

## Chapter 9: Percentage

## 9.1

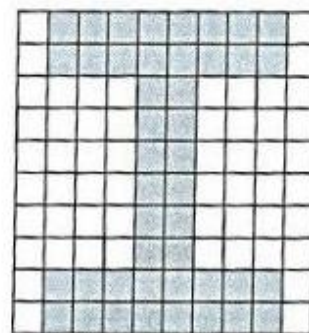
Calculators can be used only for questions with '\*\*'.

### Level 1

#### Exercise 1

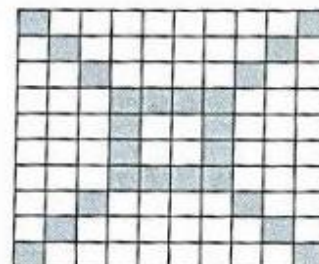
1. What percentage of the square is shaded?

\_\_\_\_\_ % of the square is shaded.



2. What percentage of the rectangle is not shaded?

\_\_\_\_\_ % of the rectangle is not shaded.



3. Express each fraction as a percentage.

(a)  $\frac{7}{100} = \underline{\hspace{2cm}} \%$       (b)  $\frac{81}{100} = \underline{\hspace{2cm}} \%$

(c)  $\frac{2}{10} = \underline{\hspace{2cm}} \%$       (d)  $\frac{8}{10} = \underline{\hspace{2cm}} \%$

- |          |        |
|----------|--------|
| 1. 44    | 2. 76  |
| 3. (a) 7 | (b) 81 |
| (c) 20   | (d) 80 |

4. Fill in the missing numerator or denominator.

$$(a) \quad 9\% = \frac{\boxed{\phantom{00}}}{100}$$

$$(b) \quad 75\% = \frac{\boxed{\phantom{00}}}{100}$$

$$(c) \quad 28\% = \frac{28}{\boxed{\phantom{00}}}$$

$$(d) \quad 36\% = \frac{36}{\boxed{\phantom{00}}}$$

5. Fill in the missing number.

(a) 38 out of 100 is \_\_\_\_\_ %.

(b) \_\_\_\_\_ out of 100 is 60%.

(c) 51 out of \_\_\_\_\_ is 51%.

(d) 5 out of 10 is \_\_\_\_\_ %.

6. Express each decimal as a percentage.

(a)  $0.09 = \underline{\hspace{2cm}}\%$     (b)  $0.66 = \underline{\hspace{2cm}}\%$

(c)  $0.6 = \underline{\hspace{2cm}}\%$     (d)  $0.9 = \underline{\hspace{2cm}}\%$

7. Express each percentage as a fraction in its simplest form.

(a)  $17\% = \underline{\hspace{2cm}}$     (b)  $55\% = \underline{\hspace{2cm}}$

(c)  $4\% = \underline{\hspace{2cm}}$     (d)  $96\% = \underline{\hspace{2cm}}$

8. Express each percentage as a decimal.

(a)  $19\% = \underline{\hspace{2cm}}$     (b)  $35\% = \underline{\hspace{2cm}}$

(c)  $49\% = \underline{\hspace{2cm}}$     (d)  $80\% = \underline{\hspace{2cm}}$

4. (a)	9	(b)	75
(c)	100	(d)	100
5. (a)	38	(b)	60
(c)	100	(d)	50
6. (a)	9	(b)	66
(c)	60	(d)	90
7. (a)	$\frac{17}{100}$	(b)	$\frac{11}{20}$
(c)	$\frac{1}{25}$	(d)	$\frac{24}{25}$
8. (a)	0.19	(b)	0.35
(c)	0.49	(d)	0.8

