



- A.** 36 minutes
B. 1 hour 20 minutes
C. 1 hour 24 minutes
D. 1 hour 40 minutes

5. **C** Rates (240543) **Core**

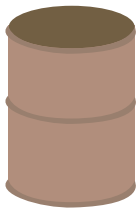
Kelly drives her motorised scooter to the shopping centre 9 km away at an average speed of 45 km per hour.

How long does the trip take?

- A. 5 minutes
- B. 12 minutes
- C. 24 minutes
- D. 40.5 minutes

6. **C** Rates (240546) **Core**

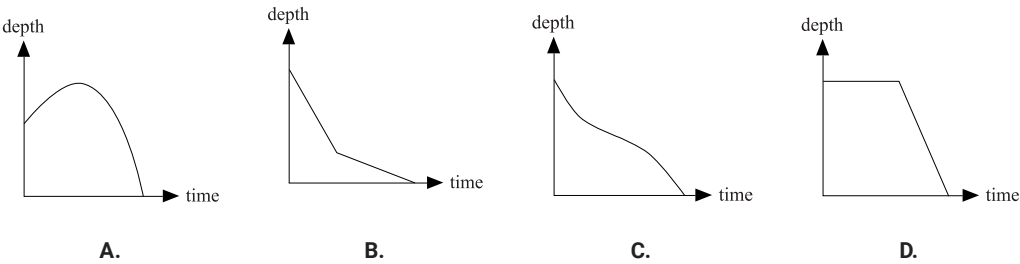
Columbo had a full drum of water.



He put two holes in the bottom and the water began leaking out.

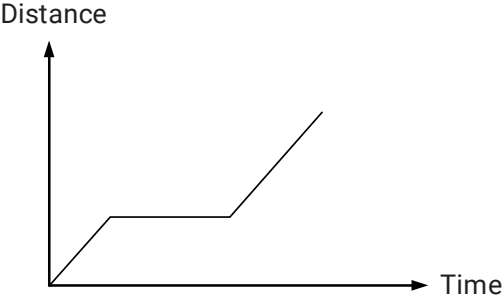
After a few minutes, Columbo closed off one of the holes in the drum and the water poured out more slowly.

Which graph below best shows the depth of water in the drum against time?



7. **B** Rates (240550) **Core**

Elvis walks from his home to the beach through a park.



Which of the following situations best fits the distance/time graph above, where distance is Elvis' distance from home?

- A. Elvis ran to the park, sat down on a bench, and then ran home.
- B. Elvis walked to the park, sat down on a bench, then ran to the beach.
- C. Elvis ran to the beach, sat down, then ran home.
- D. Elvis walked to the park, sat down on a bench, then walked to the beach.

8. **B** Rates (240554) **Core**

Fleur lives 15 kilometres from her work.

On Wednesday, she drove to work and averaged 60 kilometres per hour.

On Thursday, she took the bus which averaged 15 kilometres per hour.

What was the extra time of the bus journey, in minutes, compared to when she drove on Wednesday?

- A. 15
- B. 45
- C. 60
- D. 75

9. **B** Rates (240556) **Core**

Barry lives 30 kilometres from the library.
On Tuesday, he drove to the library and averaged 90 kilometres per hour.
On Thursday, he took the train which averaged 30 kilometres per hour.
What was the extra time of the train journey, in minutes, compared to when he drove on Tuesday?

- A. 20
- B. 30
- C. 40
- D. 60

10. **B+** Ratio (239560) **Core**

A television broadcasting tower is 800 metres high.
A model of the tower is built with a scale of 1 : 4000.
What is the height of the model?

- A. 5 cm
- B. 20 cm
- C. 200 cm
- D. 320 cm

11. **B+** Ratio (239581) **Core**

This picture shows a stone vase.

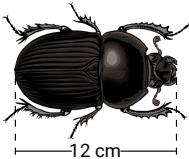


The picture is 2 cm high. The actual vase is 40 cm high.
What scale is used in the picture?

- A. 2 cm represents 20 cm
- B. 4 cm represents 40 cm
- C. 1 cm represents 2 cm
- D. 1 cm represents 20 cm

12. **B+** Ratio (239584) **Core**

The actual body length of a beetle Brad has caught is 24 mm.
A scale drawing of the beetle is shown below.



What scale is used in the drawing?

- A. 1cm represents 5 mm
- B. 1cm represents 2 mm
- C. 2cm represents 1 mm
- D. 5cm represents 1 mm

13. **B+** Ratio (239594) **Core**

Tony is making a fruit cake.
The recipe says he needs 3 cups of sultanas for every 5 cups of flour.
If 2.5 cups of flour are used, how many cups of sultanas are needed?

- A. 0.5 cups
- B. 1.5 cups
- C. 2.5 cups
- D. 4.5 cups

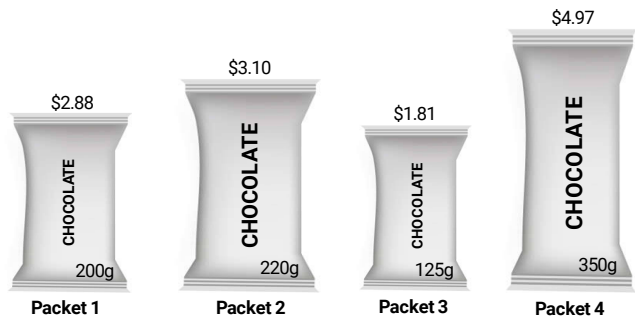
14. **A** Ratio (239564) **Core**

A school has 360 students.
The ratio of boys to girls is 4 to 6.
How many boys attend the school?

- A. 90
- B. 144
- C. 216
- D. 240

15. **A** Rates (240612) **Core**

A shop sells four sizes of chocolate bar.



