Contents

Additional Resources:

9 Speed (2)

Common Error

1 1-minute Revision

Concept Review

Formulae of speed

- (Find speed) Speed = Distance ÷ Time
- (Find distance) Distance = Speed × Time
- (Find time) Time = Distance ÷ Speed

2 Basic Practice

According to the data given in the table, complete the table below.

	Distance	Time	Speed
1.	360 m	second(s)	8 m/s
2.	9 km	hour(s)	1.5 km/h
3.	m	240 seconds	$3\frac{3}{4}$ m/s
4.	km	40 minutes	0.6 km/h
5.	15 km	minutes	75 km/h

Complete the following.

6. A tram takes _____ hour(s) to travel 20 km at an average speed of 15 km/h.
7. Uncle Joe runs at an average speed of 3 m/s. After 30 minutes, he runs _____ m.
8. A lorry departs from a warehouse at an average speed of 72 km/h. After travelling 1 hour and 10 minutes, it reaches an exhibition hall. The warehouse and the exhibition hall are _____ km apart.
9. Iris cycles at an average speed of 9 m/s. She takes _____ minute(s) to cycle 5.4 km.
10. Candy leaves home at 07:30. She walks to school at an average speed of 0.8 m/s. She reaches the school at 07:45. The school and Candy's home are _____ m apart.
11. Rocky goes hiking at an average speed of 3.6 km/h. The whole journey is 8.1 km. He starts hiking at 9:15 a.m. He finishes hiking at _____:_____ (a.m. / p.m.)
12. Jack takes 16 minutes to walk quickly from his home to a library at an average speed of 1.5 m/s. After returning books, he takes 30 minutes to return home. The average speed that Jack walks back home is _____ m/s.

Useful Tips
What is the distance between Jack's home and the library?

13. Dad takes 45 minutes to drive from home to the airport at an average speed of 60 km/h. He drives at an average speed of 75 km/h when returning home. He takes _____ hour(s) to return home.

Date		Time used	minutes	Marks	

3 Advanced Practice

Solve the problems. (Show your working)

Public Exam Question

14. City A and City B are 150 km apart. A lorry travels at an average speed of 60 km/h from City A to City B. After $1\frac{1}{5}$ hour, how far is the lorry away from City B?

Level-up Question

15. The distance from the foot to the peak of a hill is 11 km. Lily walks 5 km to the hillside at an average speed of 2.5 km/h. Then, she walks at an average speed of 2.4 km/h to the peak of the hill. How many hours does Lily take to walk from the foot to the peak of the hill?

Blacken the ◯ next to the correct answer.

16. Mum and Ronald are 50 m apart. They walk towards each other and meet in 20 seconds. If the average walking speed of Mum is 1.5 m/s, what is the average speed of Ronald?

Useful Tips
How many seconds does Ronald walk?
How many metres does he walk?

◯ A. 2.5 m/s ◯ B. 1.5 m/s ◯ C. 1.25 m/s ◯ D. 1 m/s

Public Exam Question

17. Jenny runs 800 m in a stadium. Then, she runs 400 m from the stadium to a park. She reaches the park at 10:00 a.m. If she runs at an average speed of 2.5 m/s for the whole journey, when does she start running?

◯ A. 9:52 a.m. ◯ B. 9:50 a.m. ◯ C. 9:10 a.m. ◯ D. 9:08 a.m.

Public Exam Question

18. Ivan and Joyce begin their journey at the same time and the same place and walk in opposite directions. Ivan walks 3 km each hour. After 2 hours, they are 14 km apart. What is the distance that Joyce walks each hour on average?

◯ A. 4 km ◯ B. 7 km ◯ C. 8 km ◯ D. 10 km

Final Assessment

Name: _____ Class: _____( ) Date: _____

Assessment Points		Questions	Marks
Applications of percentages	Solve problems involving finding percentages or finding values from the given percentages	1–7	/ 16
Angles	Measure and compare the sizes of angles in degree, draw angles of given sizes	8–13	/ 12
Circumferences	Find circumferences, diameters, radii and perimeters of 2-D shapes	14a, 15a, 16, 17a, 18a, 20b, 21a	/ 14
Speed	Find time intervals, speeds, times and distances	20c, 21b, 22–29	/ 20
Simple equations	Solve equations, solve problems by using equations	30–35	/ 16
Areas of circles	Find areas of circles and areas of 2-D shapes involving circles	14b, 15b, 17b, 18b–20a	/ 11
Pie charts and uses and abuses of statistics	Read pie charts, choose the appropriate statistical charts	36–38	/ 11
		Total marks:	/ 100

Instructions

- **Multiple choice questions:** Blacken the ◯ next to the correct answer.
- **Questions in which you are asked to 'show your working':** Write your mathematical expressions, answers, and statements / conclusions.
- **Other types of questions:** Answer as required in the spaces provided.