9. There were 100 passengers on a train. 85 of them were adults.
- (a) \_\_\_\_\_ % of the passengers on the train were adults.
- (b) \_\_\_\_\_ % of the passengers on the train were not adults.
10. There were 100 pupils in a school choir. 6 of them were boys.
- (a) \_\_\_\_\_ % of the pupils in the school choir were boys.
- (b) \_\_\_\_\_ % of the pupils in the school choir were girls.
11. There are 10 fruits in a basket. 3 of the fruits are apples. The rest are oranges.
- (a) \_\_\_\_\_ % of the fruits are apples.
- (b) \_\_\_\_\_ % of the fruits are oranges.
12. Express each fraction as a percentage.
- (a)  $\frac{19}{20} =$  \_\_\_\_\_ %      (b)  $\frac{3}{5} =$  \_\_\_\_\_ %
- (c)  $\frac{60}{125} =$  \_\_\_\_\_ %      (d)  $\frac{180}{240} =$  \_\_\_\_\_ %
13. In a class,  $\frac{3}{20}$  of the pupils wore glasses. What percentage of the pupils wore glasses?

9. (a) 85      (b) 15
10. (a) 6      (b) 94
11. (a) 30      (b) 70
12. (a) 95%  
(b) 60%  
(c) 48%  
(d) 75%
13. 15%

14. Alan had some money. He spent  $\frac{9}{25}$  of it on his lunch.

- (a) What percentage of his money did he spend on his lunch?
- (b) What percentage of his money had he left?

14. (a) 36%  
(b) 64%

15. 35%

Exercise 2:

1. (a) 30%  
(b) 70%

15. On a bus,  $\frac{13}{20}$  of the seats were occupied. What percentage of the seats was not occupied?

**Exercise 2**

1. Mr Koay had \$60. He used \$18 to buy a book.

- (a) What percentage of his money did he use to buy the book?
- (b) What percentage of his money did he have left?

2. There are 200 flats in an apartment block. 84 of them are four-room flats. The rest are five-room flats. What percentage of the flats are five-room flats?

2. 58%

3. 80%

4. (a) \$75  
(b) 45 cm  
(c) 16 kg  
(d) 70 m

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3. 80 pupils took part in the Mathematics Olympiad contest. 16 of them were Primary Five pupils. What percentage of the pupils were not Primary Five pupils?

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4. Find the value of the following.

(a) 25% of \$300 = \$ \_\_\_\_\_

(b) 9% of 500 cm = \_\_\_\_\_ cm

(c) 80% of 20 kg = \_\_\_\_\_ kg

(d) 100% of 70 m = \_\_\_\_\_ m

5. Mdm Ho earns \$600 a month as a cleaner. She saves 20% of the money. How much money does she save?

5. \$120

6. 14

7. \$175

8. 9

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6. There are 40 fruits in a box. 35% of them are apples. How many apples are there?

- 
7. Rong Wei had \$500. He gave 65% of the money to his parents and spent the rest. How much money did he spend?

- 
8. There were 45 questions in a test. Samantha answered 80% of them correctly. How many questions did she answer incorrectly?

9. There are 40 pupils in Class 5D. 95% of them are going for the school camp. How many pupils are not going for the school camp?

9. 2

10 99

11. (a) 6  
(b) 30%  
(c) 9

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10. The football team scored 150 goals last year. 66% of the goals were scored by the strikers. How many goals were scored by the strikers?

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11. Nelson drew 30 shapes on a sheet of drawing paper. 20% of the shapes were squares. 50% of the shapes were circles. The rest were triangles.  
(a) How many squares did he draw?  
(b) What percentage of the shapes were triangles?  
(c) How many triangles did he draw?



12. Amirah had \$200. She spent 15% of the money on food and 24% of the money on clothes. She saved the rest of the money.

- (a) Find the amount of money that she spent on clothes.  
(b) What percentage of the money did she save?  
(c) How much money did she save?

12. (a) \$48  
(b) \$61%  
(c) \$122

13. (a) 15

14. 42

15. 34

13. Siong Yew made 50 pies. 60% of them were chicken pies. 10% of them were apples pies. The rest were vegetable pies. How many vegetable pies did he make?

14. A fruit juice stall sold 120 cups of fruit juice. 40% of them were apple juice. 10% of them were orange juice. 15% of them were watermelon juice. The rest were mixed juice. How many cups of mixed juice were sold?

