

HOLIDAY HOMEWORK 假期作业

IGCSE Mathematics

Exercise sheets, topic by topic.

每个单元：练习卷。

For class or self-study • no answer keys included.

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1 Types of number – Part 1

Name: _____ Class: _____ Date: _____

Vocabulary 词汇

Write each word three times. 把每个单词抄写三遍。

English	中文	Write it 3 times (English)
integers	整数	_____
factor	因数	_____
multiple	倍数	_____
prime number	质数	_____
product	乘积	_____
factor tree	因数树	_____

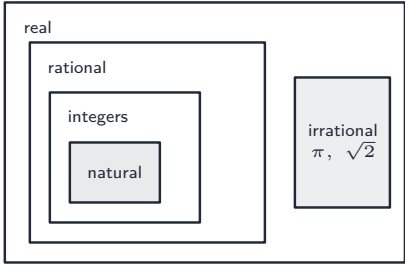
Recall

You need the right words for the different kinds of number — the examiner gives marks for using them correctly.

New ideas

Read these first, then do the Practice.

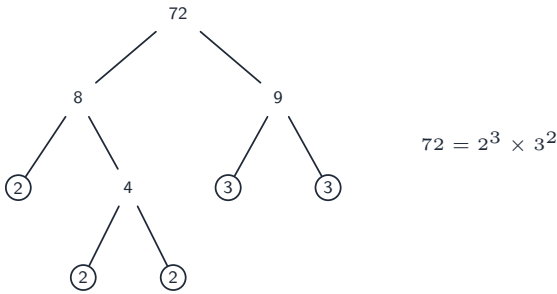
■ 1 Types of number



- **integers** 整数 — whole numbers: $\dots, -2, -1, 0, 1, 2, \dots$
- a **factor** 因数 divides exactly (the factors of 12 are 1, 2, 3, 4, 6, 12);
- a **multiple** 倍数 is the number times an integer (multiples of 5: 5, 10, 15, ...);
- a **prime number** 质数 has exactly two factors (2, 3, 5, 7, 11, ...).

■ 2 Prime factors

Every whole number is a **product** 乘积 of primes. Find them with a **factor tree** 因数树:



So $72 = 2^3 \times 3^2$.

Watch out: a **prime** has *exactly two* factors, so 1 is **not** prime (it has only one factor) and 2 *is* prime. A **factor** divides into a number; a **multiple** is that number times an integer — don't swap them.

Practice

Try these in order.

1.1 List all the factors of 12. [2]

1.2 Write down the first four multiples of 5. [1]

1.3 Is 9 a prime number? Explain. [1]

1.4 Write 36 as a product of its prime factors. [2]

1.5 Write down the next two prime numbers after 7. [1]

1.6 Challenge. Write 60 as a product of its prime factors, in index form. [3]

1 Fractions, decimals, percentages – Part 2

Name: _____ Class: _____ Date: _____

Vocabulary 词汇

Write each word three times. 把每个单词抄写三遍。

English	中文	Write it 3 times (English)
percentage	百分比	_____
fraction	分数	_____

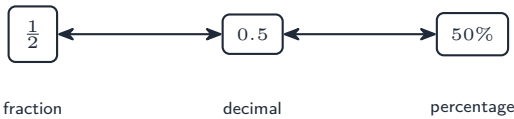
Recall

Fractions, decimals and percentages are three ways of writing the same value.

New ideas

Read these first, then do the Practice.

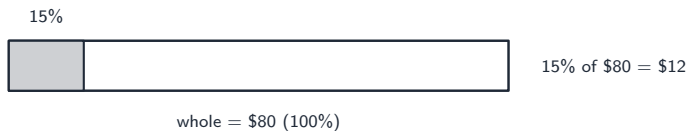
■ 1 Three ways to write a value



- fraction → decimal: divide top by bottom ($\frac{3}{8} = 3 \div 8 = 0.375$);
- decimal → **percentage** 百分比: multiply by 100 ($0.07 = 7\%$);
- percentage → **fraction** 分数: put over 100 ($7\% = \frac{7}{100}$).

■ 2 Percentage of an amount

To find a percentage of an amount, change the percentage to a decimal and multiply:



$$15\% \text{ of } \$80 = 0.15 \times 80 = \$12.$$

Watch out: to turn a decimal into a **percentage**, multiply by 100 (move the point two places); to go back, divide by 100. To find a percentage *of* an amount, change it to a decimal first ($15\% \rightarrow 0.15$) then multiply.

Practice

Try these in order.