Which packet costs the least per gram?

- A. Packet 1
- B. Packet 2
- C. Packet 3
- D. Packet 4

16. **A** Ratio (239619) **Core**

An ancient coin is made up of gold and silver in the ratio 1:3.

The coin weighs 21.65 grams.

How many grams of silver are in the ancient coin?

- A. 5.4125
- B. 7.217
- C. 14.433
- D. 16.2375

17. **C** Ratio (239399) **Core**

Complete each pair of equivalent ratios. (3 marks)

- a. $16:12 = \square : 3$
- b. $18:24 = \square : 4$
- c. $54:9 = \square : 1$

18. **C** Ratio (239436) **Core**

Fully simplify the following ratios.

- a. $\frac{1}{2} : 3$ (1 mark)
- b. $\frac{1}{4} : \frac{1}{3}$ (2 marks)

19. **C** Ratio (239443) **Core**

Fully simplify the following ratios.

- a. $\frac{5}{12} : \frac{11}{8}$ (2 mark)
- b. $1\frac{1}{4} : 3\frac{1}{2}$ (2 marks)

20. **C** Rates (240582) **Core**

Convert \$648 per hour into cents per second. (2 marks)

21. **C** Rates (240594) **Core**

The cruising speed of a kangaroo is 720 metres per minute.

What is this speed in metres per second? (2 marks)

22. **C** Rates (240047) **Core**

Johnno was standing 300 metres away from the stage at a rock concert.

If the sound travelled at 330 metres per second from the stage, how many seconds did the sound take to get to Johnno? Give your answer correct to 2 decimal places. (2 marks)

23. **C** Rates (239828) **Core**

Bryce organises parking for major events in the city.

He has open air parking spaces for 3 cars on every 27 square metres of land.

How many cars could Bryce park on 4680 square metres? (2 marks)

24. **C** Ratio (239464) **Core**

Maude has 55 cents in coins and Will has \$2.70 in coins.

- a. Write Maude's money as a ratio of Will's money in cents. (1 mark)
- b. Express the ratio in simplest form. (2 marks)

25. **C** Rates (240038) **Core**

Rhonda rode her hovercraft at a speed of 5 metres per second.
If she rode for 3 minutes, how far did she go? *(2 marks)*

26. **C** Rates (240579) **Core**

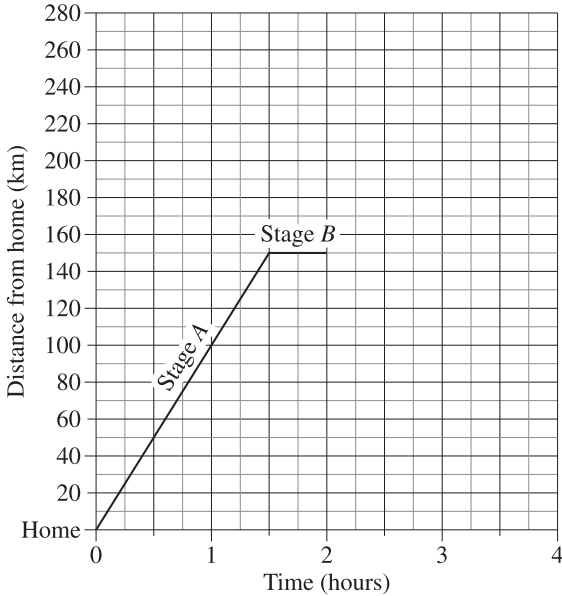
Convert 15 grams per day into kilograms per week. *(2 marks)*

27. **C** Rates (240602) **Core**

Jesse sells, an average of 150 roller-coaster tickets every 10 minutes. How long will it take him sell 600 tickets? *(2 marks)*

28. **C** Rates (241750) **Core**

The distance-time graph shows the first two stages of a car journey from home to a holiday house.



- a. At what speed, in kilometres per hour, did the car travel during stage A of the journey? *(1 mark)*
- b. For how long did the car stop during stage B of the journey? *(1 mark)*
- c. After stage B, the car continues to travel towards the holiday house at a constant speed of 50 km/h for 2 hours. Graph this part of the journey on the grid above. *(2 marks)*

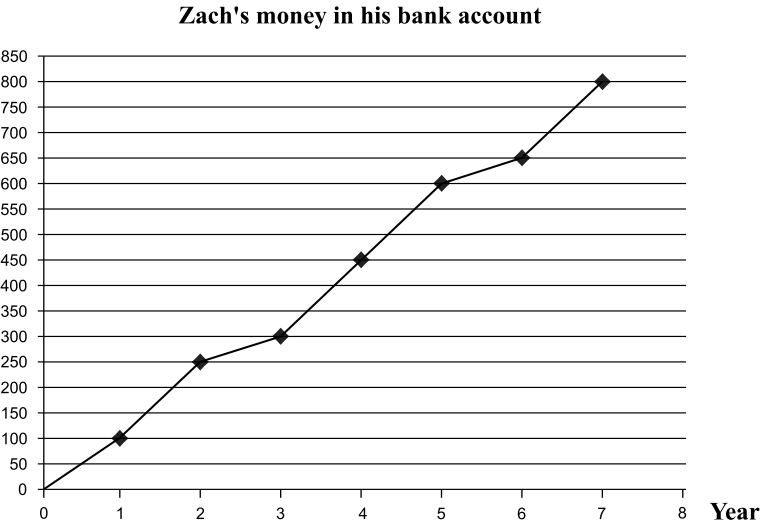
29. **B** Rates (239748) **Core**

Write each of the following as a rate in simplified form.