15. There are 1700 pupils in a school. 16% of them come to school by car. 18% of them come to school by school bus. 64% of them walk to school. The rest of the pupils cycle to school. How many pupils cycle to school?





## 9.2

## Exercise 1

1. Express 10 cm as a percentage of 2 m.

- (1) 5%
- (2) 75%
- (3) 190%
- (4) 160%

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2. Express 1500 g as a percentage of 2 kg.

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3. Express 1900 ml as a percentage of 1 l.

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4. Express 3 km 200 m as a percentage of 2 km.

5. Mr Omar wants to buy a computer which costs \$900. In addition, he has to pay 7% GST on the cost of the computer. How much GST must Mr Omar pay?
- (5) \$63  
(6) \$120  
(7) \$22  
(8) \$3000
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6. Mrs Loh has \$4000 in a fixed deposit savings account. The bank pays 3% interest per year. How much interest will she earn in 1 year?
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7. The usual price of a watch is \$110. At a sale, it is sold at a discount of 20%. How much is the discount?
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8. Mr Khan puts \$50 000 into an endowment fund that has an interest rate of 6% per year. How much interest does he earn after one year?

9. Mr Lim borrows \$2000 from a bank. The bank charges 12% interest per year. How much interest must he pay the bank after 1 year?

(9) \$240

(10) (a) \$24  
(b) \$36

(11) (a) \$9.10  
(b) \$139.10

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10. The usual price of a bag was \$60. Nadia bought it at a discount of 40% during the year-end sale.

- (a) How much was the discount?  
(b) How much did Nadia pay for the bag?

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11. The price of a ticket to a show was \$130 before GST of 7%.
- (a) How much was the GST?  
(b) What was the price of the ticket with the GST included?

12. Mdm Oh puts \$15 000 into a normal savings account with an interest rate of 1% per year.
- (a) How much interest does she earn after 1 year?
- (b) How much money does she have in the savings account after 1 year?
- (12) (a) \$150  
(b) \$15 150
- (13) \$9
- (14) \$492.20
- (15) \$6630
- 
13. The usual price of a book was \$15. At a sale, a discount of 40% was given. How much did Dave pay if he bought the book during the sale?
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14. The price of a washing machine is \$460. In addition, buyers need to pay 7% GST. How much money altogether will Mr Tan need to pay for the washing machine?
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15. Ms Pang puts \$6500 into a savings account which pays 2% interest per year. How much money will she have in the savings account after 1 year?

**Exercise 2**

Choose the correct answer and write its number in the brackets provided.

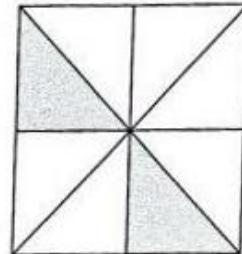
1. Express 150 cm as a percentage of 6 m. (1) 3  
 (1) 75% (2) 45% (2) 2  
 (3) 25% (4) 15% (3) 4  
 ( )
2. Express 80% as a decimal. (4) 1  
 (1) 8 (2) 0.8 (5) 4  
 (3) 0.08 (4) 0.008 ( )
3. Express  $\frac{11}{20}$  as a percentage. (6) 3  
 (1) 11% (2) 22% (7) 2  
 (3) 44% (4) 55% (8) 4  
 ( )
4. The usual price of an assessment book is \$8. At a sale, it is sold at 25% discount. How much does Mrs Wee have to pay for the book during the sale?  
 (1) \$6 (2) \$4  
 (3) \$2.50 (4) \$2 ( )
5. The price of a printer is \$400. In addition, buyers need to pay 7% GST. How much must Mr Daniel pay for the printer altogether?  
 (1) \$28 (2) \$372  
 (3) \$407 (4) \$428 ( )
6. Polly scored 96 marks out of 150 marks in an English test. What percentage did she score for the test?  
 (1) 36% (2) 48%  
 (3) 64% (4) 96% ( )
7. Zack had 40 marbles. He gave 60% of them to his friend. How many marbles did he have left?  
 (1) 12 (2) 16  
 (3) 20 (4) 24 ( )
8. Mr Goh had \$50. He spent some of the money and had \$10 left. What percentage of his money did he spend?  
 (1) 20% (2) 40%  
 (3) 60% (4) 80% ( )