1.6 Write $\frac{3}{4}$ as a decimal. [1]

1.7 Write 0.45 as a percentage. [1]

1.8 Write 20% as a fraction in its simplest form. [1]

1.9 Work out 30% of \$50. [2]

1.10 A test is marked out of 25. A student scores 18. Write this score as a percentage. [2]

1.11 Challenge. A jacket costs \$80. In a sale it is reduced by 25%. Work out the sale price. [3]

2 Simplifying and expanding – Part 1

Name: _____ Class: _____ Date: _____

Vocabulary 词汇

Write each word three times. 把每个单词抄写三遍。

English	中文	Write it 3 times (English)
Algebra	代数	_____
term	项	_____
Like terms	同类项	_____
expand	展开	_____

Recall

Algebra 代数 uses letters to stand for numbers. A **term** 项 is a single part, like $3a$ or $-b$.

New ideas

Read these first, then do the Practice.

■ 1 Collecting like terms

Like terms 同类项 have the same letter. You can add or subtract them:

$$\begin{array}{c} 3a + 2a + 4b - b \\ \downarrow \text{collect like terms} \\ 5a + 3b \end{array}$$

You **cannot** combine unlike terms (e.g. a and b stay separate).

■ 2 Expanding brackets

To **expand** 展开 a bracket, multiply each term inside by the term outside:

$$\begin{array}{ccc} & x & 2 \\ 3 & \boxed{3x} & \boxed{6} \end{array} \quad 3(x + 2) = 3x + 6$$

$$3(x + 2) = 3x + 6.$$

Watch out: you can only collect **like terms** (same letter) — a and b stay apart. When expanding, multiply the outside term by **every** term inside the bracket, keeping the signs.

Practice

Try these in order.

2.1 Simplify $5a + 3a$. [1]

2.2 Simplify $7x + 2y - 3x + 4y$. [2]

2.3 Expand $4(x + 3)$. [1]

2.4 Expand $2(3x - 5)$. [1]

2.5 Simplify $6p + 2q - p - 5q$. [2]

2.6 Challenge. Expand and simplify $3(x + 2) + 2(x - 1)$. [3]

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2 Equations and sequences – Part 2

Name: _____ Class: _____ Date: _____

Vocabulary 词汇

Write each word three times. 把每个单词抄写三遍。

English	中文	Write it 3 times (English)		
equation	方程	_____	_____	_____
sequence	数列	_____	_____	_____
term-to-term rule	递推规则	_____	_____	_____

Recall

An **equation** 方程 has an equals sign. Solving it means finding the value of the letter.

New ideas

Read these first, then do the Practice.

■ 1 Solving an equation

Do the **same** to both sides to keep it balanced, until the letter is alone:

$2x + 3 = 11$

(start)

$2x = 8$

subtract 3 from both sides

$x = 4$

divide both sides by 2

■ 2 Sequences

A **sequence** 数列 is a list of numbers with a rule. The **term-to-term rule** 递推规则 tells you how to get the next term:



Watch out: when solving, do the **same** to *both* sides at each step (subtract first, then divide) to keep the equation balanced. A sequence's **term-to-term rule** says how to get from one term to the *next*.

Practice

Try these in order.

2.6 Solve $x + 5 = 12$. [1]

2.7 Solve $3x = 21$. [1]

2.8 Solve $2x + 1 = 9$. [2]

2.9 Write down the next two terms of 2, 5, 8, 11, ... [2]

2.10 What is the term-to-term rule for 20, 17, 14, 11, ...? [1]

2.11 Challenge. Solve $3x - 4 = 11$. [2]

3 Coordinates – Part 1

Name: _____ Class: _____ Date: _____

Vocabulary 词汇

Write each word three times. 把每个单词抄写三遍。

English	中文	Write it 3 times (English)
coordinate	坐标	_____
midpoint	中点	_____

Recall

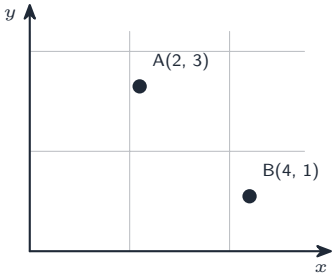
A **coordinate** 坐标 grid locates points. The position (x, y) gives the across value, then the up value.

New ideas

Read these first, then do the Practice.

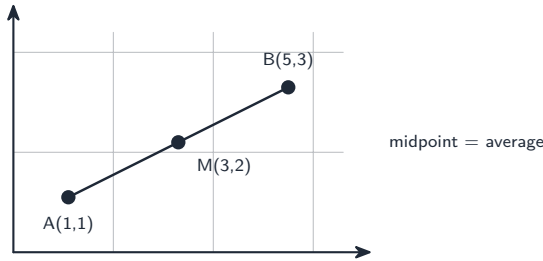
■ 1 Plotting points

The first number is x (across), the second is y (up):



■ 2 The midpoint

The **midpoint** 中点 of two points is the average of their coordinates:



$$\text{Midpoint} = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right).$$

Watch out: a coordinate is always (**across, up**) — the x value first, then y . The **midpoint** is the *average* of the two x -values and of the two y -values.

