

1

Arithmetic Operations

A. Four Basic Arithmetic Operations

Operation	Expression	Word Phrase	Result
Addition	$4 + 5$	Add 5 to 4 (or 4 plus 5)	The sum is 9.
Subtraction	$9 - 7$	Subtract 7 from 9 (or 9 minus 7)	The difference is 2.
Multiplication	6×5	Multiply 6 by 5 (or 6 times 5)	The product is 30.
Division	$18 \div 6$	Divide 18 by 6	The quotient is 3.

The following are some rules in performing mixed operation.

1. If an expression contains brackets, perform the operations inside the brackets first.
2. (a) If an expression involves addition and subtraction only (or multiplication and division only), perform the operation from left to right.
(b) Otherwise, perform multiplication and division before addition and subtraction.



Example 1

Find the value of each of the following expressions.

- (a) $16 + 24 - 32$
(b) $9 \times 2 + 24 \div 4$

Solution

(a) $16 + 24 - 32$
 $= 40 - 32$
 $= \underline{\underline{8}}$

◀ Perform the operations from left to right.

(b) $9 \times 2 + 24 \div 4$
 $= 18 + 6$
 $= \underline{\underline{24}}$

◀ Perform the multiplication and the division first.



Example 2

Write the following word phrases as arithmetic expressions, and calculate the answers.

- (a) Multiply 6 by the sum of 2 and 3.
 (b) Subtract 18 from 42, and then divide the difference by 4.

Solution

(a) $6 \times (2 + 3)$

◀ Perform the operation inside the brackets first.

$$= 6 \times 5$$

$$= \underline{\underline{30}}$$

(b) $(42 - 18) \div 4$

$$= 24 \div 4$$

$$= \underline{\underline{6}}$$



Example 3

52 books are packed evenly into 6 plastic boxes. How many books are there in each plastic box?
 How many books are left?

Solution

divisor ▶ $6 \overline{) 52}$ 8 ▶ quotient
 48 ▶ dividend
 4 ▶ remainder

Short division

$$\begin{array}{r} 6 \overline{) 52} \\ \underline{48} \\ 4 \end{array}$$

$$\therefore 52 \div 6 = 8 \dots 4$$

$\therefore$ There are 8 books in each plastic box, and 4 books are left.

Note: The symbol ‘ $\therefore$ ’ means ‘because’, while the symbol ‘ $\therefore$ ’ means ‘therefore’.



The remainder must be less than the divisor.

B. Multiples and Factors

Mathematical term	Example
Multiple	(i) 6, 12, 18, 24, ... are multiples of 6. (ii) 8, 16, 24, 32, ... are multiples of 8.
Common multiple	24, 48, 72, ... are common multiples of 6 and 8.
Least Common Multiple (L.C.M.)	24 is the L.C.M. of 6 and 8.
Factor	(i) 1, 2, 4 and 8 are the factors of 8. (ii) 1, 2, 3, 4, 6 and 12 are the factors of 12.
Common factor	1, 2 and 4 are the common factors of 8 and 12.
Highest Common Factor (H.C.F.)	4 is the H.C.F. of 8 and 12.



Example 5

Write down the first four multiples of 12 and 16, and find the L.C.M. of the two numbers.

Solution

First four multiples of 12: 12, 24, 36 and **48**

First four multiples of 16: 16, 32, **48** and 64

$\therefore$ L.C.M. of 12 and 16 = 48



Example 6

Write down the factors of 20, 45 and 50, and find the H.C.F. of the three numbers.

Solution

Factors of 20: 1, 2, 4, 5, 10 and 20

Factors of 45: 1, 3, 5, 9, 15 and 45

Factors of 50: 1, 2, 5, 10, 25 and 50

$\therefore$ H.C.F. of 20, 45 and 50 = 5

$$\begin{aligned} 20 &= 1 \times 20 \\ &= 2 \times 10 \\ &= 4 \times 5 \end{aligned}$$



Example 7

A box of candies can be evenly divided among either 6 or 8 kids. What is the minimum number of candies in the box?

Solution

Multiples of 6: 6, 12, 18, **24**, ...

Multiples of 8: 8, 16, **24**, ...

$\therefore$ L.C.M. of 6 and 8 = 24

$\therefore$ The minimum number of candies in the box is 24.



Knowing More

Prime Factors

Consider the factors of 12. The factors are 1, 2, 3, 4, 6 and 12. Among these factors, 2 and 3 are prime numbers. Therefore, 2 and 3 are called prime factors of 12.

Every composite number can be expressed as products of prime factors.

For example, 90 can be expressed as product of prime factors as follow:

$$90 = 2 \times 3 \times 3 \times 5$$

Short division is useful to find all the prime factors of a number.

$$\begin{array}{r} 2 \overline{)90} \\ 3 \overline{)45} \\ 3 \overline{)15} \\ 5 \end{array}$$

Index Notation

For simplicity, we can write the expression $3 \times 3 \times 3 \times 3$ as 3^4 , read as '3 to the power 4'. This kind of expression is called index notation.

Expression	Index notation	
	Expressed as	Read as
3×3	3^2	the square of 3 or 3 to the power 2
$3 \times 3 \times 3$	3^3	the cube of 3 or 3 to the power 3
$3 \times 3 \times 3 \times 3$	3^4	the 4th power of 3 or 3 to the power 4
$3 \times 3 \times 3 \times 3 \times 3$	3^5	the 5th power of 3 or 3 to the power 5

In 3^4 , 3 is called the base and 4 is called the index or exponent.

$$3 \times 3 \times 3 \times 3 = 3^4$$

↖ index/exponent
↖ base

Similarly, $2 \times 3 \times 3 \times 5$ can be written as $2 \times 3^2 \times 5$ in index notation.



Key Terms / Phrases



Pronunciation

addition	加法	difference	差	factor	因數
subtraction	減法	product	積	common factor	公因數
multiplication	乘法	quotient	商	highest common factor	最大公因數
division	除法	dividend	被除數	prime number	質數
plus	加	divisor	除數	composite number	合成數
minus	減	remainder	餘數	prime factor	質因數
times	乘	multiple	倍數	index notation	指數記數法
divide	除	common multiple	公倍數	base	底
sum	和	least common multiple	最小公倍數	index / exponent	指數



Useful Sentences

What is the <u>product</u> of 5 and 3?	5 和 3 的 <u>積</u> 是多少？
<u>Divide</u> 6 by 3, and then subtract 1 from the <u>quotient</u> .	把 6 <u>除以</u> 3，然後把所得的 <u>商</u> 減去 1。
Is 1485 <u>divisible</u> by 3?	1485 可被 3 <u>整除</u> 嗎？
My brother's age is <u>twice</u> my age.	哥哥的年齡是我的 <u>兩倍</u> 。
The <u>sum</u> of two <u>consecutive numbers</u> is 29.	兩個 <u>連續數</u> 的和是 29。
The <u>square</u> of 8 is 64.	8 的 <u>平方</u> 是 64。
<u>Evaluate</u> the following <u>expressions</u> .	<u>計算</u> 下列各 <u>數式</u> 。