9.  $\frac{1}{4}$  of the class are girls. What percentage of the class are boys? (9) 1  
 (1) 75% (2) 40% (10) 2  
 (3) 25% (4) 20% ( )
10. Mdm Sharifah puts \$50 000 in an investment account. The account has an interest rate of 5% per year. How much interest will she earn after 1 year? (11) 3  
 (1) \$1000 (2) \$2500 (12) 3  
 (3) \$10 000 (4) \$25 000 ( ) (13) 4  
 (14) 2
11. 75% of the passengers on a bus are men. 10% of them are women. The rest are children. What is the difference in the percentage of passengers who are adults and the percentage of passengers who are children? (15) 1  
 (1) 15% (2) 65%  
 (3) 70% (4) 85% ( )
12. Mr Seah buys 50 fruits. 10% of the fruits are oranges. The rest are apples. How many more apples than oranges are there?  
 (1) 5 (2) 10  
 (3) 40 (4) 45 ( )
13. There are 40 pupils in a class. 15% of them go home by school bus. 30% of them go home by car. The rest of them walk home. How many pupils walk home?  
 (1) 6 (2) 12  
 (3) 18 (4) 22 ( )
14. A computer is sold at \$2000 in both Country X and Country Y. In Country X, the GST is 7%. However, in Country Y, the GST is 10%. Mr Ibrahim chooses to buy the computer in Country X. How much money does he save by buying it in Country X instead of in Country Y?  
 (1) \$20 (2) \$60  
 (3) \$140 (4) \$200 ( )
15. There are 40 animals in a pet shop.  $\frac{3}{4}$  of them are cats. 15% of them are dogs. The rest are rabbits. How many rabbits and dogs are there in all?  
 (1) 10 (2) 16  
 (3) 30 (4) 36 ( )



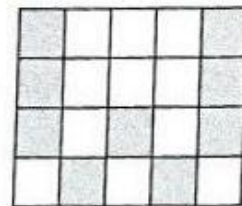
**Level 3****9.3****Exercise 1**

1. What percentage of the figure is shaded?



- (1) 25%  
(2) 55%  
(3) 60%

2. What percentage of the figure is not shaded?



3. Ah Boon put 6 fifty-cent coins into his piggy bank and had 4 fifty-cent coins left. What percentage of his money did he put into his piggy bank?



4. Michael spent \$8 and had \$32 left. What percentage of his money did he spend?
- (4) 20%
- (5) 45%
- (6) 60%
- (7) 9 : 1
- 

5. Gary gave \$20 to his brother and \$24 to his sister. He had \$36 left. What percentage of his money had he left?
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6. Muthu spent \$900 of his salary on his school fees and gave \$250 to his parents. He had \$350 left. What percentage of his salary did he spend on his school fees?
- 

7. 10% of the fruits in a box are rotten. The rest are not rotten. Find the ratio of the number of fruits that are not rotten to the number of fruits that are rotten.

8. 36% of the coins in a bag are one-dollar coins. The rest are fifty-cent coins. What is the ratio of the number of one-dollar coins to the number of fifty-cent coins?

- (8) 9 : 16  
(9) 1 : 6  
(10) 3 : 13  
(11) 25 : 57

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9. Azman spent 10% of his money on food and 30% of his money on a book. What was the ratio of the amount of money he spent on food to the amount of money he had left?

- 
10. Mr Ho spent 20% of his salary on transport and 15% of his salary on food. What was the ratio of the amount of money he spent on food to the amount of money he had left?

- 
11. There are some marbles in a bag. 18% of them are red. 25% of them are green. The rest are blue. Find the ratio of the number of green marbles to the number of blue marbles.