Practice

Try these in order.

3.1 Write down the coordinates of a point 3 across and 2 up. [1]

3.2 In the point $(5, 2)$, which number is the x -coordinate? [1]

3.3 Find the midpoint of $(2, 4)$ and $(6, 8)$. [2]

3.4 Find the midpoint of $(0, 0)$ and $(10, 4)$. [2]

3.5 Point A is $(3, 1)$ and point B is $(3, 7)$. What is special about the line AB? [1]

3.6 Challenge. A is (1,2) and the midpoint of AB is (4,5). Find the coordinates of B.

[3]

3 Straight-line graphs – Part 2

Name: _____ Class: _____ Date: _____

Vocabulary 词汇

Write each word three times. 把每个单词抄写三遍。

English	中文	Write it 3 times (English)
gradient	斜率	_____
intercept	截距	_____

Recall

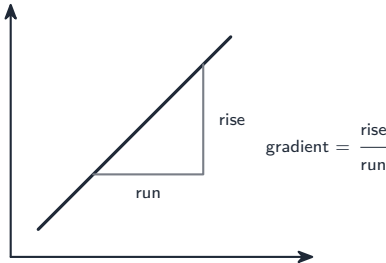
A straight-line graph has a **gradient** 斜率 (steepness) and crosses the *y*-axis at the **intercept** 截距.

New ideas

Read these first, then do the Practice.

■ 1 Gradient

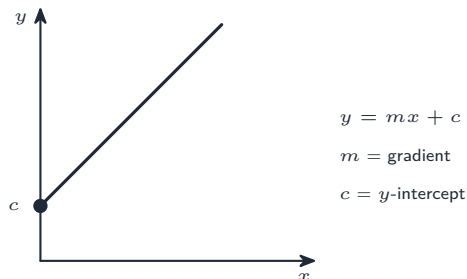
The gradient is how steep a line is — the rise divided by the run:



A bigger gradient means a steeper line.

■ 2 The equation $y = mx + c$

Every straight line can be written $y = mx + c$:



- m is the gradient;
- c is where the line crosses the y -axis (the y -intercept).

Watch out: gradient is **rise** $\div$ **run** — a bigger gradient is a steeper line. In $y = mx + c$, m is the gradient and c is the y -intercept (where the line crosses the y -axis), so don't mix them up.

Practice

Try these in order.

3.6 A line goes up 6 for every 2 across. What is its gradient? [1]

3.7 In $y = 3x + 4$, what is the gradient? [1]

3.8 In $y = 3x + 4$, where does the line cross the y -axis? [1]

3.9 Write the equation of a line with gradient 2 and y -intercept 5. [1]

3.10 Which is steeper: $y = 2x + 1$ or $y = 5x + 1$? [1]

3.11 **Challenge.** A line has gradient 3 and passes through $(0, -2)$. Write its equation, and find y when $x = 4$. [3]

4 Angle facts – Part 1

Name: _____ Class: _____ Date: _____

Vocabulary 词汇

Write each word three times. 把每个单词抄写三遍。

English	中文	Write it 3 times (English)
degrees	度	_____
vertically opposite	对顶角	_____

Recall

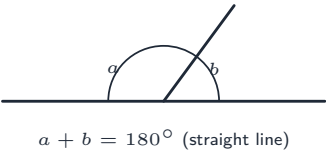
Angles are measured in **degrees** 度. Some angle facts let you find a missing angle without measuring.

New ideas

Read these first, then do the Practice.

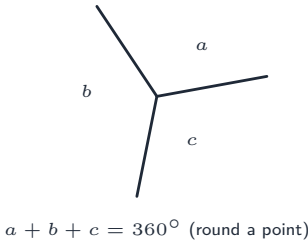
■ 1 Angles on a straight line

Angles on a straight line add up to 180° :



■ 2 Angles around a point

Angles around a point add up to 360° :



When two straight lines cross, the **vertically opposite** 对顶角 angles are equal.

Watch out: angles on a **straight line** add to 180° ; angles **around a point** add to 360° — pick the right total. When two lines cross, the **vertically opposite** angles are *equal*.

Practice

Try these in order.

