stops did she make over the day?

c What happened at 1:30pm?

d What was Jane's average speed between 9:00am and 11:00am?

e When was Jane 20 km from home (two answers)?

36 (4 marks) This diagram of a shed has a scale of 1 : 200.



a Calculate the actual height of the shed's door.

b A tree is to be planted 11 metres to the right of the shed. Mark clearly on the diagram with an X where the base of the tree should go.

END OF TEST.

Use the back for extra working space.

Topic test 10

Ratios and rates

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- Part B: 16 free-response questions (60 marks)

Name: ANSWERS

Part A

20 multiple-choice questions
2 marks each: 40 marks
Circle the correct answer.

- 1 What is the ratio of shaded parts to unshaded parts in this rectangle?



- A 3:2 B 5:3
C 5:8 D 3:5
- 2 Simplify 28:40.
A 3:7 B 2:5
C 4:7 D 7:10
- 3 What number goes in the blank?
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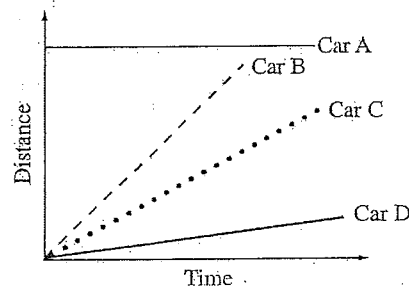
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 B 121 L
 C 114 L
 D 117 L

19 On a travel graph, if the slope changes from pointing upwards to pointing downwards, this indicates a change in:

- A height
 B transport
 C speed
 D direction

20 A water tank of capacity 80 litres takes 18 minutes to fill. At what rate is the tank being filled?

- A 2.25 L/min
 B 1.44 L/min
 C 3.2 L/min
 D 4.4 L/min

25 (4 marks) Simplify each ratio:

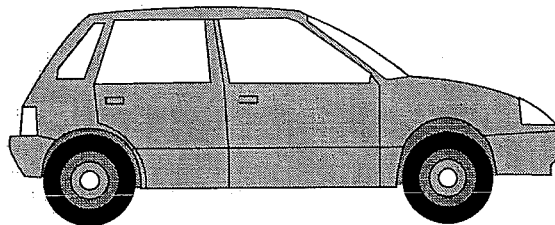
a $16:10 \div 2$
 $8:5$ ✓
 b $24:30:9 \div 3$
 $8:10:3$ ✓

26 (2 marks) The ratio of male to female teachers at Westvale College is 3 : 5. If there are 72 teachers, how many male teachers are there?

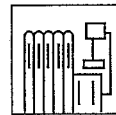
~~72:3~~ 8 parts = 72
 1 part = 9 male
 3 parts = 27 teachers

27 (4 marks) For each scale drawing below, measure the length of the object and use the scale to calculate its actual length. Please *do* me!

a Car 1 : 50



b Microchip 3 : 1



Part B

16 free-response questions

60 marks

Show working where appropriate.

21 (6 marks) At the school excursion, there were 3 teachers, 40 boys and 44 girls. Express in simplest terms the ratio of:

a teachers to students

$3:84 = 1:28$

b girls to boys

$44:40 = 11:10$

c boys to everybody.

~~40:47~~ $40:87$

22 (4 marks) Complete each pair of equivalent ratios.

a $7:9 = 35:45$ ✓

b $18:12 = 6:4$ ✓

23 (2 marks) A TV screen has a length : height ratio of 4 : 3. If its length is 38 cm, what is its height?

$4:3$
 $\times 9.5$
 $38:28.5$ ✓

24 (2 marks) Petrol costs 96.1 cents per litre. How many litres did Peter buy for \$42.30?

~~$1000\text{ mL} = 96.1$~~
 ~~$10.4\text{ L} = \$42.30$~~
 $\frac{4230^c}{96.1^c} = 44\text{ L}$

$13.2 \frac{\text{kWh}}{\text{day}}$ ✓

28 (4 marks) Name the units used to measure each rate:

a the cost of apples
 cents/apple. ✓

b mobile phone call charges
 cents/call. ✓

29 (4 marks) One home used 1284 kilowatt-hours (kWh) of electricity over 97 days and paid \$141.24.

a Express the cost of electricity in cents/kWh.

$14124 \text{ cents} / 1284 \text{ kWh} = 11 \text{ cents/kWh}$ ✓

b Calculate the average usage of electricity in kWh/day correct to one decimal place.