12. A flag was painted in three colours, orange, red and yellow. 30% of the flag was painted in orange. The area painted in orange was three times the area painted in red. Find the ratio of the area painted in orange to the area painted in red to the area painted in yellow.

(12) 3 : 1 : 6

(13) 6 : 12 : 7

(14) 4 : 3 : 7

- 
13. In a school, 24% of the pupils come to school by bus. The percentage of pupils coming to school by car is twice the percentage of pupils coming to school by bus. The rest of the pupils walk to school. What is the ratio of the number of pupils coming to school by bus to the number of pupils coming to school by car to the number of pupils walking to school?

- 
14. On a tour bus to a resort, the number of girls was  $\frac{3}{4}$  of the number of boys. 50% of the passengers were adults. Find the ratio of the number of boys to the number of girls to the number of adults.

15. In a box, there were red, blue and black pens. 70% of the pens were black pens. The number of red pens was  $\frac{4}{5}$  of the number of blue pens. Find the ratio of the number of black pens to the number of red pens to the number of blue pens.

(15) 21 : 4 : 5

Exercise 2 :

(1) 65%

(2) 52%

### Exercise 2

1. The ratio of the number of four-room flats to the number of five-room flats in an apartment block is 13 : 7. What percentage of the flats are four-room flats?

- 
2. The ratio of the number of boys to the number of girls in a class is 12 : 13. What percentage of the pupils are girls?

3. Mdm Teo used flour, butter and sugar to make bread. The ratio of the amount of flour used to the amount of butter used to the amount of sugar used is 13 : 6 : 1. What percentage of the bread was made from butter?
- (3) 30%  
(4) 20%  
(5) 50%
- 

4. Before a party, Mrs Jenson mixed pineapple juice, orange juice and apple juice to make a drink for the children. The ratio of the amount of pineapple juice to the amount of orange juice to the amount of apple juice was 5 : 4 : 11. What percentage of the drink was made from orange juice?
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- \*5. A cage in the school contains basketballs, volleyballs and hockey sticks.  $\frac{1}{5}$  of the items are hockey sticks. The ratio of the number of basketballs to the number of volleyballs is 5 : 3. What percentage of the items are basketballs?

- \*6. On an airplane, the ratio of the number of men to the number of women was  $9 : 5$ .  $\frac{3}{10}$  of the passengers were children. What percentage of the passengers were women?

- (6) 25%  
(7) 60%  
(8)  $3 : 5$

- 
7. At a party, the ratio of the number of boys to the number of girls was  $1 : 2$ . The ratio of the number of children to the number of adults was  $9 : 1$ . What percentage of the people were girls?

- 
8.  $\frac{1}{3}$  of A is equal to 20% of B. What is the ratio of A to B?

9. 60% of Gary's salary is equal to 25% of Ben's salary. What is the ratio of Gary's salary to Ben's salary?

(9) 5 : 12

(10) 10 : 7

(11) 1 : 4

(12) 2 : 3

- 
10. In a zoo, 40% of the number of lions is equal to  $\frac{4}{7}$  of the number of tigers. Find the ratio of the number of lions to the number of tigers.

- 
11. 30% of P is equal to 10% of Q. Find the ratio of P to the sum of P and Q.

- 
12. 50% of C is equal to  $\frac{1}{5}$  of D. Find the ratio of C to the difference between D and C.



13. 80% of Lucy's savings is equal to 75% of Natalie's savings. Find the ratio of Lucy's savings to the difference between Lucy's savings and Natalie's savings.

(13) 15 : 1

(14)  $\frac{2}{5}$

(15)  $\frac{4}{9}$

- 
14. Mr Owen baked some chocolate cookies and hazelnut cookies. 45% of the number of chocolate cookies is equal to 30% of the number of hazelnut cookies. What fraction of all the cookies are chocolate cookies?

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15. At a factory,  $\frac{2}{5}$  of the number of female workers is equal to 50% of the number of male workers. What fraction of the workers is male?