- a. \$18 for every 5 kilograms *(1 mark)*
- b. 30 animals per 6 cages *(1 mark)*
- c. 63 rainy days in 7 months *(1 mark)*

30. **B** Rates (240564) **Core**

Zach is saving money every year. The graph shows how much money is in his bank account at the end of each year.



What was Zach's average amount of money saved per year during the first 5 years? *(2 marks)*

31. **B** Ratio (239486) **Core**

The ratio of kilograms of bananas to apples at the fruit shop is **11:5**.

- a. What fraction of the fruit is bananas? *(1 mark)*
- b. If there are 128 kilograms of bananas and apples altogether, how many kilograms of bananas are there? *(2 marks)*

32. **B** Rates (239759) **Core**

Write each of the following as a rate in simplified form.

- a. \$136 for every 8 hours worked *(1 mark)*
- b. \$171 000 to purchase 3 cars *(1 mark)*
- c. 112 millimetres of rain in 14 days *(1 mark)*

33. B Rates (240598) Core

The top speed of a peregrine falcon is 360 km/hr.
What is this top speed in metres per second? *(2 marks)*

34. B Ratio (239633) Core

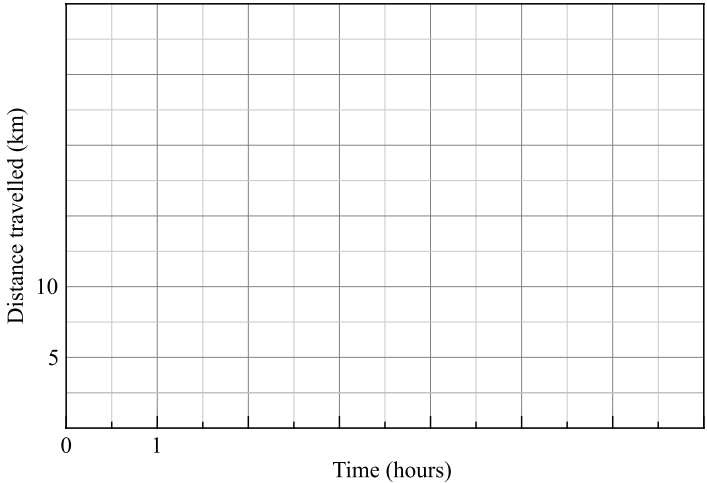
The scale on a map is **4:20 000**.
For each of these scaled distances, find the actual distances in kilometres.

- a. **2 cm** *(1 mark)*
- b. **5 mm** *(1 mark)*
- c. **18.4 cm** *(1 mark)*

35. B+ Rates (241780) Core

- Each stage of Moira's 30 km charity fitness challenge is outlined below.
- Moira started the challenge with a running leg and ran 10 kilometres in 1.5 hours.
 - She then stopped for 30 minutes.
 - Her next leg involved cycling and she averaged 40 km/h for the next half an hour.
 - Moira then stopped and had lunch for 1.5 hours.
 - She walked with her friends for the next hour averaging 5 km/h.
 - Moira stopped for half an hour for afternoon tea and completed the challenge in a total of 7 hours.

Draw a distance-time graph to represent Moira's challenge on the following grid. Include the scale on both axes. *(3 marks)*



36. B+ Rates (240607) Core

The top speed of an ostrich is 72 kilometres per hour.
What is this speed in metres per second? *(2 marks)*

37. B+ Ratio (239497) Core

Divide 480 tonnes in the ratio 1:5. *(2 marks)*

38. B+ Rates (240068) Core

Fleur lives 15 kilometres from her work.
On Wednesday, she drove to work and averaged 60 kilometres per hour.
On Thursday, she took the bus which averaged 15 kilometres per hour.
What was the extra time of the bus journey, in minutes, compared to when she drove on Wednesday? *(2 marks)*

39. B+ Rates (240077) Core

Riley lives 3 km from the park.
He jogs at a constant speed of 10 km per hour.
How many minutes does it take for Riley to get to the park? *(2 marks)*

40. B+ Rates (240083) Core

Constance used 300 grams of sugar to make 12 brownies.
How many grams of sugar will she need to make 18 brownies? *(2 marks)*

41. B+ Rates (240092) Core

A solar panel grid on a school roof produces an average of 8.6 kWh of energy per day.
How much energy will the grid produce for the school on average over 7 days? *(2marks)*

42. B+ Ratio (239701) Core

Determine the scale factor if a scaled length of 1.6 centimetres represents an actual length of 0.48 kilometres. *(2 marks)*

43. B+ Ratio (239589) Core

Milly is using this cupcake recipe.

Cupcake recipe
Makes 4 cupcakes
Ingredients
1 cup flour
2 eggs
1 $\frac{1}{2}$ cups milk
$\frac{3}{4}$ cup sugar
20g butter

How many cups of sugar are needed for 20 cupcakes? *(2 marks)*

44. B+ Rates (240096) Core

It takes Kate 15 seconds to place a brochure in an envelope and seal it.

How many minutes will it take her to pack and seal 42 envelopes? *(2 marks)*

45. B+ Ratio (239501) Core

Divide 84 days in the ratio 3:4. *(2 marks)*

46. B+ Rates (241128) Core

An oyster farm sells bags of oysters in four different sizes.

Bag Size	1 kg	2 kg	3 kg	5 kg
Price	\$12.00	\$23.10	\$37.00	\$55.00

What is the lowest price a customer can pay for 7 kg of oysters, given that you must buy whole bags? *(2 marks)*

47. A Rates (239767) Core

All the water has leaked from a 10 litre bucket in 20 minutes.

a. Calculate the leaking rate in litres/minute. *(1 mark)*

b. How long would it take to empty a 12 litre bucket at the same rate? *(2 marks)*

48. A Rates (240111) Core

Genghis and Kublai are shooting arrows at a target.