4.1 Angles on a straight line add up to how many degrees? [1]

4.2 Angles around a point add up to how many degrees? [1]

4.3 Two angles on a straight line are 110° and x . Find x . [1]

4.4 Three angles around a point are 90° , 150° and y . Find y . [2]

4.5 Two straight lines cross. One angle is 65° . What is the vertically opposite angle? [1]

4.6 Challenge. Three angles on a straight line are 30° , x and $2x$. Find x . [3]

4 Triangles and parallel lines – Part 2

Name: _____ Class: _____ Date: _____

Vocabulary 词汇

Write each word three times. 把每个单词抄写三遍。

English	中文	Write it 3 times (English)		
parallel	平行	_____	_____	_____
alternate	内错角	_____	_____	_____
corresponding	同位角	_____	_____	_____

Recall

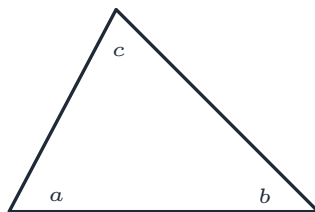
Triangles and parallel lines each have angle rules you can use.

New ideas

Read these first, then do the Practice.

■ 1 Angles in a triangle

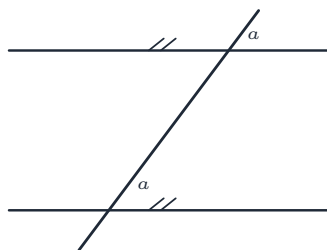
The three angles of a triangle add up to 180° :



$$a + b + c = 180^\circ$$

■ 2 Angles in parallel lines

When a line crosses two **parallel** 平行 lines, some angles are equal:



equal (Z / F angles)

- **alternate** 内错角 (Z) angles are equal;
- **corresponding** 同位角 (F) angles are equal.

Watch out: the three angles of a **triangle** add to 180° . With parallel lines, **alternate** (Z) angles are equal and **corresponding** (F) angles are equal — look for the Z or F shape.

Practice

Try these in order.

4.6 The angles in a triangle add up to how many degrees? [1]

4.7 A triangle has angles 50° and 60° . Find the third angle. [2]

4.8 A triangle has two equal angles of 70° each. Find the third angle. [2]

4.9 What do we call the equal “Z” angles in parallel lines? [1]

4.10 Two corresponding (F) angles: one is 75° . What is the other? [1]

4.11 **Challenge.** An isosceles triangle has a top angle of 40° and two equal base angles. Find each base angle. [3]

5 Units and perimeter – Part 1

Name: _____ Class: _____ Date: _____

Vocabulary 词汇

Write each word three times. 把每个单词抄写三遍。

English	中文	Write it 3 times (English)
metric	公制	_____
perimeter	周长	_____

Recall

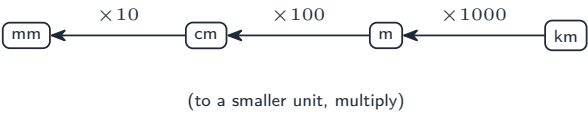
We measure length in **metric** 公制 units: millimetres (mm), centimetres (cm), metres (m) and kilometres (km).

New ideas

Read these first, then do the Practice.

■ 1 Converting units

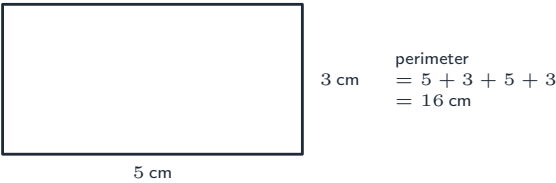
To change to a **smaller** unit, multiply:



So 1 cm = 10 mm, 1 m = 100 cm and 1 km = 1000 m.

■ 2 Perimeter

The **perimeter** 周长 is the total distance around the edge of a shape:



Add up all the side lengths.

Watch out: going to a **smaller** unit, *multiply* (m → cm is $\times 100$); to a **bigger** unit, *divide*. The **perimeter** is the distance *around* the edge — add up all the sides (it is a length, not an area).

Practice

Try these in order.

5.1 How many millimetres are there in 1 cm? [1]

5.2 Change 3 m into centimetres. [1]

5.3 Change 250 cm into metres. [1]

5.4 Find the perimeter of a rectangle 8 cm by 4 cm. [2]

5.5 A square has sides of 6 cm. Find its perimeter. [1]

5.6 Challenge. A rectangle has a perimeter of 20 cm and one side is 6 cm. Find the length of the other side. [3]

5 Area and circles – Part 2

Name: _____ Class: _____ Date: _____

Vocabulary 词汇

Write each word three times. 把每个单词抄写三遍。

English	中文	Write it 3 times (English)
area	面积	_____
radius	半径	_____
diameter	直径	_____
circumference	周长	_____

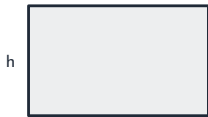
Recall

The **area** 面积 of a shape is the amount of space inside it, measured in square units (e.g. cm²).

