

### Summary of students' performance by the end of Grade 4

#### Reasoning and problem solving

Students represent and interpret routine and non-routine mathematical problems using calculations, mathematical symbols, diagrams, graphs, charts and tables. They explain orally in their own words, or in writing or by using diagrams, the method used to solve a problem, or why an answer is correct. They check that results are appropriate in the context of the problem. They justify their reasoning in simple cases.

#### Number and algebra

Students represent whole numbers and decimals to two places in expanded form and use their understanding of place value to order numbers and to multiply and divide by multiples of 10 and 100. They round whole numbers to the nearest 10 or 100, and decimals to the nearest whole number, and estimate answers to calculations. They identify multiples of one-digit numbers and extend and find missing numbers in a simple linear sequence. They know multiplication and division facts to  $10 \times 10$  and use factors to simplify mental multiplication and division calculations. They choose, use and explain written column methods to multiply and divide three-digit by one-digit whole numbers, multiply three-digit by two-digit whole numbers, add and subtract decimals to two places, and multiply a decimal with up to two places by a one-digit whole number. They add and subtract two simple fractions with the same denominator or where one denominator is a multiple of the other, expressing the answer as a mixed number. They solve both routine and non-routine problems (up to two steps with whole numbers or one step with decimals), including real-life problems related to money or measures.

#### Geometry and measures

Students identify parallel and perpendicular lines, recognise lines of symmetry and complete symmetrical figures. They identify angles as greater than or less than a right angle and put a set of acute and obtuse angles in order of size. They identify simple properties of squares, rectangles and parallelograms. They construct squares and rectangles on grids and by using a set square and ruler, drawing lines to the nearest millimetre. They solve simple problems involving scale. They find the perimeters of irregular polygons and perimeters and areas of shapes that can be split into squares and rectangles. They choose and use suitable units to estimate and measure and read scales with increasing accuracy. They convert centimetres to metres or millimetres, using decimal notation. They calculate a time interval of up to 1 hour in minutes, and larger time intervals that are multiples of 15 minutes.

#### Data handling

Students complete, extract and interpret information presented in lists, two-way tables and simple Carroll diagrams. They solve problems using data presented in bar charts and tables.

## Content and assessment weightings for Grade 4

The mathematics standards for Grades K to 9 are grouped into four strands: reasoning and problem solving; number and algebra; geometry and measures; and data handling.

The reasoning and problem solving strand cuts across the other three strands and should be integrated with them in teaching and assessments. For Grade 4, about 50% of the teaching and assessment of each of the other three strands should be devoted to reasoning and problem solving.

For Grades 1 to 6, the weightings of the three content strands relative to each other are as follows:

Number and algebra	Geometry and measures	Data handling
60%	30%	10%

The standards are numbered for easy reference. Those in shaded rectangles, e.g. 1.2, are the performance standards for all students. The national tests for mathematics will be based on these standards.

**Grade 4 teachers should review and consolidate Grade 3 standards where necessary.**

### Reasoning and problem solving

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#### Students should:





#### 1 Use mathematical reasoning to solve simple problems



**1.1** Model or represent a problem using calculations, mathematical symbols, diagrams, graphs, charts and tables.

##### Class survey of favourite fruit drinks

flavour	number of children
pineapple	2
orange	10
blackcurrant	8
grapefruit	6
apple	9

Complete the pictogram for the class.

flavour	number of children
blackcurrant	
apple	
	
orange	
pineapple	

 2 children  
 1 child

How many children altogether chose the three most popular flavours?

Write another question you can ask someone about the results of the survey.

The table shows the number of shirts in a shop.

How many shirts are white?

How many shirts are there altogether?

	Cotton	Not cotton
White	27	74
Not white	56	90

#### Key standards

Key performance standards are shown in shaded rectangles, e.g. **1.2**.

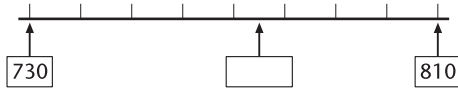
#### Cross-references

Standards are referred to using the notation RP for reasoning and problem solving, NA for number and algebra, GM for geometry and measures and DH for data handling, e.g. standard NA 2.4.

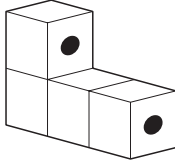
#### Examples of problems

The examples of problems in italics are intended to clarify the standards, not to represent the full range of possible problems.