Genghis shoots an arrow every 3 seconds.

Kublai shoots an arrow every 8 seconds.

They shoot their first arrow together at 10:00 am.

How many more times will they shoot arrows at exactly the same time in the next 3 minutes? *(2 marks)*

49. A Ratio (239705) Core

Jinderee and Exetroll are 8 centimetres apart on a map with a scale of **1 : 2000**. How far apart, in kilometres, are the two towns in real life? *(2 marks)*

50. A Rates (240615) Core

An avocado farmer sells her avocados in four different sizes.

Size	1 kg	2 kg	3 kg	4 kg
Price	\$6.35	\$13.00	\$19.00	\$25.10

What is the lowest price a customer can pay for 8 kg of avocados? *(2 marks)*

51. A Ratio (239709) Core

Macton and Brownville are 15 centimetres apart on a map with a scale of **1 : 150 000**. How far apart, in kilometres, are the two cities in real life? *(2 marks)*

52. A Rates (239771) Core

A tree was 143 cm tall at the beginning of January. At the end of May it measured 233 cm tall.

a. Calculate the average rate of growth of the tree for the 5 month period. *(2 marks)*

b. If this rate of growth were to continue, how many more months would it take the tree to reach a height of 611 cm? *(2 marks)*

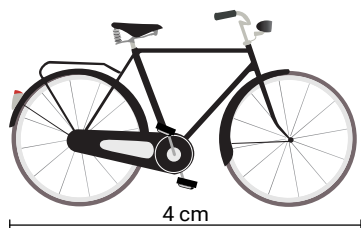
53. A Ratio (239510) Core

This year there are 108 students in Year 8 and the ratio of Year 7 students to Year 8 students is 8:9.

Use this information to calculate the number of students in Year 7 this year. *(2 marks)*

54. **A** Ratio (239715) **Core**

Oliver's bike is 1.68 metres long in real life.



Calculate the scale used in this scale drawing of Oliver's bike. (2 marks)

55. **A+** Ratio (239524) **Core**

The ratio of the angles in a triangle is 1:2:5.

Calculate the sizes of all three angles? (2 marks)

56. **A+** Ratio (239535) **Core**

It is known that one of the angles in a triangle is 120° .

Calculate the size of the other 2 angles if they are in the ratio **2:3**. (3 marks)

57. **A+** Rates (240130) **Core**

One litre of softdrink contains 90 grams of sugar.

How many millilitres of softdrink contain 4.5 grams of sugar? (2 marks)

58. **A+** Rates (240132) **Core**

John's old tractor used 8.3 litres of fuel per 100km.

His new tractor uses 5.9 litres of fuel per 100 km.

John pays \$2.15 per litre for fuel and drives 20,000 km each year.

How much money will John save on fuel each year with his new tractor? (2 marks)

Worked Solutions

1. **C** Rates (241599) **Core**

Calculate the yearly saving of each action

$$\text{Car wash} = \$80 \times 12 = \$960$$

$$\text{Hairdresser} = \$150 \times 4 = \$600$$

$$\text{Thai} = 15 \times 52 = \$780$$

$$\text{Streaming services} = 12 \times 52 = \$624$$

Washing the car costs the most each year so she should stop washing the car.

$\Rightarrow A$

2. **C** Rates (241618) **Core**

Calculate the yearly saving of each action

$$\text{Gym membership} = \$50 \times 12 = \$600$$

$$\text{Air travel} = \$120 \times 4 = \$480$$

$$\text{KFC lunch} = \left(\frac{14 \times 52}{2} \right) = \$364$$

$$\text{Football tickets} = 26 \times 25 = \$650$$

Penrith Panthers tickets costs the most each year so she should stop going to Penrith games.

$\Rightarrow D$

3. **C** Rates (240536) **Core**

$$\text{Time} = \frac{\text{Distance}}{\text{Speed}}$$

$$= \frac{100}{80}$$

$$= 1.25 \text{ hours}$$

$$= 1 \text{ hour } 15 \text{ minutes}$$

$\Rightarrow B$

4. **C** Rates (240541) **Core**

$$\begin{aligned}\text{Time} &= \frac{\text{Distance}}{\text{Speed}} \\ &= \frac{100}{60} \\ &= 1\frac{40}{60} \text{ hours} \\ &= 1 \text{ hour } 40 \text{ minutes}\end{aligned}$$

⇒ *D*

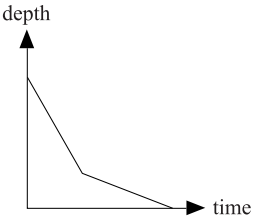
5. **C** Rates (240543) **Core**

$$\begin{aligned}\text{Time} &= \frac{\text{Distance}}{\text{Speed}} \\ &= \frac{9}{45} \\ &= \frac{1}{5} \text{ hours} \\ &= 12 \text{ minutes}\end{aligned}$$

⇒ *B*

6. **C** Rates (240546) **Core**

The depth decreases quickly at a constant rate at the start (steep decline) and then slows down when one hole is closed (less steep decline).



⇒ *B*

7. **B** Rates (240550) **Core**

The horizontal section of the graph indicates Elvis’ distance from home is not changing and he is resting.
The slope before and after the rest break is the same, so Elvis’ speed of travel was the same before and after the rest.

∴ Elvis walked, rested then walked.