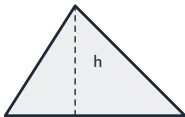
New ideas

Read these first, then do the Practice.

■ 1 Area of a rectangle and a triangle



area = base × height



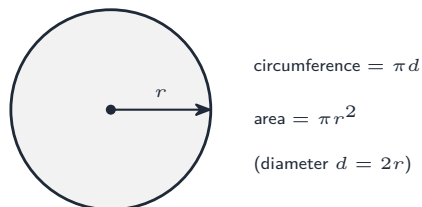
area = $\frac{1}{2}$ × base × height

- rectangle: area = base × height;

- triangle: $\text{area} = \frac{1}{2} \times \text{base} \times \text{height}$.

■ 2 The circle

A circle has a **radius** 半径 r (centre to edge) and a **diameter** 直径 $d = 2r$:



- **circumference** 周长 $= \pi d$;
- $\text{area} = \pi r^2$.

Watch out: **area** is in *square* units (cm^2); **perimeter/circumference** is a length (cm). For a circle, **circumference** $= \pi d$ but **area** $= \pi r^2$ — use the radius for the area, and remember $d = 2r$.

Practice

Try these in order.

5.6 Find the area of a rectangle 7 cm by 3 cm. [2]

5.7 Find the area of a triangle with base 6 cm and height 4 cm. [2]

5.8 A circle has a radius of 5 cm. Write down its diameter. [1]

5.9 Find the circumference of a circle with diameter 10 cm. (Use $\pi \approx 3.14$.) [2]

5.10 Find the area of a circle with radius 3 cm. (Use $\pi \approx 3.14$.) [2]

5.11 Challenge. A circle has a diameter of 14 cm. Find its area. (Use $\pi \approx 3.14$.) [3]

6 Pythagoras’ theorem – Part 1

Name: _____ Class: _____ Date: _____

Vocabulary 词汇

Write each word three times. 把每个单词抄写三遍。

English	中文	Write it 3 times (English)
right-angled triangle	直角三角形	_____
hypotenuse	斜边	_____
Pythagoras’ theorem	勾股定理	_____

Recall

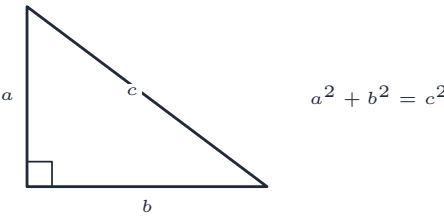
In a **right-angled triangle** 直角三角形, the longest side (opposite the right angle) is the **hypotenuse** 斜边.

New ideas

Read these first, then do the Practice.

■ 1 Pythagoras’ theorem

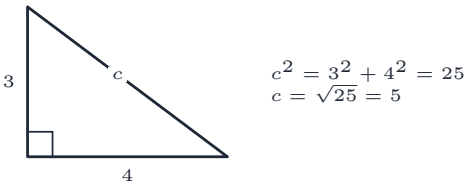
Pythagoras’ theorem 勾股定理 links the three sides:



$$a^2 + b^2 = c^2$$

■ 2 Finding the hypotenuse

To find the hypotenuse, square the two shorter sides, add, then take the square root:



Watch out: Pythagoras only works in a **right-angled** triangle, and c must be the **hypotenuse** (the longest side, opposite the right angle). To find the hypotenuse: square both shorter sides, **add**, then square-root.

Practice

Try these in order.

6.1 In a right-angled triangle, what is the *hypotenuse*? [1]

6.2 Write down Pythagoras’ theorem. [1]

6.3 A right-angled triangle has shorter sides 6 cm and 8 cm. Find the hypotenuse. [2]

6.4 Find the hypotenuse of a triangle with shorter sides 5 cm and 12 cm. [2]

6.5 Is a triangle with sides 3, 4 and 5 right-angled? Explain. [1]

6.6 Challenge. A rectangular field is 40 m long and 30 m wide. Find the length of the diagonal path straight across it. [3]

6 Shorter sides and trig – Part 2

Name: _____ Class: _____ Date: _____

Vocabulary 词汇

Write each word three times. 把每个单词抄写三遍。

English	中文	Write it 3 times (English)
opposite	对边	_____
adjacent	邻边	_____

Recall

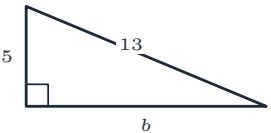
Pythagoras can also find a shorter side, and trigonometry links the sides to an angle.

New ideas

Read these first, then do the Practice.