Exercise 1

Write the following word phrases as arithmetic expressions, and calculate the answers. (1 – 9)

- Add seventy to twelve. _____
- Subtract one hundred and six from two thousand. _____
- 97 minus 48 plus 23. _____
- 30 times 5 minus 38. _____
- Multiply the sum of 12 and 4 by 8. _____
- Divide the sum of 35 and 17 by 13. _____
- Subtract 14 from 30 and then add 20 to the result. _____

8. Add the product of 16 and 4 to the quotient of 28 divided by 4. _____
9. The difference between 50 and the quotient of 45 divided by 9. _____

Evaluate the following expressions. (10 – 17)

- | | | | |
|---------------------------------|-------|---------------------------------|-------|
| 10. $67 + 22 - 79$ | _____ | 11. $25 \times 14 \div 5$ | _____ |
| 12. $5 + 144 \times 23$ | _____ | 13. $342 - 26 \times 7$ | _____ |
| 14. $15 \times 33 - 636 \div 2$ | _____ | 15. $(42 - 18) \div 2 \times 3$ | _____ |
| 16. $(38 + 46) - (24 + 19)$ | _____ | 17. $(128 + 64 \div 8) \div 4$ | _____ |

Determine whether the following are true or false. (18 – 21)

- | | True | False |
|--|--------------------------|--------------------------|
| 18. The divisor in the expression $54 \div 9$ is 54. | ☐ | ☐ |
| 19. The product of two <i>even numbers</i> is an <i>odd number</i> . | ☐ | ☐ |
| 20. 50 is a multiple of 50. | ☐ | ☐ |
| 21. 33 is a factor of 132. | ☐ | ☐ |

22. Find the L.C.M. of the following sets of numbers.

- | | | | |
|------------|-------|----------------|-------|
| (a) 7, 8 | _____ | (b) 18, 24 | _____ |
| (c) 30, 50 | _____ | (d) 15, 20, 40 | _____ |

23. Find the H.C.F. of the following sets of numbers.

- | | | | |
|------------|-------|----------------|-------|
| (a) 24, 30 | _____ | (b) 20, 36 | _____ |
| (c) 27, 54 | _____ | (d) 12, 18, 60 | _____ |

Solve the following problems. (24 – 27)

24. Find the sum of two *consecutive numbers* if the smaller one is 43. _____
25. A *dozen* pack of noodles costs \$36. Tony buys 5 packs of them. How much should he pay? _____
26. Soya milk costs \$8 per *litre*. If Peter has \$100 and wants to buy 17 litres soya milk, how much more money does he need? _____
27. 3 bags of rice weigh 15 kg in total. 2 bottles of cooking oil weigh 6 kg in total. How much heavier is a bag of rice than a bottles of cooking oil? _____

.....

determine 判斷 even number 偶數 odd number 奇數 consecutive numbers 連續數 dozen 一打 litre 公升

Solve the following problems. Show your working steps clearly. (28 – 31)

28. Candies cost \$84 per 6 kg. Apple juice costs \$8 per pack. Find the cost for 4 kg candies and 12 packs of apple juice.

29. 1 orange costs \$4 and 1 watermelon costs \$48. Martha pays \$200 for 6 oranges and 2 watermelons. How much *change* should she get?

30. 80 toy cars and 64 teddy bears are shared evenly among some children. Each child gets the same numbers of toy cars and teddy bears as the others. What is the *maximum* number of children?



31. In a ferry pier, ferries *set off* for islands A, B and C every 25, 45 and 75 minutes respectively. At 10:00 a.m., ferries set off from the pier for all the three islands. When will they set off again at the same time if the ferry services end at 11:00 p.m. every day? *List* all the *possible* cases.



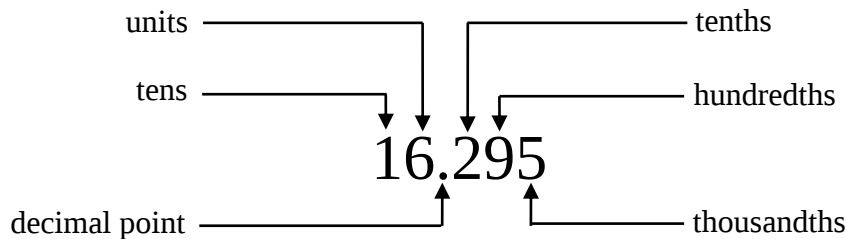
change 找回的零錢 maximum 最大的 set off 出發 list 列出 possible 可能的

2

Decimals and Fractions

A. Conversion between Decimals and Fractions

16.295 is a decimal, which can be read as sixteen point two nine five.



Fractions can be classified into following three types:

Proper fraction	Improper fraction	Mixed fraction
The numerator is smaller than the denominator.	The numerator is greater than or equal to the denominator.	An improper fraction which is written as a sum of a natural number and a proper fraction.
numerator → $\frac{3}{5}$ denominator →	$\frac{7}{4}$	integral part → $6\frac{2}{3}$ fractional part →
Read as : three-fifths / three over five	Read as : seven quarters / seven over four	Read as : six and two-thirds / six and two over three



Improper fractions can be converted into mixed fractions and vice versa.

e.g. $\frac{7}{4} = 1\frac{3}{4}$



Example 1

Convert 0.45 into a fraction.

Solution

$$\begin{aligned}
 0.45 &= \frac{45}{100} \\
 &= \frac{9}{20}
 \end{aligned}$$

◀ Reduce the fraction to its simplest form.



Example 2

Convert $\frac{3}{5}$ and $\frac{7}{25}$ into decimals.