Marks

1. There are 80 pork buns and 50 custard buns in a steam oven.

a. The number of pork buns is _____% that of custard buns. ☐ 1M

b. The number of custard buns is _____% that of pork buns. ☐ 1M

2. There are 18 male and 22 female customers in a fast food shop. What percentage of the customers are female? ☐ 3M

3. There are 20 chocolates in a box. Peter eats 4 chocolates, which is 2 fewer than Jack.

a. Jack eats _____% of the box of chocolates. ☐ 1M

b. The number of chocolates that Jack eats is _____% that of Peter. ☐ 1M

4. There are 75 cans of coke and 125 cans of juice in a convenience store.

a. 40% of the coke are cola. There are _____ cans of cola. ☐ 1M

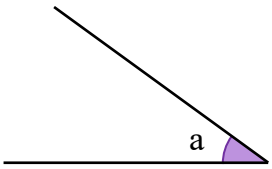
b. Among the juice, 12% are orange juice, 20% are apple juice. There are _____ cans of orange juice and apple juice in the convenience store altogether. ☐ 1M

Cross-topic Exercise

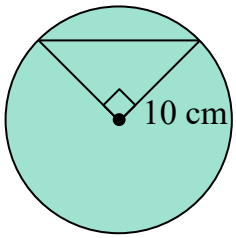
Complete the following.

1. A carton of milk is 1 L. After drinking 250 mL, the remaining milk is _____% of the carton of milk.

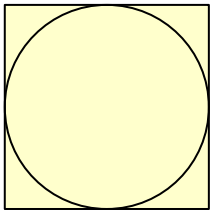
2. Measure the angle on the right.
   Angle a is _____% of a straight angle.



3. Tom draws a right-angled triangle in a circle. The radius of the circle is 10 cm.
   a. The circumference is _____ cm. (Take $\pi = 3.14$)
   b. The area of the triangle is _____ cm^2.



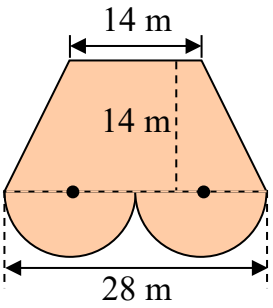
4. Fanny puts a circular ring on a piece of square paper.
   a. The perimeter of the square paper is _____ cm.
   b. The length of the ring is about _____ times the side of the square paper. (Give the answer as a whole number.)



5. The diameter of a circular lawn is 7.7 m. Mabel walks around the edge of the lawn at an average speed of 1.1 m/s for one lap. She walks for _____ second(s). (Take $\pi = \frac{22}{7}$)

Useful Tips
How far does Mabel walk?

6. In the figure, '•' represents the centre of each circle.
   The area of the figure on the right is _____ m^2.
   (Take $\pi = \frac{22}{7}$)



Solve the problems. (Show your working)

7. Location A and location B are 100 km apart. A minibus travels from location A to location B at an average speed of 75 km/h. A bus travels from location B to location A at an average speed of 50 km/h. If two cars depart at the same time, after how many hour(s) will they meet? (Use an equation to solve the problem.)

Unit 1: Applications of percentages (Exercises 1-2)

1. Finding percentages

There are 20 marbles in a bottle. 12 of them are yellow, 5 of them are blue and the remaining are green.

- $\frac{12}{20} \times 100\%$
  $= 60\%$

60% of the marbles are yellow marbles.

- $\frac{20 - 12 - 5}{20} \times 100\%$
  $= 15\%$

15% of the marbles are green marbles.

- $\frac{12}{5} \times 100\%$
  $= 240\%$

The number of yellow marbles is 240% that of blue marbles.

The number of blue marbles is **the standard of comparison**. So, it is the **denominator.**

- $60\% + 15\%$
  $= 75\%$

75% of the marbles are yellow marbles **and** green marbles.

- $60\% - 15\%$
  $= 45\%$

The percentage of the yellow marbles is 45% **more than** that of green marbles.