■ 1 Finding a shorter side

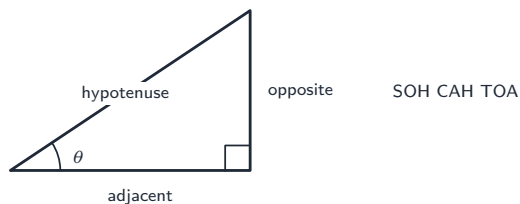
To find a shorter side, **subtract**: square the hypotenuse, take away the other side, then take the square root:



$$b^2 = 13^2 - 5^2 = 144$$
$$b = \sqrt{144} = 12$$

■ 2 Trigonometry

For an angle θ , label the sides **opposite** 对边, **adjacent** 邻边 and hypotenuse. Then use **SOH CAH TOA**:



$$\sin \theta = \frac{\text{opp}}{\text{hyp}}, \quad \cos \theta = \frac{\text{adj}}{\text{hyp}}, \quad \tan \theta = \frac{\text{opp}}{\text{adj}}$$

Watch out: to find a **shorter** side, *subtract*: $b^2 = c^2 - a^2$ (square the hypotenuse, take away the known side). For trig, label opposite / adjacent / hypotenuse for the angle first, then pick SOH, CAH or TOA.

Practice

Try these in order.

6.6 A right-angled triangle has hypotenuse 10 cm and one shorter side 6 cm. Find the other side. [2]

6.7 To find a shorter side with Pythagoras, do you add or subtract? [1]

6.8 What does the “S” in SOH stand for? [1]

6.9 Write the formula for $\tan \theta$. [1]

6.10 Which side is the *hypotenuse* in a right-angled triangle? [1]

6.11 Challenge. A right-angled triangle has hypotenuse 26 cm and one shorter side 10 cm. Find the other shorter side. [3]

7 Reflection and rotation – Part 1

Name: _____ Class: _____ Date: _____

Vocabulary 词汇

Write each word three times. 把每个单词抄写三遍。

English	中文	Write it 3 times (English)
transformation	变换	_____
image	像	_____
reflection	反射	_____
mirror line	镜线	_____
rotation	旋转	_____
centre	中心	_____

Recall

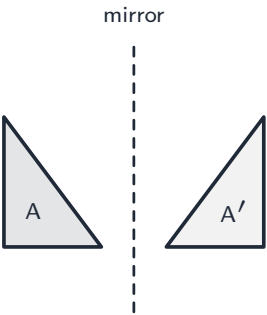
A **transformation** 变换 moves or changes a shape. The new shape is the **image** 像.

New ideas

Read these first, then do the Practice.

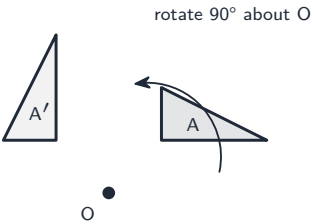
■ 1 Reflection

A **reflection** 反射 flips a shape across a **mirror line** 镜线. Each point and its image are the same distance from the line:



■ 2 Rotation

A **rotation** 旋转 turns a shape about a fixed point (the **centre** 中心), through an angle:



Watch out: a **reflection** flips a shape across a *mirror line* (each point ends the same distance from the line, on the other side). A **rotation** needs three things: the **centre**, the **angle**, and the **direction**.

Practice

Try these in order.

7.1 What is the *image* of a shape?

[1]

7.2 What does a reflection need? [1]

7.3 In a reflection, how far is the image from the mirror line, compared with the object?[1]

7.4 What three things do you need to describe a rotation? [2]

7.5 A shape is rotated 90° , then 90° again about the same point. Through what total angle has it turned? [1]

7.6 **Challenge.** A shape is rotated 90° clockwise three times about the same point. Through what single angle and direction could it have been turned in one go? [2]

7 Translation and enlargement – Part 2

Name: _____ Class: _____ Date: _____

Vocabulary 词汇

Write each word three times. 把每个单词抄写三遍。

English	中文	Write it 3 times (English)
translation	平移	_____
enlargement	放大	_____
scale factor	比例因子	_____

Recall

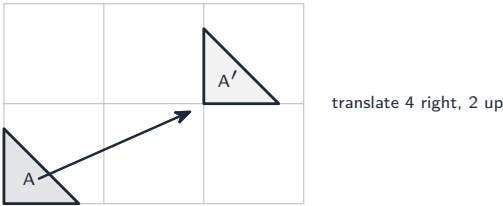
Two more transformations slide a shape or change its size.

New ideas

Read these first, then do the Practice.