Solution

Method 1: Expand the fractions

$$\begin{aligned}\frac{3}{5} &= \frac{3 \times 2}{5 \times 2} \\ &= \frac{6}{10} \\ &= \underline{\underline{0.6}}\end{aligned}$$

$$\begin{aligned}\frac{7}{25} &= \frac{7 \times 4}{25 \times 4} \\ &= \frac{28}{100} \\ &= \underline{\underline{0.28}}\end{aligned}$$

Method 2: Use division

$$\begin{aligned}\frac{3}{5} &= 3 \div 5 \\ &= \underline{\underline{0.6}}\end{aligned}$$

$$\begin{array}{r} 0.6 \\ 5 \overline{) 3.0} \\ \underline{30} \end{array}$$

$$\begin{aligned}\frac{7}{25} &= 7 \div 25 \\ &= \underline{\underline{0.28}}\end{aligned}$$

$$\begin{array}{r} 0.28 \\ 25 \overline{) 7.00} \\ \underline{50} \\ 200 \\ \underline{200} \end{array}$$



Example 3

Arrange the following numbers in descending order.

$$1\frac{1}{4}, 1\frac{3}{8}, 1.125$$

Solution

Method 1: Convert the numbers into fractions

$$1\frac{1}{4} = 1\frac{1 \times 2}{4 \times 2} = 1\frac{2}{8}$$

$$1.125 = 1\frac{125}{1000} = 1\frac{1}{8}$$

$$\therefore 1\frac{3}{8} > 1\frac{2}{8} > 1\frac{1}{8} \quad \leftarrow \text{Compare the numerators.}$$

$$\therefore 1\frac{3}{8} > 1\frac{1}{4} > 1.125$$

Method 2: Convert the numbers into decimals

$$1\frac{1}{4} = 1 + \frac{1}{4} = 1 + 0.25 = 1.25$$

$$1\frac{3}{8} = 1 + \frac{3}{8} = 1 + 0.375 = 1.375$$

$$\therefore 1.375 > 1.25 > 1.125$$

$$\therefore 1\frac{3}{8} > 1\frac{1}{4} > 1.125$$

B. Basic Operations of Decimals and Fractions

The following table shows some basic arithmetic operations of decimals.

Addition	Subtraction
e.g. $2.08 + 3.42$ $= \underline{5.5}$ $\begin{array}{r} 2.08 \\ + 3.42 \\ \hline 5.50 \end{array}$	e.g. $5.4 - 2.25$ $= \underline{3.15}$ $\begin{array}{r} 5.40 \\ - 2.25 \\ \hline 3.15 \end{array}$
Multiplication	Division
e.g. 8.12×3.4 $= \underline{27.608}$ $\begin{array}{r} 8.12 \\ \times 3.4 \\ \hline 24360 \\ + 3248 \\ \hline 27.608 \end{array}$	e.g. $3.5 \div 0.4$ $= (3.5 \times 10) \div (0.4 \times 10)$ $= 35 \div 4$ $= \underline{8.75}$ $\begin{array}{r} 8.75 \\ 4 \overline{) 35.00} \\ \underline{32} \\ 30 \\ \underline{28} \\ 20 \\ \underline{20} \end{array}$



Example 4

Evaluate $2.5 \times 3.6 \div 1.5$.

Solution

$$\begin{aligned} 2.5 \times 3.6 \div 1.5 &= 9 \div 1.5 \\ &= (9 \times 10) \div (1.5 \times 10) \\ &= 90 \div 15 \\ &= \underline{6} \end{aligned}$$

$$\begin{array}{r} 2.5 \\ \times 3.6 \\ \hline 750 \\ + 150 \\ \hline 9.00 \end{array}$$



◀ Multiply both the divisor and the dividend by 10 so that the divisor becomes a whole number.

The following table shows some basic arithmetic operations of fractions.

Addition	Subtraction
e.g. $\frac{1}{3} + \frac{1}{6} = \frac{2}{6} + \frac{1}{6}$ $= \frac{3}{6}$ $= \frac{1}{2}$	e.g. $3\frac{2}{5} - 2\frac{1}{15} = 3\frac{6}{15} - 2\frac{1}{15}$ $= 1\frac{5}{15}$ $= 1\frac{1}{3}$
Multiplication	Division
e.g. $3\frac{1}{3} \times \frac{1}{15} = \frac{10}{3} \times \frac{1}{15}$ $= \frac{2}{9}$	e.g. $\frac{5}{27} \div \frac{2}{9} = \frac{5}{27} \times \frac{9}{2}$ $= \frac{5}{6}$



If the multiplication and division of fractions involve mixed fractions, we should first change the mixed fractions into improper fractions.



Example 5

Evaluate $2\frac{1}{4} + 3\frac{3}{4} \div \frac{5}{6}$.

Solution

$$\begin{aligned}
 2\frac{1}{4} + 3\frac{3}{4} \div \frac{5}{6} &= 2\frac{1}{4} + \frac{15}{4} \times \frac{6}{5} \\
 &= 2\frac{1}{4} + \frac{9}{2} \\
 &= 2\frac{1}{4} + 4\frac{1}{2} \\
 &= 2\frac{1}{4} + 4\frac{2}{4} \\
 &= \underline{\underline{6\frac{3}{4}}}
 \end{aligned}$$

◀ Express $3\frac{3}{4}$ as an improper fraction.

◀ Perform multiplication and division before addition and subtraction.

◀ Express the fractions in a common denominator.



Example 6

Harry bought a $\frac{3}{4}$ kg chocolate cake and ate $\frac{3}{5}$ of it. Find the weight of the remaining chocolate cake.

Solution

Weight of the remaining chocolate cake

$$\begin{aligned}
 &= \frac{3}{4} \times \left(1 - \frac{3}{5}\right) \text{ kg} \\
 &= \frac{3}{4} \times \frac{2}{5} \text{ kg} \\
 &= \underline{\underline{\frac{3}{10} \text{ kg}}}
 \end{aligned}$$



Example 7

The selling price of a pen is \$6.3 and the selling price of a pencil is \$3.7. What is the total selling price of half a dozen pens and $1\frac{1}{3}$ dozen pencils?

Solution

Total selling price

$$\begin{aligned}
 &= \$ \left(6.3 \times 12 \times \frac{1}{2} + 3.7 \times 12 \times 1\frac{1}{3} \right) \\
 &= \$ \left(6.3 \times 6 + 3.7 \times 12 \times \frac{4}{3} \right) \\
 &= \$ (6.3 \times 6 + 3.7 \times 16) \\
 &= \$ (37.8 + 59.2) \\
 &= \underline{\underline{\$97}}
 \end{aligned}$$



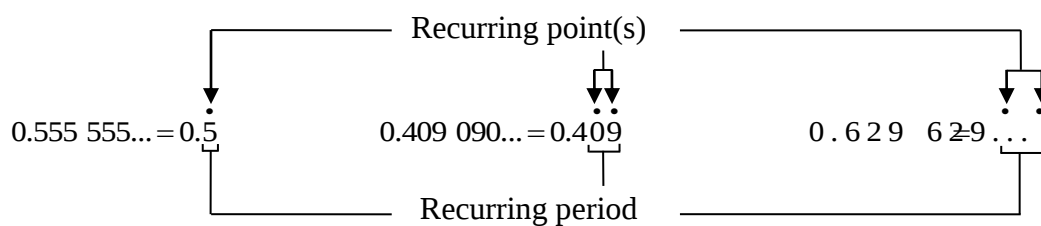
Knowing More

Recurring Decimals

In a decimal, if a digit or a pattern of digits after the decimal point repeats continuously, the decimal is called a recurring decimal. For example: $0.555\dots$, $0.409\ 09\dots$, $0.629\ 629\dots$ are recurring decimals.