⇒ *D*

8. **B** Rates (240554) **Core**

$$\begin{aligned}\text{Time on Wednesday} &= \frac{15}{60} \\ &= 0.25 \text{ hour} \\ &= 15 \text{ minutes}\end{aligned}$$

$$\begin{aligned}\text{Time on Thursday} &= \frac{15}{15} \\ &= 1 \text{ hour} \\ &= 60 \text{ minutes}\end{aligned}$$

$$\begin{aligned}\therefore \text{The extra time taking the bus} &= 60 - 15 \\ &= 45 \text{ minutes}\end{aligned}$$

⇒ *B*

9. **B** Rates (240556) **Core**

$$\begin{aligned}\text{Time Driving} &= \frac{\text{Distance}}{\text{Speed}} \\ &= \frac{30}{90} \\ &= \frac{1}{3} \text{ hour} \\ &= 20 \text{ minutes}\end{aligned}$$

$$\begin{aligned}\text{Train Time} &= \frac{30}{30} \\ &= 1 \text{ hour} \\ &= 60 \text{ minutes}\end{aligned}$$

$$\begin{aligned}\therefore \text{The extra time taking the train} \\ &= 60 - 20 \\ &= 40 \text{ minutes}\end{aligned}$$

$\Rightarrow C$

10. **B+** Ratio (239560) **Core**

$$\begin{aligned}\text{Model height} &= \frac{800}{4000} \\ &= 0.2 \text{ m} \\ &= 20 \text{ cm}\end{aligned}$$

$\Rightarrow B$

11. **B+** Ratio (239581) **Core**

$$\begin{aligned}\text{Scale: } 2 \text{ cm} : 40 \text{ cm} \\ \rightarrow \text{Divide both sides by 2} \\ \text{Scale: } 1 \text{ cm} : 20 \text{ cm}\end{aligned}$$

$\Rightarrow D$

12. **B+** Ratio (239584) **Core**

$$\begin{aligned}\text{Scale:} \\ 12 \text{ cm} : 24 \text{ mm} &= 120 \text{ mm} : 24 \text{ mm} = 5 : 1\end{aligned}$$

In the options given, the ratio of 5 : 1 occurs when 10 mm represents 2 mm **OR** when 1 cm represents 2 mm

$\Rightarrow B$

13. **B+** Ratio (239594) **Core**

$$\begin{aligned}\text{Strategy 1:} \\ 2.5 \text{ is half of } 5 \text{ cups of flour, therefore half of} \\ 3 \text{ cups of sultanas is required.} \\ \rightarrow 1.5 \text{ cups of sultanas needed.}\end{aligned}$$

$$\begin{aligned}\text{Strategy 2:} \\ \text{Let } n = \text{cups of sultanas needed}\end{aligned}$$

$$\begin{aligned}\frac{n}{2.5} &= \frac{3}{5} \\ \therefore n &= \frac{3 \times 2.5}{5} \\ &= 1.5 \text{ cups}\end{aligned}$$

$\Rightarrow B$

14. **A** Ratio (239564) **Core**

$$\text{Total students} = 4 + 6 = 10$$

$$\begin{aligned}\text{Fraction of boys} &= \frac{4}{10} = \frac{2}{5} \\ \text{Boys} &= \frac{2}{5} \times 360 = 144\end{aligned}$$

$\Rightarrow B$

15. **A** Rates (240612) **Core**

Packet 1 = $\frac{288}{200} = 1.44$ c/g

Packet 2 = $\frac{310}{220} = 1.41$ c/g

Packet 3 = $\frac{181}{125} = 1.45$ c/g

Packet 4 = $\frac{497}{350} = 1.42$ c/g

∴ Packet 2 costs the least per gram.

⇒ *B*

16. **A** Ratio (239619) **Core**

Total parts = 1 + 3 = 4

Fraction of silver = $\frac{3}{4}$

Silver = $\frac{3}{4} \times 21.65 = 16.2375$

⇒ *D*

17. **C** Ratio (239399) **Core**

a. $16:12 = (16 \div 4):(12 \div 4)$
 $= 4:3$

b. $18:24 = (18 \div 6):(24 \div 6)$
 $= 3:4$

c. $54:9 = (54 \div 9):(9 \div 9)$
 $= 6:1$

18. **C** Ratio (239436) **Core**

a. $\frac{1}{2}:3 = \left(\frac{1}{2} \times 2\right):\left(3 \times 2\right)$ Multiply by LCM of 2 and 1.
 $= 1:6$

b. $\frac{1}{4}:\frac{1}{3} = \left(\frac{1}{4} \times 12\right):\left(\frac{1}{3} \times 12\right)$ Multiply by LCM of 3 and 4.
 $= 3:4$

19. **C** Ratio (239443) **Core**

a. $\frac{5}{12}:\frac{11}{8} = \left(\frac{5}{12} \times 24\right):\left(\frac{11}{8} \times 24\right)$ Multiply by LCM of 12 and 8.
 $= 10:33$

b. $1\frac{1}{4}:3\frac{1}{2} = \frac{5}{4}:\frac{7}{2}$ Convert to improper fractions
 $= \left(\frac{5}{4} \times 4\right):\left(\frac{7}{2} \times 4\right)$ Multiply by LCM of 4 and 2.
 $= 5:14$

20. **C** Rates (240582) **Core**

$\$648/\text{hour} = \left(\frac{64\ 800}{60 \times 60}\right) \text{cents/second}$
 $= 18 \text{ cents/second}$

21. **C** Rates (240594) **Core**

Speed = $\left(\frac{720}{60}\right) \text{m/sec}$
 $= 12 \text{ m/sec}$

22. C Rates (240047) Core

$$\begin{aligned}\text{Time} &= \frac{\text{distance}}{\text{speed}} \\ &= \frac{300}{330} \\ &= 0.909090\dots \approx 0.91 \text{ (2 d.p.)}\end{aligned}$$

∴ The sound takes approximately 0.91 seconds to reach Johnno.