Topic test 10: Ratios and rates continued

30 (2 marks) In a statistical survey, there were 154 Labor voters and 126 Liberal voters. What was the ratio of Labor to Liberal voters?

$$154 : 126 = \frac{11}{9}$$

31 (2 marks) Troy made 42 runs in 8 overs of cricket. Calculate his run rate in runs per over.

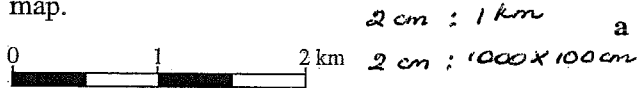
$$8 = 42 \\ 1 = 5.25 \checkmark$$

32 (4 marks) Simplify these ratios.

a 75 mm : 10 cm
 $\frac{75}{100} = \frac{3}{4} \checkmark$

b 4 years : 8 months
 $\frac{48}{8} = 6 : 1 \checkmark$

33 (4 marks) This is the scale shown on a street map.



a Express this scale as a simplified ratio.

$$1 : 50000$$

b What does a scaled distance of 10 cm on this map represent?

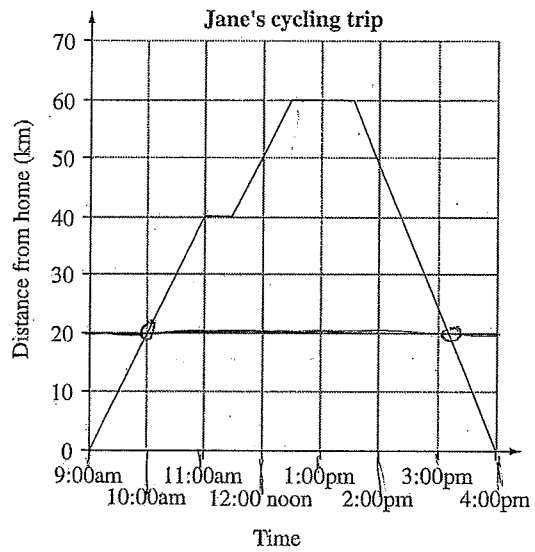
$$10 \text{ cm} \rightarrow 5 \text{ km}$$

34 (2 marks) To make concrete, you mix 3 parts gravel to 2 parts sand to 1 part cement. How much concrete can be made with 30 kg of sand?

$$\begin{matrix} \times 5 & = & 15 & \times 15 \\ 3 & : & 2 & : & 1 \\ 225 & : & 30 \text{ kg} & : & 15 \end{matrix}$$

2 parts : 30 kg
 1 part : 15 kg
 6 parts : 90 kg of concrete

35 (10 marks) This travel graph describes Jane's cycling trip.



a How far was Jane from home at 12:30pm?

$$60 \text{ km} \checkmark$$

b How many stops did she make over the day?

$$4 \text{ times } 2$$

c What happened at 1:30pm?

Jane is going ~~down~~ home

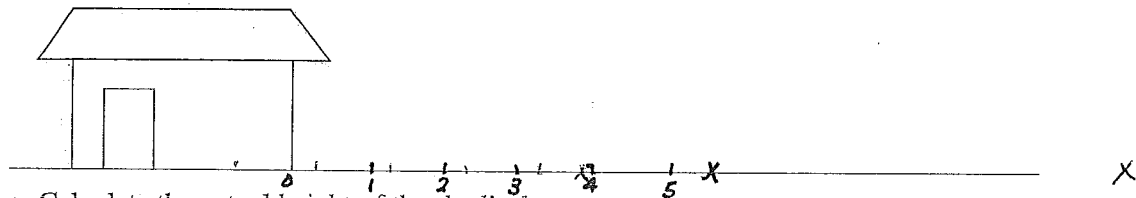
d What was Jane's average speed between 9:00am and 11:00am?

$$20 \text{ km/hr}$$

e When was Jane 20 km from home (two answers)?

$$10:00 \text{ am and } 3:15 \text{ pm} \checkmark$$

36 (4 marks) This diagram of a shed has a scale of 1 : 200.



a Calculate the actual height of the shed's door.

$$200 \text{ cm} = 2 \text{ m}$$

b A tree is to be planted 11 metres to the right of the shed. Mark clearly on the diagram with an X where the base of the tree should go.

END OF TEST.

Use the back for extra working space.