In a recurring decimal, the repeated part is called the recurring period. It is indicated by the recurring point(s).

For example:



We can use recurring decimals to represent fractions as follows:

$$\frac{1}{3} = 0.333\dots = 0.\dot{3}, \quad \frac{8}{11} = 0.7272\dots = 0.\dot{7}\dot{2}, \quad \frac{11}{27} = 0.407\ 407\dots = 0.\dot{4}0\dot{7}$$



Pronunciation



Key Terms / Phrases

decimal	小數	thousandths	千分位	mixed fraction	帶分數
decimal point	小數點	fraction	分數	divisor	除數
units	個位	numerator	分子	dividend	被除數
tens	十位	denominator	分母	descending order	由大至小排列
tenths	十分位	proper fraction	真分數	ascending order	由小至大排列
hundredths	百分位	improper fraction	假分數	recurring decimals	循環小數



Useful Sentences

What <u>fraction</u> of the time is spent on studying?	花在學習上的時間佔幾分之幾？
What fraction of $\frac{7}{8}$ is $\frac{1}{2}$?	$\frac{1}{2}$ 是 $\frac{7}{8}$ 的幾分之幾？
Convert the following <u>mixed fraction</u> into an <u>improper fraction</u> .	把以下 <u>帶分數</u> 寫成 <u>假分數</u> 。
4.085 is read as four point zero eight five.	4.085 讀作四點零八五。
Which digit in 35.62 is in <u>hundredths place</u> ?	在 35.62 這個數中，哪一個數字是在 <u>百分位</u> ？

Exercise 2

1. Consider the number 65.013. Determine whether each of the following is true for the number.

Put a '✓' or a '✗' in each of the boxes.

- (a) '1' is in the hundredths place. ☐ (b) '1' in the number represents 10. ☐
- (c) '6' in the number represents 60 000. ☐ (d) '0' is in the tenths place. ☐
- (e) '5' in the number represents 50. ☐ (f) It is equal to $65\frac{13}{100}$. ☐

2. Reduce the following fractions into their simplest forms.

- (a) $\frac{24}{80}$ _____ (b) $\frac{120}{135}$ _____ (c) $\frac{126}{42}$ _____

3. Convert the following decimals into fractions.

(a) 0.55 _____ (b) 3.75 _____ (c) 15.625 _____

4. Convert the following fractions into decimals.

(a) $\frac{98}{200}$ _____ (b) $3\frac{1}{8}$ _____ (c) $\frac{27}{25}$ _____

5. Compare the values of each of the following pairs of fractions. Put a '>' or '<' in each of the boxes.

(a) $\frac{4}{5}$ $\square$ $\frac{6}{7}$ (b) $\frac{11}{8}$ $\square$ $\frac{14}{11}$ (c) $\frac{5}{13}$ $\square$ $\frac{7}{17}$

6. Arrange each of the following sets of numbers in *ascending order*.

(a) 6.7, 8.03, 0.969, 10.34 _____
 (b) 3.6, 3.06, 36, 30.6 _____

7. Arrange each of the following sets of numbers in *descending order*.

(a) $\frac{2}{3}$, $\frac{5}{6}$, $\frac{7}{12}$, $\frac{1}{2}$ _____
 (b) 0.5, $\frac{1}{8}$, $1\frac{1}{16}$, 1.15, $1\frac{1}{4}$, 0.12 _____

Evaluate the following. (8 – 19)

8. $5.4 - 3.2 + 2.6$ _____

9. $19.8 \div 0.33$ _____

10. $12.6 \div 0.7 - 2.25 \times 4$ _____

11. $(6.6 \times 0.3 - 1.5) \times 4$ _____

12. $\frac{11}{30} + \frac{5}{6} - \frac{7}{10}$ _____

13. $\frac{7}{30} \times \frac{6}{7} \times \frac{10}{12}$ _____

14. $1\frac{19}{45} \div 32 \div 1\frac{1}{7}$ _____

15. $\left(3 - \frac{2}{5}\right) \div 2\frac{11}{35}$ _____

16. $\frac{7}{10} \div 1\frac{1}{2} - \frac{1}{6} \times \frac{2}{3}$ _____

17. $\frac{2}{3} \times \left(\frac{11}{12} - \frac{5}{6}\right) + \frac{5}{8}$ _____

18. $2.5 \div 3\frac{3}{4} \times (2 + 0.75)$ _____

19. $0.25 \times \left(2 - \frac{7}{12}\right) \div 1\frac{1}{16}$ _____

.....
 ascending order 由小至大排列

Find the result of each of the following. (20 – 22)

20. 6.5 L orange juice is divided into 26 cups equally. How much orange juice is there in each cup in L? _____

21. Wendy is 35 years old and Jacky is 15 years old. What fraction of Wendy's age is Jacky's age? _____

22. A bag of *coconuts* weighs 10.5 kg. If we sell 5 bags of coconuts for \$756, how much does one kilogram of coconuts cost? _____

Solve the following problems. Show your working steps clearly. (23 – 26)

23. Each box of apples costs \$35.8. It costs \$4.3 more than each box of oranges. Nelson pays \$250 for 5 boxes of oranges. How much change should he get?

24. A bag of peanuts weighing $2\frac{4}{5}$ kg costs \$30. Mary buys a bag of peanuts that weighs $4\frac{2}{3}$ kg. How much should she pay?

25. Red roses cost \$50.4 per dozen, yellow roses cost \$81.6 per dozen.
How much do 5 red roses and 8 yellow roses cost?



26. Linda uses $\frac{1}{7}$ of a bag of flour to make some bread and $\frac{3}{5}$ of the rest of it to make some biscuits. What fraction of the flour is left?



3

Approximations

A. Unit Conversion

The following table shows some common unit conversion.

Quantity	Example
Time	1 minute (min) = 60 seconds (s)
	1 hour (h) = 60 minutes (min)
	1 day = 24 hours (h)
Weight	1 g = 1000 mg
	1 kg = 1000 g
Length	1 cm = 10 mm
	1 m = 100 cm
	1 km = 1000 m
Capacity	1 mL = 1 cm ³
	1 L = 1000 mL
	1 L = 1000 cm ³
	1 m ³ = 1000 L



Example 1

Express 60 cm in the following units.

(a) mm

(b) m

Solution

$$\begin{aligned}
 \text{(a)} \quad 60 \text{ cm} &= 60 \times 10 \text{ mm} \\
 &= \underline{\underline{600 \text{ mm}}}
 \end{aligned}$$

$$\begin{aligned}
 \text{(b)} \quad 60 \text{ cm} &= \frac{60}{100} \text{ m} \\
 &= \underline{\underline{0.6 \text{ m}}}
 \end{aligned}$$



Example 2

Express 75 min in the following units.