23. C Rates (239828) Core

$$\begin{aligned}3 \text{ cars} / 27 \text{ m}^2 &= 1 \text{ car} / 9 \text{ m}^2 \\ \therefore \text{ cars on } 4680 \text{ m}^2 &= \frac{4680}{9} \\ &= 520 \text{ cars}\end{aligned}$$

24. C Ratio (239464) Core

a. 55 cents to \$2.70 = 55:270

b. $55:270 = \frac{55}{5} : \frac{270}{5}$
= 11:54

25. C Rates (240038) Core

$$\begin{aligned}3 \text{ minutes} &= 60 \times 3 \text{ seconds} \\ &= 180 \text{ seconds}\end{aligned}$$

$$\begin{aligned}\text{Distance} &= \text{Speed} \times \text{Time} \\ &= 5 \times 180 \\ &= 900 \text{ m}\end{aligned}$$

26. C Rates (240579) Core

$$\begin{aligned}15 \text{ g/day} &= 15 \times 7 \text{ g/week} \\ &= 105 \text{ g/week} \\ &= 0.105 \text{ kg/week}\end{aligned}$$

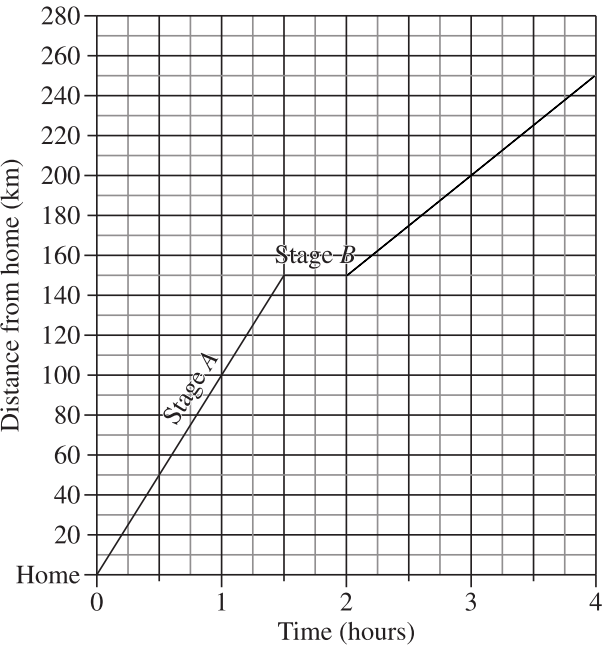
27. C Rates (240602) Core

$$\begin{aligned}10 \text{ minutes} / 150 \text{ tickets} &= \frac{10}{150} \text{ minutes} / \frac{150}{150} \text{ tickets} \\ &= \frac{1}{15} \text{ minute} / 1 \text{ ticket} \\ &= \left(\frac{1}{15} \times 600 \right) \text{ minutes} / 600 \text{ tickets} \\ &= 40 \text{ minutes} / 600 \text{ tickets}\end{aligned}$$

∴ It would take 40 minutes to sell 600 tickets.

28. C Rates (241750) Core

- a. $S = \frac{D}{T}$
 $S = \frac{150}{1.5} = 100 \text{ km/h}$
- b. Stage B = 1.5 → 2 hours = 30 minutes
- c. Position at time 4 hours at 50km/h = 150 + 2 × 50 = 250 km



29. **B** Rates (239748) **Core**

- a. $\$18/5 \text{ kg} = \frac{\$18}{5} / \frac{5}{5} \text{ kg}$
 $= \$3.60/\text{kg}$
- b. $30 \text{ animals}/6 \text{ cages} = \frac{30}{6} \text{ animals}/\frac{6}{6} \text{ cages}$
 $= 5 \text{ animals}/\text{cage}$
- c. $63 \text{ rainy days}/7 \text{ months} = \frac{63}{7} \text{ rainy days}/\frac{7}{7} \text{ months}$
 $= 9 \text{ rainy days}/\text{month}$

30. **B** Rates (240564) **Core**

$$\begin{aligned} \text{Average saved per year} &= \frac{\text{Money at Y5}}{\text{time}} \\ &= \frac{600}{5} \\ &= \$120/\text{year} \end{aligned}$$

31. **B** Ratio (239486) **Core**

- a. $\text{Total fruits} = 11 + 5 = 16$
 $\text{Fraction bananas} = \frac{11}{16}$
- b. $\text{Kilograms of bananas} = \frac{11}{16} \times 128$
 $= 88$

 $\therefore$ There are 88 kgs of bananas.

32. **B** Rates (239759) **Core**

- a. $\$136/8 \text{ hours} = \frac{\$136}{8} / \frac{8}{8} \text{ hours}$
 $= \$17/\text{hour}$
- b. $\$171\,000/3 \text{ cars} = \frac{\$171\,000}{3} / \frac{3}{3} \text{ cars}$
 $= \$57\,000/\text{car}$
- c. $112 \text{ mm}/14 \text{ days} = \frac{112}{14} \text{ mm}/\frac{14}{14} \text{ days}$
 $= 8 \text{ mm}/\text{day}$