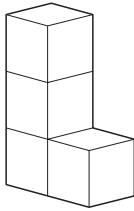
Write the correct number shown by the arrow.



This shape is made from four cubes stuck together.  
Two circles are drawn on the shape.



Draw the circles on the shape in its new position.



- 1.2** Explain orally in own words, or in writing or by using diagrams, the method used to solve a problem, or why an answer is correct.

*Yassim wanted to add 1463 and 319.*

*She added 1263 and 319 by mistake.*

*What could she do to correct her answer?*

- A. Add 200.      B. Add 2.      C. Subtract 2.      D. Subtract 200.

**TIMSS Grades 3 and 4**

- 1.3** Justify reasoning in simple cases.

*Sara is older than Aida. Aida is older than Huda.*

*Which statement must be true?*

- A. Sara is older than Huda.  
B. Sara is younger than Huda.  
C. Sara is the same age as Huda.  
D. We cannot tell who is older from this information.

**TIMSS Grades 3 and 4**

- 1.4** Check that results are appropriate in the context of the problem.

*Some chocolates are put into boxes.*

*One box holds 7 chocolates.*

*How many boxes are needed to hold 50 chocolates?*

*Explain your reasoning.*

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# Number and algebra

By the end of Grade 4, students represent whole numbers and decimals to two places in expanded form and use their understanding of place value to order numbers and to multiply and divide by multiples of 10 and 100. They round whole numbers to the nearest 10 or 100, and decimals to the nearest whole number, and estimate answers to calculations. They identify multiples of one-digit numbers and extend and find missing numbers in a simple linear sequence. They know multiplication and division facts to  $10 \times 10$  and use factors to simplify mental multiplication and division calculations. They choose, use and explain written column methods to multiply and divide three-digit by one-digit whole numbers, multiply three-digit by two-digit whole numbers, add and subtract decimals to two places, and multiply a decimal with up to two places by a one-digit whole number. They add and subtract two simple fractions with the same denominator or where one denominator is a multiple of the other, expressing the answer as a mixed number. They solve both routine and non-routine problems (up to two steps with whole numbers or one step with decimals), including real-life problems related to money or measures.

## Students should:

### 2 Understand place value in and order whole numbers

- 2.1** Read and write whole numbers in numerals and words; identify the place value for each digit in whole numbers.

*Write in figures the number two and a half million.*

- 2.2** Round three- or four-digit whole numbers to the nearest 10 or 100.

*Circle the number that is nearest in value to 750.*

570 699 810 852 1050

### 3 Identify factors and multiples

- 3.1** Know all facts to  $10 \times 10$  for multiplication and division.

- 3.2** Recognise multiples up to 100 of one-digit numbers; find all the factors of whole numbers to 100, recognising that:

- many whole numbers can be factorised in different ways;  
*e.g.  $12 = 4 \times 3 = 2 \times 6 = 2 \times 2 \times 3$*
- prime numbers (2, 3, 5, 7, 11, 13, ...) have exactly two factors, the number itself and 1.

*The two-digit number 98 has 2 and 7 among its factors.*

*Write another two-digit number that has 2 and 7 among its factors.*

*Use the four digits 7, 5, 2 and 1.*

*Choose two digits each time to make the following two-digit numbers.*

*a multiple of 9*   

*a prime number*   

*a factor of 96*   

#### Whole numbers

Include large numbers involving millions.

#### Facts to $10 \times 10$

Learn division facts by heart.

#### Factors

Include finding a common factor of two numbers.

Exclude finding the highest common factor (HCF).

#### Prime numbers

Stress that the first prime number is 2.

- 3.3** Find missing terms in a number pattern, and describe the relationship between one term and the next, e.g. ‘add 4’.

The rule for this number sequence is ‘double and subtract 1’.

$$2 \rightarrow 3 \rightarrow 5 \rightarrow 9 \rightarrow \square$$

Write in the missing number.

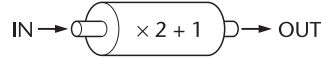
Here is part of another sequence with the same rule.

$$\square \rightarrow 13 \rightarrow 25 \rightarrow 49$$

Write in the missing number.