(a) s

(b) h

Solution

$$\begin{aligned} \text{(a)} \quad 75 \text{ min} \\ &= 75 \times 60 \\ &= \underline{\underline{4500}} \text{ s} \end{aligned}$$

$$\begin{aligned} \text{(b)} \quad 75 \text{ min} \\ &= \frac{75}{60} \text{ h} \\ &= \underline{\underline{1.25}} \text{ h} \end{aligned}$$

B. Approximate Value

Mathematical term	Example
Exact value	7.56 is the exact value of 2.1×3.6 .
Approximate value	7.6 is an approximate value of 7.56.

Rounding off is a method of finding an approximate value.

Take 17 825.364 as an example. It can be rounded off as follows:

Approximate value	Degree of accuracy
20 000	correct to the nearest ten thousand
18 000	correct to the nearest thousand
17 800	correct to the nearest hundred
17 830	correct to the nearest ten
17 825	correct to the nearest one
17 825.4	correct to the nearest tenth or correct to 1 decimal place
17 825.36	correct to the nearest hundredth or correct to 2 decimal places

**Example 3**

- (a) Round off 98 467 to the nearest thousand.
- (b) Round off 4.98 to 1 decimal place.

Solution

(a) $98\ 4\cancel{6}7 \approx \underline{\underline{98\ 000}}$ (correct to thousand)

(b) $4.98 = \underline{\underline{5.0}}$ (correct to 1 decimal place)

**Example 4**

- (a) Round off 46.95 kg to the nearest kg.
- (b) Round off 46.95 kg to the nearest 0.1 kg.

Solution

(a) $46.95\ \text{kg} \approx \underline{\underline{47\ \text{kg}}}$ (correct to nearest kg)

(b) $46.95\ \text{kg} = \underline{\underline{47.0\ \text{kg}}}$ (correct to the nearest 0.1 kg)

**Example 5**

Express the following fractions in decimals and round off your results to 2 decimal places.

(a) $\frac{1}{16}$

(b) $\frac{7}{8}$

Solution

(a) $\frac{1}{16} = 0.0625$
 $= \underline{\underline{0.06}}$ (correct to 2 decimal places)

(b) $\frac{7}{8} = 0.875$
 $= \underline{\underline{0.88}}$ (correct to 2 decimal places)

C. Solving Problems by Approximations

When handling problems involving numbers in daily life, we may use approximate values to do calculations to get a result close to the exact value.

For example, if we have \$45 and each piece of cake costs \$4.8, about how many pieces of cake can we buy?



Firstly, we can round off the cost of a piece of cake to the nearest dollar, i.e. \$5. Then, by computing $\frac{45}{5}$, we get 9. Therefore, we can buy about 9 pieces of cake. This is simpler than finding the exact value $\left(\text{i.e. } \frac{45}{4.8}\right)$.



Example 6

There are 596 students joining the school picnic. If one coach can carry 40 students, estimate the number of coaches required to carry all the students.

Solution

There are about 600 students joining the school picnic.

∴ The required number of coaches

$$\begin{aligned} &\approx \frac{600}{40} \\ &= \underline{\underline{15}} \end{aligned}$$

◀ The symbol '≈' means
'approximately equal to'.



Example 7

Calvin walks 49 minutes from one end of a sidewalk to the other end. If he walks about 81.5 m in one minute, estimate the length of the sidewalk in km.

Solution

Length of the sidewalk

$$= 49 \times 81.5 \text{ m}$$

$$\approx 50 \times 80 \text{ m}$$

$$= 4000 \text{ m}$$

$$= \frac{4000}{1000} \text{ km}$$

$$= \underline{\underline{4 \text{ km}}}$$



Key Terms / Phrases



Pronunciation

unit conversion	單位轉換	rounding off	四捨五入法	estimate	估算
exact value	真確值	correct to	捨入至 / 準確至		
approximate value	近似值	degree of accuracy	準確度		



Useful Sentences

Round off the following numbers to 1 decimal place.	把下列各數捨入至一位小數。
<u>Estimate</u> the average number of students in a school.	<u>估算</u> 每間學校的平均學生人數。
Estimate how many books Harry can buy.	估算思朗可買多少本書。
Estimate whether Amy can afford to buy 12 dresses.	估算雅文能否購買 12 條裙子。
The symbol ' $\approx$ ' means <u>approximately equal to</u> .	符號「 $\approx$ 」表示 <u>大約等於</u> 。

Exercise 3

1. Complete the following unit conversions.

- | | |
|---------------------------------|-------------------------------|
| (a) 100 min = _____ s | (b) 5 h = _____ min |
| (c) 1800 s = _____ h | (d) 1200 g = _____ kg |
| (e) 0.85 L = _____ mL | (f) 6 L = _____ cm^3 |
| (g) 3.5 m^3 = _____ L | (h) 150 m = _____ cm |
| (i) 10 m = _____ mm | (j) 0.5 km = _____ cm |

2. In each of the following, determine whether the underlined number is an exact value or an approximate value. Put a '✓' in the appropriate box.

	Exact value	Approximate value
(a) 5 kg equals <u>5000</u> g.	☐	☐
(b) Number of <i>passengers</i> of the train is around <u>900</u> .	☐	☐
(c) The price of a shirt is \$ <u>58</u> .	☐	☐
(d) There are about <u>1200</u> students in the school.	☐	☐

3. Round off the following numbers to the required degree of accuracy.

Number	8637	742 218	37 425	99 999
Correct to the nearest ten thousand				
Correct to the nearest thousand				
Correct to the nearest hundred				
Correct to the nearest ten				

4. Round off the following numbers to the required degree of accuracy.

Number	3.4637	0.3389	6.406 92	0.9999
Correct to the nearest one				
Correct to 1 decimal place				
Correct to 2 decimal places				
Correct to 3 decimal places				

5. Round off the following fractions to the nearest one.

Fraction	$\frac{2}{3}$	$3\frac{1}{3}$	$1\frac{5}{8}$	$8\frac{7}{15}$	$\frac{15}{4}$
Correct to the nearest one					

6. (a) Round off 7.45 m to the nearest m. _____

(b) Round off 496 mL to the nearest 10 mL. _____

(c) Round off \$163.89 to the nearest \$0.1. _____

(d) Round off 7649 g to the nearest kg. _____

7. Round off each of the numbers in the following expressions to the nearest one first, and then find the approximate values of the expressions.

(a) $3.2 + 2.7$ _____

(b) $15.17 - 9.85$ _____

(c) 7.06×3.9 _____

(d) $19.8 \div 10.4$ _____

8. Round off each of the numbers in the following expressions to the nearest hundred first, and then find the approximate values of the expressions.