33. **B** Rates (240598) **Core**

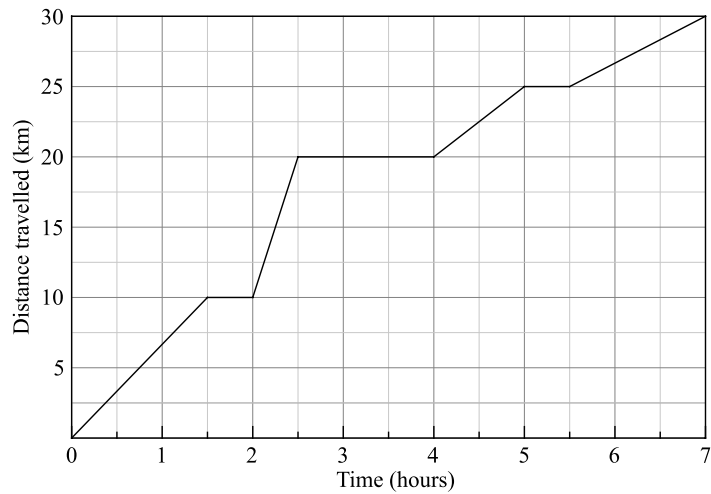
$$\begin{aligned} \text{Speed} &= 360 \text{ km}/\text{hour} \\ &= 360\,000 \text{ m}/\text{hour} \\ &= \left(\frac{360\,000}{60 \times 60} \right) \text{ m}/\text{sec} \\ &= 100 \text{ m}/\text{sec} \end{aligned}$$

34. **B** Ratio (239633) **Core**

$$\text{Scale} = 4:20\,000 = 1:5000$$

- a. $\text{Actual Distance} = 2 \text{ cm} \times 5000$
 $= 10\,000 \text{ cm}$
 $= 100 \text{ m} = 0.1 \text{ km}$
- b. $\text{Actual Distance} = 8 \text{ mm} \times 5000$
 $= 40\,000 \text{ mm}$
 $= 40 \text{ m} = 0.04 \text{ km}$
- c. $\text{Actual Distance} = 18.4 \text{ cm} \times 5000$
 $= 92\,000 \text{ cm}$
 $= 920 \text{ m} = 0.92 \text{ km}$

35. **B+** Rates (241780) **Core**



36. **B+** Rates (240607) **Core**

$$\begin{aligned}
 72 \text{ km/h} &= 72\,000 \text{ m/h} \\
 &= \left(\frac{72\,000}{60 \times 60} \right) \text{ m/s} \\
 &= 20 \text{ m/s}
 \end{aligned}$$

37. **B+** Ratio (239497) **Core**

$$\text{Total number of parts} = 1 + 5 = 6$$

$$\frac{1}{6} \times 480 = 80$$

$$\frac{5}{6} \times 480 = 400$$

$\therefore$ 480 tonnes divided in the ratio 1:5 is 80 tonnes and 400 tonnes.

38. **B+** Rates (240068) **Core**

$$\begin{aligned}
 \text{Time on Wednesday} &= \frac{15}{60} \\
 &= 0.25 \text{ hour} \\
 &= 15 \text{ minutes}
 \end{aligned}$$

$$\begin{aligned}
 \text{Time on Thursday} &= \frac{15}{15} \\
 &= 1 \text{ hour} \\
 &= 60 \text{ minutes}
 \end{aligned}$$

$$\begin{aligned}
 \therefore \text{The extra time taking the bus} \\
 &= 60 - 15 \\
 &= 45 \text{ minutes}
 \end{aligned}$$

39. **B+** Rates (240077) **Core**

$$\begin{aligned}
 \text{Time} &= \frac{\text{Distance}}{\text{Speed}} \\
 &= \frac{3}{10} \text{ hr} \\
 &= \frac{3}{10} \times 60 \\
 &= 18 \text{ minutes}
 \end{aligned}$$

40. **B+** Rates (240083) **Core**

Method 1

Sugar to make 18 brownies

$$\begin{aligned}
 &= \frac{18}{12} \times 300 \\
 &= 1.5 \times 300 \\
 &= 450 \text{ grams}
 \end{aligned}$$

Method 2 – Unitary Method

$$\begin{aligned}
 300 \text{ g/12 cookies} &= \frac{300}{12} \text{ g/cookie} \\
 &= 25 \text{ g/cookie}
 \end{aligned}$$

$$\begin{aligned}
 \text{Sugar to make 18 brownies} &= 25 \times 18 \\
 &= 450 \text{ grams}
 \end{aligned}$$

41. **B+** Rates (240092) **Core**

One multiplication strategy:

$$7 \times 8 = 56$$

$$7 \times 0.6 = 4.2$$

$$7 \times 8.6 = 56 + 4.2 = 60.2$$

 $\therefore$ It produces 60.2 kWh over 7 days.42. **B+** Ratio (239701) **Core**

Scale ratio = scale length : actual length

$$= 1.6 \text{ cm} : 0.48 \text{ km}$$

$$= 1.6 \text{ cm} : 48\,000 \text{ cm}$$

$$= 1 : 30\,000$$

Scale factor

$$= 30\,000$$

43. **B+** Ratio (239589) **Core**

From the recipe:

$$\frac{3}{4} \text{ cups} = 4 \text{ cupcakes}$$

$$\begin{aligned}\therefore \text{Sugar in 20 cupcakes} &= \frac{3}{4} \times 5 \\ &= \frac{15}{4} \\ &= 3\frac{3}{4} \text{ cups}\end{aligned}$$

44. **B+** Rates (240096) **Core**

$$\text{Time} = 42 \times 15$$

$$= 630 \text{ seconds}$$

$$= \frac{630}{60} \text{ minutes}$$

$$= 10.5 \text{ minutes}$$

45. **B+** Ratio (239501) **Core**

$$\text{Total number of parts} = 3 + 4 = 7$$

$$\frac{3}{7} \times 84 = 36$$

$$\frac{4}{7} \times 84 = 48$$

 $\therefore$ 84 days divided in the ratio 3 : 4 is 36 days and 48 days.46. **B+** Rates (241128) **Core**