- 3.4** Generate pairs of numbers that follow a given rule, such as ‘multiply the first number by 3 and add 2 to get the second number’; given some pairs of numbers that satisfy a relationship, identify a rule for the relationship.

This number machine multiplies all numbers by 2, and then adds 1.



Write the missing numbers in the table.

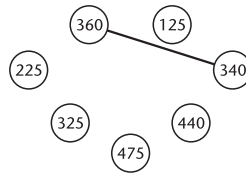
IN	OUT
5	11
13	
	117

## 4 Calculate with whole numbers and apply these skills to solve routine and non-routine problems

### Addition, subtraction, multiplication and division

- 4.1** Add and subtract two or more whole numbers, choosing and using mental or written methods as appropriate.

Draw a line to join two other numbers that have a total of 700.



- 4.2** Use and explain mental methods to multiply or divide a two-digit number by a one-digit number, supported as necessary by informal jottings.

$$\begin{array}{r} 43 \\ 40 + 3 \\ \downarrow \quad \downarrow \times 6 \\ 240 + 18 = 258 \end{array}$$

- 4.3** Use factors to multiply and divide whole numbers by multiples of 10 or 100.

e.g.  $45 \times 60 = (45 \times 6) \times 10 = 270 \times 10 = 2700$   
 $45 \times 600 = (45 \times 6) \times 100 = 270 \times 100 = 27000$   
 $720 \div 80 = (720 \div 10) \div 8 = 72 \div 8 = 9$   
 $7200 \div 800 = (7200 \div 100) \div 8 = 72 \div 8 = 9$

### Dividing by multiples of 10 or 100

Limit division to whole-number answers.

- 4.4** Use and explain written column methods to:

- multiply or divide numbers with two or three digits by a one-digit number;

e.g.  $53 \times 7$ ,  $428 \times 6$ ,  $865 \div 5$

×	50	3
7		

×	50	3
7	350	21

- multiply numbers with up to three digits by a two-digit number.  
e.g.  $437 \times 28$

- 4.5** Estimate answers to whole-number calculations by using approximations.

*Ahmed worked 57 hours in March, 62 hours in April, and 59 hours in May.  
Which is the BEST estimate of the total number of hours he worked for the 3 months?*

- A.  $50 + 50 + 50$     B.  $55 + 55 + 55$     C.  $60 + 60 + 60$     D.  $65 + 65 + 65$

**TIMSS Grade 4**

### Problem solving with whole numbers

- 4.6** Model a problem involving an unknown number by writing an equation.

- 4.7** Solve problems with up to two steps using addition, subtraction, multiplication or division of whole numbers, measurements or money.

*Some fruit is put in baskets. There are 3 oranges and 2 apples in every basket.  
There are 45 pieces of fruit altogether. How many apples are there?*

*Najla use 5 tomatoes to make half a kilogram of tomato sauce.  
How much sauce can she make from 15 tomatoes?*

- A. One and a half kilograms  
B. Two kilograms  
C. Two and a half kilograms  
D. Three kilograms

**TIMSS Grade 4**

- 4.8** Solve missing-number problems involving inverse operations.

*What number goes in the box to make this equation true?*

$$87 + \square = 129$$

*Badriya thought of a number. She multiplied it by 2 and added 4. The answer was 16.  
What was the number Badriya first thought of?*

**Adapted from TIMSS Grade 4**

- 4.9** Solve non-routine problems, including those involving more than one step.

*A soft drink and a cake together cost QR 9.  
Two soft drinks and a cake together cost QR 14.  
What does a cake cost?  
Explain how you got your answer.*

*Khalid makes a sequence of five numbers.  
The first number is 2. The last number is 18.  
His rule is to add the same amount each time.  
Write in the missing numbers.*

$$2 \quad \square \quad \square \quad \square \quad 18$$

*Write in the missing digits to make this calculation correct.*

$$\square 4 \square \times 6 = 2052$$

## 5 Understand and use simple fractions

- 5.1** Recognise that a proportion of a number of objects can be described by a fraction.

*5 out of the 12 children in a group wear glasses.  
What fraction of the children wear glasses?*

### Estimating answers

Include checking the reasonableness of an answer.

### Problems

Include:

- problems involving proportional reasoning;
- money and measures.

Measurements in a problem should be expressed in the same unit (no conversions).