(a) $2283 - 1098$ _____

(b) $113 + 202 - 97$ _____

(c) 189×101 _____

(d) $999 \div 218$ _____

9. 6 pieces of toys cost \$117. Estimate the cost of one piece of toy. _____

10. A box weighs 59.7 kg. Estimate the total weight of 3 boxes. _____

Solve the following problems. Show your working steps clearly. (11 – 15)

11. If Raymond can type 38 English words in one minute, estimate the number of words that can be typed in two hours.

12. In a theatre, there are 89 seats in each row. If there are 71 rows in the theatre, about how many seats are there in the theatre?

13. A major shopping centre has approximately 49 780 visitors per day. Estimate the total number of visitors per month.

- 14.** Polly has \$1605 as savings. If she spends \$80 every day, estimate the number of days needed for her to use up the savings.
- 15.** The costs of photo frames *A*, *B* and *C* are \$40.2, \$69.6 and \$109.7 respectively. Estimate the total cost of 2 pieces of *A*, 3 pieces of *B* and 1 piece of *C*.

4

Basic Algebra and Simple Equations

A. Introduction to Algebra

Mathematical term	Meaning	Example
Algebraic symbol	A symbol representing a value. We often use English letters as algebraic symbols.	x, y, z
Algebraic expression	An expression that contains one or more algebraic symbols.	$7y - 5, \frac{3x}{2}, 8a^2$

Word phrase	Algebraic expression
Add 2 to a	$a + 2$
The sum of x and b	$x + b$
Subtract u from w	$w - u$
3 times a	$3a$ ($3a$ represents $3 \times a$.)
The product of x and $2y$	$2xy$
Divide c by 6	$\frac{c}{6}$ ($\frac{c}{6}$ represents $c \div 6$.)
One-fourth of m minus 2	$\frac{m}{4} - 2$
The square of t	t^2



Example 1

Represent the following word phrases by algebraic expressions.

- (a) Add 3 to the product of y and 4.
 (b) Divide the square of c by 5 and then add 4 to the result.

Solution

- (a) The required algebraic expression
 $= y \times 4 + 3$
 $= \underline{\underline{4y + 3}} \quad \blacktriangleleft \text{ } 4y \text{ represents } y \times 4.$

- (b) The required algebraic expression
 $= c^2 \div 5 + 4$
 $= \frac{c^2}{5} + 4$ ◀ $\frac{c^2}{5}$ represents $c^2 \div 5$.



Example 2

There are 5 bags of chocolates in a box and each bag of chocolates weighs x g.

- (a) What is the total weight of 5 bags of chocolates?
 (b) The box of chocolates are shared among 9 students evenly and no chocolates are left. What is the weight of chocolates does each student get?

Solution

- (a) Total weight of 5 bags of chocolates
 $= 5 \times x$ g
 $= \underline{\underline{5x}}$ g
- (b) Weight of chocolates that each student gets
 $= 5x \div 9$ g
 $= \frac{5x}{9}$ g

B. Simple Equations

An equality that contains an unknown is called an equation. For example, $x + 2 = 5$ is an equation with an unknown x .



Example 3

Solve $x - 5 = 13$.

Solution

$$\begin{aligned}
 x - 5 &= 13 \\
 x - 5 + 5 &= 13 + 5 &< \text{Add 5 to both sides of the equation.} \\
 x &= \underline{\underline{18}}
 \end{aligned}$$

**Example 4**Solve $3y + 6.5 = 9.8$.**Solution**

$$3y + 6.5 = 9.8$$

$$3y + 6.5 - 6.5 = 9.8 - 6.5$$

◀ Subtract 6.5 from both sides of the equation.

$$3y = 3.3$$

$$\frac{3y}{3} = \frac{3.3}{3}$$

◀ Divide both sides of the equation by 3.

$$y = \underline{\underline{1.1}}$$

**Example 5**Solve $5(z - 7) = 40$.**Solution**

$$5(z - 7) = 40$$

$$\frac{5(z - 7)}{5} = \frac{40}{5}$$

◀ Divide both sides of the equation by 5.

$$z - 7 = 8$$

$$z - 7 + 7 = 8 + 7$$

◀ Add 7 to both sides of the equation.

$$z = \underline{\underline{15}}$$

C. Application of Equations

Steps of setting up an equation to solve a problem:

1. Identify the unknown in the problem.
2. Represent the unknown by a letter.
3. Set up an equation based on the given information.
4. Solve the equation.
5. Write down the answer to the problem.



Example 6

There are y passengers on a bus. After $\frac{2}{5}$ of them get off, 33 passengers remain on the bus. Set up an equation to represent the situation.

Solution

The fraction of passengers remained $= 1 - \frac{2}{5}$
 $= \frac{3}{5}$

$\therefore$ The required equation is $\frac{3}{5}y = 33$.



Example 7

There are 15 chickens and n pigs in a farm. Altogether they have 98 feet. Find the value of n .

Solution

Based on the given information, we can set up an equation as follows:

$$2 \times 15 + 4n = 98$$

$$30 + 4n = 98$$

$$30 + 4n - 30 = 98 - 30$$

$$4n = 68$$

$$\frac{4n}{4} = \frac{68}{4}$$

$$n = \underline{\underline{17}}$$

◀ A chicken has two feet and a pig has four.

	Number	Number of feet
Chicken	15	2×15
Pig	n	$4n$



Example 8

Leo has eight \$0.5 coins and some \$0.2 coins. If these coins can just exchange for two \$10 banknotes, how many \$0.2 coins does Leo have?

Solution

Let x be the number of \$0.2 coins that Leo has.

$$0.5 \times 8 + 0.2 \times x = 2 \times 10$$

$$4 + 0.2x = 20$$

$$4 + 0.2x - 4 = 20 - 4$$

$$0.2x = 16$$

$$\frac{0.2x}{0.2} = \frac{16}{0.2}$$

$$x = 80$$

$\therefore$ Leo has 80 \$0.2 coins.

Type of coins	Number of coins	Value of the coins
\$ 0.5	8	$\$0.5 \times 8$
\$ 0.2	x	$\$0.2x$



Key Terms / Phrases



Pronunciation

algebra

代數

unknown

未知數

let 設

algebraic symbol

代數符號

equation

方程

algebraic expression

代數式

solve

解



Useful Sentences

Which of the following are <u>algebraic expression</u> ?	下列哪些是 <u>代數式</u> ?
Set up an <u>equation</u> in x .	建立一個以 x 為未知數的 <u>方程</u> 。
<u>Express</u> the total area of the figure in terms of y .	以 y <u>表示</u> 圖形的總面積。
The number equals half the product of b and c .	該數等於 b 與 c 的積的一半。
Find the value of the <u>unknown</u> in each equation.	求各方程中的 <u>未知數</u> 的值。
The number of boys is half that of the girls in the class.	班中男生人數是女生人數的一半。
Find how many more boys than girls there are.	求男生比女生多出的數目。
My uncle's age is 4 times that of his son.	伯父的年齡是他的兒子的四倍。

What are their present ages?