Calculate the cost per litre for each size:

$$1 \text{ L} = \$12.00/\text{kg}$$

$$2 \text{ L} = \frac{23.10}{2} = \$11.55/\text{kg}$$

$$3 \text{ L} = \frac{37.00}{3} \approx \$12.33/\text{kg}$$

$$5 \text{ L} = \frac{55.00}{5} = \$11.00/\text{kg}$$

 $\therefore$ Cheapest price to buy 7 kg

$$= 1 \times 55.00 + 1 \times 23.10$$

$$= \$78.10$$

47. **A** Rates (239767) **Core**

$$\begin{aligned}\text{a. } 10 \text{ litres}/20 \text{ minutes} &= \frac{10}{20} \text{ litres}/\frac{20}{20} \text{ minutes} \\ &= 0.5 \text{ litres}/\text{minute}\end{aligned}$$

$$\begin{aligned}\text{b. } 0.5 \text{ litres}/\text{hour} &= 1 \text{ litres}/2 \text{ minutes} \\ &= 12 \text{ litres}/2 \times 12 \text{ minutes} \\ &= 12 \text{ litres}/24 \text{ minutes}\end{aligned}$$

 $\therefore$ It would take 24 minutes to empty a 12 litre bucket.48. **A** Rates (240111) **Core**

Lowest common multiple of 3 and 8 = 24

 $\therefore$ Every 24 seconds, the arrows are shot at the same time. $\rightarrow$ Arrows are shot at the same time:

$$24, 48, 72, 96, 120, 144, 168 \text{ seconds}$$

 $\therefore$ 7 more times (time $\leq$ 180 seconds)49. **A** Ratio (239705) **Core**

$$\text{Scale factor} = 2000$$

$$\text{Actual distance} = \text{Scaled distance} \times \text{scale factor}$$

$$= 8 \times 2000 \text{ cm}$$

$$= 16\,000 \text{ cm}$$

$$= 0.16 \text{ km}$$

50. **A** Rates (240615) **Core**

Calculate the cost per kg for each size:

$$1\text{kg} = \$6.35/\text{kg}$$

$$2\text{kg} = \frac{13}{2} = \$6.50/\text{kg}$$

$$3\text{kg} = \frac{19}{3} = \$6.33/\text{kg}$$

$$4\text{kg} = \frac{25.10}{4} \approx \$6.28/\text{kg}$$

$\therefore$ 4kg packet is the cheapest.

$$\begin{aligned}\therefore \text{Cheapest price to buy 8 kg} \\ &= 2 \times 25.10 \\ &= \$50.20\end{aligned}$$

51. **A** Ratio (239709) **Core**

$$\text{Scale factor} = 150\,000$$

$$\begin{aligned}\text{Actual distance} &= \text{Scaled distance} \times \text{scale factor} \\ &= 15 \times 150\,000\text{ cm} \\ &= 2\,250\,000\text{ cm} \\ &= 22.5\text{ km}\end{aligned}$$

52. **A** Rates (239771) **Core**

$$\begin{aligned}\text{a. Growth} &= 233 - 143 \\ &= 90\text{ cm}\end{aligned}$$

$$\begin{aligned}\text{Rate of growth/month} &= \frac{90}{5}\text{ cm/month} \\ &= 18\text{ cm/month}\end{aligned}$$

$$\begin{aligned}\text{b. Growth} &= 611 - 233 \\ &= 378\text{ cm}\end{aligned}$$

$$\begin{aligned}\text{Months} &= \frac{378}{18} \\ &= 21\end{aligned}$$

$\therefore$ It would take 21 months for the tree to grow to a height of 611 cm.

53. **A** Ratio (239510) **Core**

Year 8 represents 9 parts

$$9\text{ parts} = 108$$

$$1\text{ part} = \frac{108}{9} = 12$$

$$\begin{aligned}\text{Year 7 represents 8 parts} \\ &= 12 \times 8 = 96\end{aligned}$$

$\therefore$ There are 96 students in Year 7.

54. **A** Ratio (239715) **Core**

$$\begin{aligned}\text{Scale} &= \text{Scaled length} : \text{Actual length} \\ &= 4\text{ cm} : 1.68\text{ m} \\ &= 4\text{ cm} : 168\text{ cm} \\ &= 1 : 42\end{aligned}$$

55. **A+** Ratio (239524) **Core**

$$\text{Total parts} = 1 + 2 + 5 = 8 \text{ and the angle sum of a triangle} = 180^\circ$$

$$\frac{1}{8} \times 180 = 22.5$$

$$\frac{2}{8} \times 180 = 45$$

$$\frac{5}{8} \times 180 = 112.5$$

$\therefore$ The angles in the triangle are 22.5° , 45° and 112.5°

56. **A+** Ratio (239535) **Core**

$$\text{Angle sum of a triangle} = 180^\circ$$

$$\therefore \text{Remaining angles} = 180 - 120 = 60^\circ$$

$$\text{Total parts remaining angles} = 2 + 3 = 5$$

$$1\text{st angle} = \frac{2}{5} \times 60 = 24$$

$$2\text{nd angle} = \frac{3}{5} \times 60 = 36$$

$\therefore$ The remaining angles are 24° and 36° .

57. **A+** Rates (240130) **Core**

$$\begin{aligned}\text{Millilitres} &= \frac{4.5}{90} \times 1000 \text{ mL} \\ &= 50 \text{ mL}\end{aligned}$$

58. **A+** Rates (240132) **Core**

Fuel cost of old tractor

$$\begin{aligned}&= 8.3 \times \$2.15 \times \frac{20\,000}{100} \\ &= 8.3 \times \$2.15 \times 200 \\ &= \$3569\end{aligned}$$

Fuel cost of new tractor

$$\begin{aligned}&= 5.9 \times \$2.15 \times \frac{20\,000}{100} \\ &= 5.9 \times \$2.15 \times 200 \\ &= \$2537\end{aligned}$$

∴ John's fuel savings each year

$$\begin{aligned}&= \$3569 - \$2537 \\ &= \$1032\end{aligned}$$