- $100\% - 60\% - 15\%$
  $= 25\%$

25% of the marbles are blue marbles.

The number of origami star is 5% more than that of origami crane. The number of origami crane is 3% fewer than that of origami turtle.

- $100\% + 5\%$
  $= 105\%$

The number of origami star is 105% that of origami crane.

- $100\% - 3\%$
  $= 97\%$

The number of origami crane is 97% that of origami turtle.

- $100\% + 10\%$
  $= 110\%$

After folding 10% **more** origami crane, the number of origami crane is 110% the original number.

2. Finding values from the given percentages

There are 20 cartons of drinks at home. 40% are soya milk, 15% are green tea and the remainder are lemon tea.

- $20 \times 40\%$
  $= 8$

There are 8 cartons of soya milk.

- $20 \times (40\% + 15\%)$
  $= 11$

There are 11 cartons of soya milk **and** green tea **altogether**.

- $20 \times (40\% - 15\%)$
  $= 5$

The **difference** between the numbers of cartons of soya milk and green tea is 5.

- $20 \times (100\% - 40\% - 15\%)$
  $= 9$

There are 9 cartons of lemon tea.

5. 12 [$15 \div 75 \times 60 = 12$]

Common mistake: $\frac{1}{5}$ ×

- Neglect that the unit of the answer is minutes. To get the correct answer, we should × 60 to convert hours to minutes.

6. $1\frac{1}{3}$ [$20 \div 15 = 1\frac{1}{3}$]

7. 5400

[$3 \times 30 \times 60 = 5400$

(30 minutes = (30 × 60) seconds = 1800 seconds)]

8. 84

[$72 \times (1 + 10 \div 60) = 84$

(1 hour and 10 minutes = $(1 + 10 \div 60)$ hours = $1\frac{1}{6}$ hours)]

9. 10

[$5.4 \times 1000 \div 9 \div 60 = 10$

(5.4 km = (5.4 × 1000) m = 5400 m)]

Common mistake 1: 0.6 ×

- Neglect that the unit of distance is km and neglect that the unit of the answer is minutes. Therefore, wrongly write the expression as $5.4 \div 9$.

Common mistake 2: 600 ×

- Neglect that the unit of the answer is minutes. Therefore, we should ÷ 60 to convert seconds to minutes.

10. 720

[The time taken to walk from Candy's home to the school is 15 minutes.

$0.8 \times 15 \times 60 = 720$

(15 minutes = (15 × 60) seconds = 900 seconds)]

11. 11:30 a.m.

[$8.1 \div 3.6 = 2\frac{1}{4}$ hours

$2\frac{1}{4}$ hours = 2 hours and $(\frac{1}{4} \times 60)$ minutes

= 2 hours and 15 minutes

i.e.: Hour: (9 + 2); Minute: (15 + 15)]

12. 0.8 [$1.5 \times 16 \times 60 \div (30 \times 60) = 0.8$]

13. $\frac{3}{5}$ or 0.6 [$60 \times (45 \div 60) \div 75 = \frac{3}{5}$ or 0.6]

14. $150 - 60 \times 1\frac{1}{5}$

= 78

The lorry is 78 km away from City B.

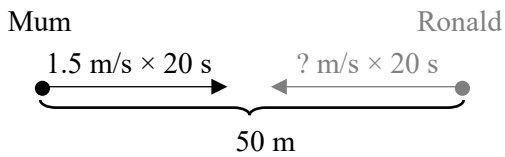
15. $5 \div 2.5 + (11 - 5) \div 2.4$

= 4.5

Lily takes 4.5 hours to walk from the foot to the peak of the hill.

16. D [Ronald walks: $50 - 1.5 \times 20 = 20$ m

Average speed of Ronald: $20 \div 20 = 1$ m/s]



MCQ Explanation

Wrong choice	Reason
A	Mistakenly regard 50 m as the distance walked by Ronald. Therefore, wrongly write the expression as $50 \div 20 = 2.5$.
B	Mistakenly regard the distance find from Mum's speed is the distance walked by Ronald. Therefore, wrongly write the expression as $(1.5 \times 20) \div 20 = 1.5$.
C	Mistakenly regard 50 m as the distance in the expression and the time for them to walk as 20 × 2. Therefore, wrongly write the expression as $50 \div (20 \times 2) = 1.25$.