他們現年多少歲？

Exercise 4

1. In each of the following, determine whether it is an algebraic expression or an equation.
Put a '✓' in the *appropriate* box.

		Algebraic expression	Equation
(a)	$5b + 4$		
(b)	$7c + 3 = 17$		
(c)	$3d^2 + 8d = 1$		
(d)	$x^2 - 100$		
(e)	$\frac{2}{3}m - 6n = 7$		

Represent the following word phrases by algebraic expressions. (2 – 5)

- Add a to 10. _____
- Subtract b from 7. _____
- Multiply 5 by c . _____
- Divide 4 by d . _____

Fill in the blanks with suitable algebraic expressions. (6 – 10)

- The old bus fare is \$5.5. It is increased by $\$a$. The new bus fare is \$_____.
- Henry weighs b kg. He is 10 kg heavier than his friend. Henry's friend weighs _____ kg.
- Each box contains y cakes. If Betty buys 3 boxes of cakes, then she has _____ cakes.
- A bag contains 50 sweets. It is shared among k children evenly and no sweets are left. Each child gets _____ sweets.
- If the length of a square is m cm, then the total area of 25 squares is _____ cm^2 .

.....
appropriate 適當的

Solve the following equations. (11 – 22)

11. $a + 13 = 20$ $a =$ _____

12. $b - 50 = 123$ $b =$ _____

13. $3c = 57$ $c =$ _____

14. $\frac{d}{5} = 12$ $d =$ _____

15. $7e - 27 = 36$ $e =$ _____

16. $4f + 21 = 41$ $f =$ _____

17. $3(g + 7) = 36$ $g =$ _____

18. $\frac{h-3}{4} = 8$ $h =$ _____

19. $0.7w = 4.9$ $w =$ _____

20. $\frac{x}{2.6} = 1.5$ $x =$ _____

21. $5y + 1.9 = 9.4$ $y =$ _____

22. $\frac{z-0.23}{6} = 0.73$ $z =$ _____

Set up an algebraic equation to represent each of the following situations. (23 – 28)

23. Nicole has x stamps and Tom has 25 stamps. They have 59 stamps altogether. _____

24. Annie is 15 years old now. She was y years old last year. _____

25. There are p dogs and 12 cats. There are 7 more dogs than cats. _____

26. The hourly wage of Peter is \$130. He worked for z hours last week and earned \$3380. _____

27. Each exercise book costs \$ d . Kive has \$100. After buying 4 exercise books, Kive has \$16 left. _____

28. The length of a rectangle is 12 cm. The width of the rectangle is shorter than its length by a cm. The perimeter of the rectangle is 42 cm. _____

Solve the following problems using equations. Show your working steps clearly. (29 – 33)

29. 3 times 17 is equal to the sum of t and 16. What is the value of t ?

30. Edward has a pack of sweets. After eating 9 sweets, he gives away the rest to 8 of his friends. If each friend gets 7 sweets, how many sweets are there *originally*?
31. Five bottles of milk cost \$4.4 more than four bottles of juice. If one bottle of milk costs \$5.2, find the cost of one bottle of juice.
32. Four years ago, the age of Paul was twice that of John. John is 18 years old now. How old is Paul now?
33. Miss Cheung spends $\frac{1}{8}$ of her *savings* on personal *ornaments* and $\frac{5}{6}$ on clothing.
If her savings still has \$130 left, find the original amount of her savings.



.....

originally 原來 savings 儲蓄 ornament 飾物

5

Percentages

A. Concept of Percentages

A percentage is a fraction with 100 as its denominator.

For example, $20\% = \frac{20}{100}$ and $125\% = \frac{125}{100}$.

◀ Percentages are often expressed in % (percent).



Note that $100\% = \frac{100}{100} = 1$ and 1 (or 100%) means the whole.

Convert a fraction into a percentage	Convert a percentage into a fraction
(a) $\frac{1}{5} = \frac{1}{5} \times 100\% = 20\%$ ◀ Alternatively, $\frac{1}{5} = \frac{1 \times 20}{5 \times 20} = \frac{20}{100} = 20\%$ (b) $1\frac{1}{10} = \frac{11}{10} \times 100\% = 110\%$	(a) $75\% = \frac{75}{100} = \frac{3}{4}$ (b) $160\% = \frac{160}{100} = \frac{8}{5} = 1\frac{3}{5}$
Convert a decimal into a percentage	Convert a percentage into a decimal
(a) $0.5 = 0.5 \times 100\% = 50\%$ ◀ $0.5 \xrightarrow{\uparrow} = 50\%$ (b) $1.2 = 1.2 \times 100\% = 120\%$	(a) $25\% = \frac{25}{100} = 0.25$ ◀ $25\% \xrightarrow{\uparrow} = 0.25$ (b) $140\% = \frac{140}{100} = 1.4$



Example 1

- (a) Convert $\frac{3}{8}$ and 0.37 into percentages.
- (b) Hence, arrange $\frac{3}{8}$, 0.37 and 38% in descending order.

Solution

(a) $\frac{3}{8} = \frac{3}{8} \times 100\% = \underline{\underline{37.5\%}}$

$0.37 \xrightarrow{\uparrow} = \underline{\underline{37\%}}$

◀ Move the decimal point 2 digits to the right and add the % sign.

(b) $\therefore 38\% > 37.5\% > 37\%$

$\therefore 38\% > \frac{3}{8} > 0.37$



Example 2

- (a)** Convert $33\frac{1}{3}\%$ into a fraction.
- (b)** Convert 12.5% into a decimal.

Solution

$$\begin{aligned} \text{(a)} \quad 3\frac{1}{3}\% &= \frac{100}{3}\% \\ &= \frac{100}{3} \times \frac{1}{100} \\ &= \frac{1}{3} \end{aligned}$$

(b) $12.5\% \underline{\underline{0.}}$

◀ Move the decimal point 2 digits to the left and remove the % sign.



Example 3

Find the values of the following expressions. Express your answers in percentages.

- (a) $38\% + 83\%$
 (c) $97\% - 79\%$
- (b) $1 + 12.5\%$
 (d) $1 - 80\%$

Solution

(a) $38\% + 83\% = (38 + 83)\%$
 $= 121\%$

(b) $1 + 12.5\% = 100\% + 12.5\%$ ◀ $1 = 100\%$
 $= (100 + 12.5)\%$
 $= 112.5\%$

(c) $97\% - 79\% = (97 - 79)\%$
 $= 18\%$

(d) $1 - 80\% = 100\% - 80\%$
 $= (100 - 80)\%$
 $= 20\%$

**Example 4**

Find the values of the following expressions.