**5.2** Identify simple equivalent fractions.

Tick (✓) two cards that have the same value.



**5.3** Add and subtract two proper fractions:

- with the same denominator;
- where one denominator is a multiple of the other.

Tick (✓) two cards that give a total of seven twelfths.



**5.4** Express an improper fraction as a mixed number and vice versa.

**5.5** Calculate the product of a proper fraction and a whole number.

**5.6** Solve simple word problems involving fractions.

$\frac{3}{8}$  of the books on a shelf are story books.

What fraction of the books on the shelf are not story books?

**6 Understand the place value of decimals to two places and how decimals relate to simple fractions**

**6.1** Read and write decimals with one or two places; represent place value in decimals with one or two places in words, models or expanded form.

e.g. Know that  $0.45 = 0.4 + 0.05 = \frac{4}{10} + \frac{5}{100} = \frac{45}{100}$

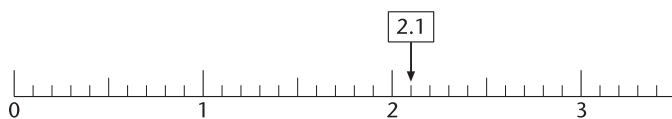
Express 4.62 as:  $4 + 0.6 + 0.02$

or as:  $4 + \frac{6}{10} + \frac{2}{100}$

**6.2** Understand that fractions and decimals are two different representations of the same concept; recognise the fraction and decimal equivalents for one half, one quarter, three quarters, tenths and hundredths.

**6.3** Order a set of decimals with one or two places and position them on a number line.

2.1 is marked on the number line.



Mark 0.65 on the number line.

**6.4** Round decimals to the nearest whole number or one decimal place.

On the number line, which of these numbers would be closest to 1?

0.1    0.9    1.2    1.9

**TIMSS Grade 4**

Write each of these to the nearest whole number.

13.7    is nearest to .....

$8\frac{3}{8}$     is nearest to .....

3.38    is nearest to .....

**Adding and subtracting**

Include the terms *numerator, denominator*.

**Mixed numbers**

Include expressing the improper fraction or mixed number in its simplest form.

**Decimal place value**

Include identifying values of digits as fractions or decimals.

**Fraction and decimal equivalents**

When writing hundredths as fractions, exclude reducing the fraction to its lowest terms, other than for one half, one quarter, three quarters and tenths.

**Rounding decimals**

Include units of measure and money.

## 7 Extend understanding of calculations with whole numbers to decimals and apply these skills to solve problems

### Addition, subtraction, multiplication and division

- 7.1** Multiply or divide decimals with up to two places by 10 and 100 and recognise the effect.

*Jamal is thinking of a number.  
He multiplies it by 10, then adds 25.  
The answer is 100.  
What is Jamal's number?*

- 7.2** Read and write money in decimal form; convert riyals in decimal form to dirhams, and dirhams to riyals in decimal form.

### Mental and written calculations

- 7.3** Use and explain mental methods to:

- add and subtract two-digit decimals;

*e.g.*  $3.5 + 0.6$   
 $4.8 - 1.9$

- multiply or divide a simple decimal by a one-digit number.

*e.g.*  $0.7 \times 8$        $0.03 \times 6$   
 $5.4 \div 9$        $0.45 \div 5$

- 7.4** Use and explain written column methods to:

- add and subtract decimals with up to two places;

*e.g.*  $36.4 + 5.62$   
 $4.78 - 3.9$

- multiply decimals with up to two places by a one-digit whole number.

*e.g.*  $1.47 \times 9$

- 7.5** Estimate answers to calculations involving decimals by using approximations.

*Circle the number that is about the same as the correct answer to  $4.9 + 4.8$ .*

1    5    4    10    7    20

### Solving problems

- 7.6** Solve one-step problems involving decimals, including rounding answers to a specified degree of accuracy.

*Circle two numbers with a total of 0.12.*

0.1    0.5    0.05    0.7    0.07    0.2

*Bader is 1.35 metres tall.  
Salman is 1.4 metres tall.  
How much taller than Bader is Salman?*

*Some boys go camping for 6 nights.  
It costs QR 5.50 for each boy to camp each night.  
How much does it cost for each boy to camp for the 6 nights?*

*A box of 7 pineapples costs QR 31.50.  
How much does each pineapple cost?*

### Division by 10, 100

Limit decimal quotients to no more than two places.