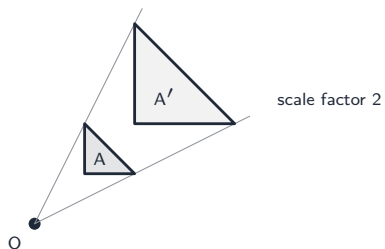
■ 1 Translation

A **translation** 平移 slides a shape — same size, same way up — by a vector (so many across, so many up):



■ 2 Enlargement

An **enlargement** 放大 changes the size by a **scale factor** 比例因子, measured from a centre:



A scale factor of 2 makes every length **twice** as long.

Watch out: a **translation** slides a shape — same size, same way up — by a vector (across, up). An **enlargement** changes the size by the **scale factor**: every length is multiplied by it.

Practice

Try these in order.

7.6 In a translation, does the shape change size? [1]

7.7 A point at (1, 1) is translated 3 right and 2 up. What are its new coordinates? [2]

7.8 What does an enlargement change about a shape? [1]

7.9 A shape is enlarged by scale factor 2. A side was 5 cm. How long is it now? [1]

7.10 A shape is enlarged by scale factor 3. A side was 4 cm. How long is it now? [1]

7.11 Challenge. A rectangle 3 cm by 5 cm is enlarged by scale factor 4. Find the new side lengths and the new perimeter. [3]

8 The probability scale – Part 1

Name: _____ Class: _____ Date: _____

Vocabulary 词汇

Write each word three times. 把每个单词抄写三遍。

English	中文	Write it 3 times (English)
Probability	概率	_____
fraction	分数	_____

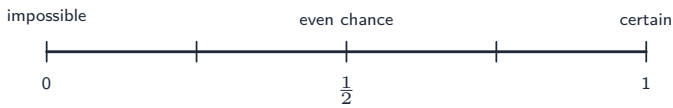
Recall

Probability 概率 measures how likely something is. It is a number from 0 (impossible) to 1 (certain).

New ideas

Read these first, then do the Practice.

■ 1 The probability scale



A probability can be a **fraction** 分数, a decimal or a percentage.

■ 2 Working out a probability

$$P(\text{event}) = \frac{\text{number of ways it can happen}}{\text{total number of outcomes}}$$



$$P(\text{rolling a 3}) = \frac{1}{6}$$

Watch out: a probability is always between **0** (impossible) and **1** (certain) — never more than 1 or negative. Work it out as $\frac{\text{ways it can happen}}{\text{total outcomes}}$.

Practice

Try these in order.

8.1 What is the probability of an *impossible* event? [1]

8.2 What is the probability of a *certain* event? [1]

8.3 A fair coin is flipped. What is the probability of Heads? [1]

8.4 A fair dice is rolled. What is the probability of getting a 5? [1]

8.5 A bag has 3 red and 2 blue balls. What is the probability of picking a red ball? [2]

8.6 Challenge. A bag has 3 red, 2 blue and 5 green balls. Find the probability of picking (a) a green ball, (b) a ball that is *not* red. [3]

8 Listing outcomes – Part 2

Name: _____ Class: _____ Date: _____

Vocabulary 词汇

Write each word three times. 把每个单词抄写三遍。

English	中文	Write it 3 times (English)
sample space	样本空间	_____
tree diagram	树状图	_____

Recall

When two things happen, we can list all the outcomes to find a probability.

New ideas

Read these first, then do the Practice.

■ 1 Sample space

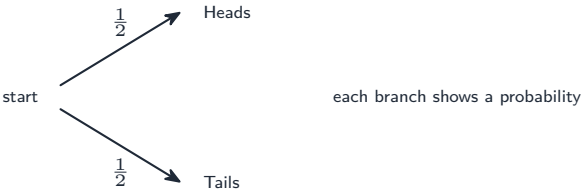
A **sample space** 样本空间 lists every possible outcome. For two dice, a grid shows all 36 sums:

		dice 1							
		1	2	3	4	5	6		
dice 2	1	2	3	4	5	6	7	sums of two dice	
	2	3	4	5	6	7	8		
	3	4	5	6	7	8	9		
	4	5	6	7	8	9	10		
	5	6	7	8	9	10	11		
	6	7	8	9	10	11	12		

You can count outcomes from the grid (for example, there are 6 ways to score a sum of 7).

■ 2 Tree diagrams

A **tree diagram** 树状图 shows the outcomes as branches, each with its probability:



Watch out: a **sample space** lists *every* outcome — count from it carefully (two dice have $6 \times 6 = 36$ outcomes, not 12). On a **tree diagram** the numbers on the branches are the probabilities.

Practice

Try these in order.