17. A

[Jenny runs: $(800 + 400) \div 2.5 = 480$ seconds = 8 minutes

Starting time = Ending time – Time spent]

MCQ Explanation

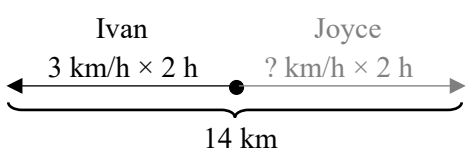
Wrong choice	Reason
B	Mix up the formulae of speed and wrongly write the expression as $(800 + 400) \times 2.5 =$ 3000 seconds = 50 minutes. Then, mistakenly subtract 1 from the hour part of the ending time and regard the minute part as 50.
C	Mix up the formulae of speed and wrongly write the expression as $(800 + 400) \times 2.5 =$ 3000 seconds = 50 minutes.
D	Mistakenly subtract 1 from the hour part of the ending time and add 8 to the minute part.

18. A

[Joyce walks: $14 - 3 \times 2 = 8$ km

The distance that Joyce walks each hour on average:

$8 \div 2 = 4$ km]



MCQ Explanation

Wrong choice	Reason
B	Mistakenly regard 14 km as the distance walked by Joyce. Therefore, wrongly write the expression as $14 \div 2 = 7$.
C	Mistakenly find the distance walked by Joyce. Therefore, wrongly write the expression as $14 - (3 \times 2) = 8$.
D	Mistakenly regard 14 km as the distance walked by Joyce. Also, wrongly regard the distance in the expression as 'distance walked by Joyce' + 'distance walked by Ivan'. Therefore, wrongly write the expression as $(14 + 3 \times 2) \div 2 = 10$.

10 Travel graphs

1. 1200, 2400

2. 17:45, 1 hour and 45 minutes

3. $\frac{8}{21}$

[1 hour and 45 minutes = $(1 \times 60 + 45) \times 60$ seconds = 6300 seconds

Average speed of May: $1200 \times 2 \div 6300 = \frac{8}{21}$ m/s]

4. 16:45, 30

5. 30, 12

[Each small unit on the vertical axis stands for 1 km.]

6. 8

[Distance: 12 km, time: $1\frac{1}{2}$ hours

Average speed: $12 \div 1\frac{1}{2} = 8$ km/h]

7. 12:30

8. 24, earlier

[Each small unit on the horizontal axis stands for:

$30 \div 5 = 6$ minutes]

9. departed from, 11:50 a.m., beach, 1:00 p.m.

10. 12:22 p.m., 19

[Time:
On the horizontal axis, each large unit stands for 10 minutes, each small unit stands for 2 minutes.
Distance:
On the vertical axis, each large unit stands for 5 km, each small unit stands for 1 km.
Distance away from the estate: 11 km, distance away from the beach: $30 - 11 = 19$ km]

11. 36

[Distance: 30 km, time: $\frac{50}{60}$ hour

Average speed: $30 \div \frac{50}{60} = 36$ km/h]

12. 8, 5

13. 3

14. higher, 2

[Distance: 12 km, time: 6 hours

Average speed: $12 \div 6 = 2$ km/h]

15. 14:00 to16:00

[The line during this period is the steepest.]

16. 12:05 p.m.

[He took 140 minutes to reach the peak.
140 minutes = 2 hours and 20 minutes
Hour: $9 + 2 + 1 = 12$; Minute: $45 + 20 - 60 = 5$]

Common mistake: 12:05 a.m. ×
- Neglect that after 12:00 noon, the time change from a.m. to p.m.

17. $34\frac{2}{7}$ [Distance: 80 km, time: $2\frac{20}{60}$ hours

Average speed: $80 \div 2\frac{20}{60} = 34\frac{2}{7}$ km/h]

18. 50 [$80 - 30 = 50$]

19. 1:41 p.m.

[Distance: 80 km, average speed: 50 km/h

Time: $80 \div 50 = 1\frac{3}{5}$ hours

$1\frac{3}{5}$ hours = 1 hour $(\frac{3}{5} \times 60)$ minutes = 1 hour 36 minutes

After reaching the peak at 12:05 p.m., he reached his home at:
Hour: $12 + 1 = 13$ (i.e. 1 p.m.);
Minute: $5 + 36 = 41$]

Assessment 1

1. **a.** 125% [$\frac{20}{16} \times 100\%$]

b. 72% [$\frac{20 + 16}{50} \times 100\%$]

2. $\frac{250 - 135}{250} \times 100\%$

$= 46\%$

46% of the stamps are unused stamps.