(a) $22 \times 50\%$

(b) $30 \div 25\%$

Solution

$$\begin{aligned}
 \text{(a)} \quad 22 \times 50\% &= 22 \times \frac{50}{100} \\
 &= 22 \times \frac{1}{2} \\
 &= \underline{\underline{11}}
 \end{aligned}$$

◀ Convert percentages into fractions.

$$\begin{aligned}
 \text{(b)} \quad 30 \div 25\% &= 30 \div \frac{25}{100} \\
 &= 30 \div \frac{1}{4} \\
 &= 30 \times 4 \\
 &= \underline{\underline{120}}
 \end{aligned}$$

B. Applications of Percentages

In the primary school, we learnt about the percentage of a part to the whole.

$$\text{Percentage of the part} = \frac{\text{part}}{\text{whole}} \times 100\%$$

**Example 5**

There are 40 books on a shelf. 8 of them are English books. Find the percentage of English books on the shelf.

Solution

The required percentage

$$\begin{aligned}
 &= \frac{8}{40} \times 100\% \\
 &= \underline{\underline{20\%}}
 \end{aligned}$$



Example 6

Kelly has 160 marbles. 30 of them are red marbles, 70 of them are blue marbles and the rest are green marbles.

- (a) What percentage of the marbles are blue marbles?
 (b) What percentage of marbles are green marbles?

Solution

- (a) The required percentage

$$\begin{aligned}
 &= \frac{70}{160} \times 100\% \\
 &= \underline{\underline{43.75\%}}
 \end{aligned}$$

- (b) Number of green marbles

$$= 160 - 30$$

$$= 60$$

The required percentage

$$\begin{aligned}
 &= \frac{60}{160} \times 100\% \\
 &= \underline{\underline{37.5\%}}
 \end{aligned}$$

When the value of the whole and the percentage of a part to the whole are given, we can find the value of the part.

$$\text{Part} = \text{whole} \times \text{percentage of the part}$$



Example 7

There are 680 students in a hall. If 62.5% of them are girls, find the number of girls.

Solution

Number of girls

$$= 680 \times 62.5\%$$

$$= 680 \times \frac{62.5}{100}$$

$$= \underline{\underline{425}}$$

**Example 8**

In a school, there are 500 students, among whom 15% go to school on foot, 62% go to school by MTR, and the rest go to school by bus. Find the number of students who go to school by bus.

Solution

Percentage of students who go to school by bus

$$= 1 - 15\% - 62\%$$

$$= 23\%$$

The required number of students

$$= 500 \times 23\%$$

$$= 500 \times \frac{23}{100}$$

$$= \underline{\underline{115}}$$

**Example 9**

Solve the equation $y \times 60\% = 9$.

Solution

$$y \times 60\% = 9$$

$$y \times \frac{60}{100} = 9$$

$$y \times \frac{3}{5} = 9$$

$$y \times \frac{3}{5} \times \frac{5}{3} = 9 \times \frac{5}{3}$$

$$y = \underline{\underline{15}}$$

**Key Terms / Phrases**

percentage 百分數

descending order 由大至小排列

ascending order 由小至大排列



Pronunciation



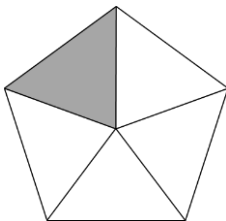
Useful Sentences

80% is read as eighty per cent.	80% 讀作百分之八十。
Express '150 m out of 250 m' in <u>percentages</u> .	以 <u>百分數</u> 表示「250 m 中的 150 m」。
If 60% of a number is 42, find the number.	若某數的 60% 等於 42，求該數。
Harry has \$14, which is 35% less than what Amy has.	思朗有款項 \$14，他的款項比雅文少 35%。
The library occupies 8% of the area of the school.	圖書館佔學校面積的 8%。
<u>What percentage</u> of the figure is shaded?	陰影部分佔全圖的 <u>百分之幾</u> ？

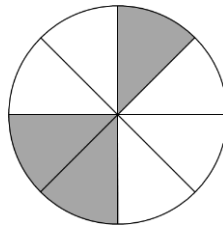
Exercise 5

1. In each of the following, what percentage of the figure is shaded?

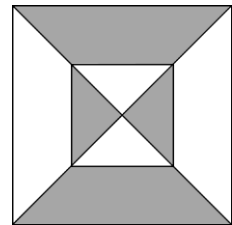
(a)



(b)



(c)



2. Complete the following table.

Percentage	85%			12.5%	
Fraction		$\frac{1}{4}$			$3\frac{1}{5}$
Decimal			0.7		

3. (a) Arrange $\frac{1}{8}$, 12% and 0.1 in descending order. _____

- (b) Arrange 46%, 4.6 and $4\frac{2}{5}$ in ascending order. _____

4. Find the values of the following expressions. Express your answers in percentages.

(a) $40\% + 25\%$ _____ (b) $1 - 30\%$ _____

5. Find the values of the following expressions.

(a) $150 \times 54\%$ _____ (b) $80 \div 64\%$ _____

6. Solve the following equations. Express your answers in decimals if necessary.

(a) $a + 20\% = 1$ _____

(b) $\frac{b}{3} = 50\%$ _____

(c) $c \times 175\% = 21$ _____

(d) $d \times (1 - 65\%) = 14$ _____

7. What is 45% of 160? _____

8. What percentage of 52 is 13? _____

9. 150% of a number is 72. Find the number. _____

10. There are 80 passengers in a bus, 56 passengers are adults. What percentage of the passengers are adults? _____

11. A kind of fruit juice contains 35% orange juice. How much orange juice does 180 mL fruit juice contain? _____

12. Polly has a saving of \$4500. If she spends 6% of her saving on a dress, how much is the dress? _____

13. There are 18 girls and 22 boys in a class. What percentage of the class are boys? _____

14. There are 50 balls in a bag, where 8 of them are white and the rest are black. Find the percentage of black balls in the bag. _____

15. A wire is 30 cm long. If 19.2% of the wire is cut away, find the length of the remaining part. _____

16. There are 20 questions in a Mathematics exercise. Jimmy answers 15% of them incorrectly. How many questions does Jimmy answer correctly? _____

17. Peter has 40 square stamps and 10 triangular stamps.

(a) What percentage of stamps are square in shape? _____

(b) What percentage of stamps are triangular in shape? _____

Solve the following problems. Show your working steps clearly. (18 – 21)

18. There is 600 mL of coffee in a cup. If 150 mL of milk is added and stirred to make a drink, what is the percentage of milk in the drink?

- 19.** After Tina has eaten 23% of a box of candies, 154 candies are left.
- (a)** What percentage of the candies is left?
 - (b)** What is the original number of candies in the box?
- 20.** Karen has 150 books, among which 10% are Japanese books, 36% are English books and the rest are Chinese books. How many Chinese books does Karen have?
- 21.** There are 40 members in a school choir. 28 of them are from S1, 8 of them are from S2 and the rest are from S3. Find the percentage of S3 members in the school choir.