8.6 How many outcomes are there when two dice are rolled? [1]

8.7 Using the grid, how many ways are there to get a sum of 7? [1]

8.8 What is the probability of a sum of 7 with two dice? [2]

8.9 On a tree diagram, what do the numbers on the branches show? [1]

8.10 Two coins are flipped. List all the possible outcomes. [2]

8.11 **Challenge.** Two dice are rolled. Using the sample space, find the probability that the two numbers add up to 9. [3]

9 Averages and range – Part 1

Name: _____ Class: _____ Date: _____

Vocabulary 词汇

Write each word three times. 把每个单词抄写三遍。

English	中文	Write it 3 times (English)
average	平均数	_____
mean	平均值	_____
median	中位数	_____
mode	众数	_____
range	极差	_____

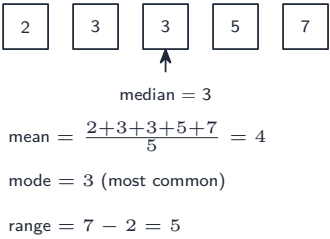
Recall

An **average** 平均数 is a single value that represents a set of data. There are three kinds, plus the range.

New ideas

Read these first, then do the Practice.

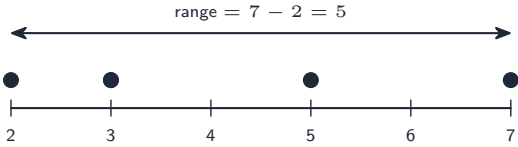
■ 1 Mean, median, mode



- **mean** 平均值 = add all the values, then divide by how many there are;
- **median** 中位数 = the middle value (put the data in order first);
- **mode** 众数 = the most common value.

■ 2 The range

The **range** 极差 measures the **spread**: largest – smallest.



Watch out: put the data **in order** before finding the **median** (the middle value). The **mean** uses *all* the values (add, then divide by how many); the **range** (largest – smallest) measures *spread*, not an average.

Practice

Use the data 4, 6, 6, 8, 11 for the first four questions.

9.1 Find the mean of 4, 6, 6, 8, 11. [2]

9.2 Find the median of 4, 6, 6, 8, 11. [1]

9.3 Find the mode of 4, 6, 6, 8, 11. [1]

9.4 Find the range of 4, 6, 6, 8, 11. [1]

9.5 What does the range tell you about a set of data? [1]

9.6 Challenge. Five numbers have a mean of 8. Four of them are 6, 9, 7, 10. Find the fifth number. [3]

9 Charts and diagrams – Part 2

Name: _____ Class: _____ Date: _____

Vocabulary 词汇

Write each word three times. 把每个单词抄写三遍。

English	中文	Write it 3 times (English)		
bar chart	条形图	_____	_____	_____
frequency	频数	_____	_____	_____
pictogram	象形图	_____	_____	_____
key	图例	_____	_____	_____

Recall

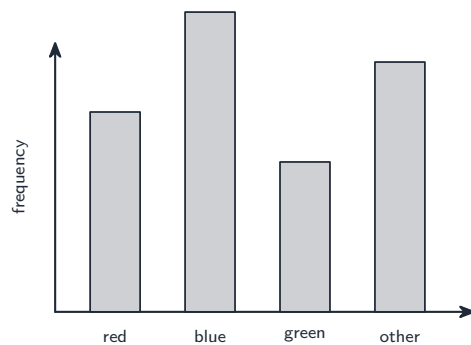
Charts show data as a picture, so it is easy to compare.

New ideas

Read these first, then do the Practice.

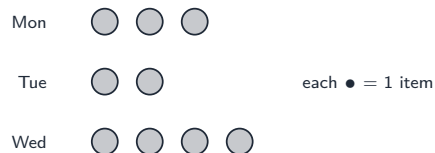
■ 1 Bar charts

A **bar chart** 条形图 shows the **frequency** 频数 of each group as a bar. The bars are the same width, with gaps between them:



■ 2 Pictograms

A **pictogram** 象形图 uses a symbol to stand for a number of items. A **key** 图例 tells you how many each symbol means:



Watch out: a **bar chart** shows the **frequency** as the *height* of each bar, with **gaps** between the bars. In a **pictogram**, always read the **key** to see how many each symbol stands for.

Practice

Try these in order.

9.6 In a bar chart, what does the height of a bar show? [1]

9.7 Are bar-chart bars drawn with gaps, or touching? [1]

9.8 In a pictogram, what tells you how many each symbol stands for? [1]

9.9 A pictogram uses ● = 2 people. How many people do ●● show? [1]

9.10 A bar reaches a frequency of 5. How many items are in that group? [1]

9.11 **Challenge.** A pictogram uses ● = 4 people. One row shows ●● and a half-symbol. How many people does that row show? [2]