Include units of measure and money.

### Multiplication and division

Keep within multiplication table facts.

### Written methods

Include adding and subtracting numbers with different numbers of decimal places.

Include money and decimal measurements, e.g. 4.6 m.

### Solving problems

Include money and decimal measurements.

Include checking reasonableness of answer.

# Geometry and measures

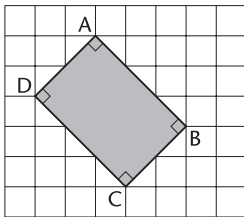
By the end of Grade 4, students identify parallel and perpendicular lines, recognise lines of symmetry and complete symmetrical figures. They identify angles as greater than or less than a right angle and put a set of acute and obtuse angles in order of size. They identify simple properties of squares, rectangles and parallelograms. They construct squares and rectangles on grids and by using a set square and ruler, drawing lines to the nearest millimetre. They solve simple problems involving scale. They find the perimeters of irregular polygons and perimeters and areas of shapes that can be split into squares and rectangles. They choose and use suitable units to estimate and measure and read scales with increasing accuracy. They convert centimetres to metres or millimetres, using decimal notation. They calculate a time interval of up to 1 hour in minutes, and larger time intervals that are multiples of 15 minutes.

**Students should:**

## 8 Identify and use simple properties of shapes

- 8.1** Identify parallel and perpendicular lines; draw parallel and perpendicular lines using a ruler and set square.

*ABCD is a rectangle.*



*Which of these statements is true?*

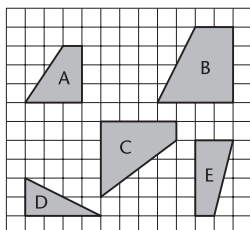
- Line CD is parallel to line BC.
- Line AB is perpendicular to line AD.

- 8.2** Classify angles as greater than, equal to, or less than a right angle; compare given angles and put them in order of size.

- 8.3** Know simple side and angle properties of:

- squares: four equal sides, four right angles, opposite sides parallel;
- rectangles: opposite sides equal, four right angles, opposite sides parallel;
- parallelograms: opposite sides equal, opposite angles equal, opposite sides parallel.

*Here are five shapes on a square grid.*



*Which two shapes fit together to make a square? Explain why.*

### Parallel and perpendicular lines

Include use of the terms *horizontal*, *vertical*.

### Angles

Include use of the terms *acute* and *obtuse*.

Exclude reflex angles.

Explain which of the following statements are true and why.

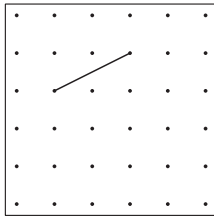
- All squares are rectangles.
- All rectangles are squares.
- All rectangles are parallelograms.
- Some parallelograms are squares.
- All parallelograms are rectangles.

**8.4** Use knowledge of properties of squares and rectangles to:

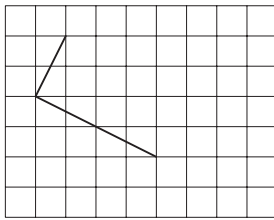
- construct squares and rectangles of given dimensions using a ruler and set square;
- construct squares and rectangles on grids.

The line on the grid is one side of a square.

On the grid, draw the other three sides of the square. Use a ruler.



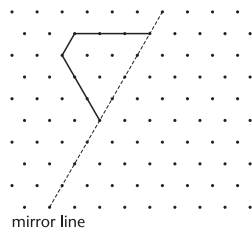
Draw two more straight lines to make a rectangle. Use a ruler.



**8.5** Identify lines of symmetry in 2-D shapes and complete a 2-D shape to make it symmetrical about a given line of symmetry.

Complete this shape so that it is symmetrical about the mirror line.

Use a ruler.



**8.6** Solve simple problems involving properties of lines, squares and rectangles.

## 9 Choose appropriate units and measurement tools to estimate and measure

**9.1** Choose and use suitable units to estimate and measure.

**9.2** Read measurements from scales with increasing accuracy, e.g. read a measure on a scale marked in intervals of 100 g to the nearest 0.1 kg.

**9.3** Convert metres to centimetres, centimetres to millimetres, millimetres to centimetres, and centimetres to metres, using decimal notation.

### ICT opportunity

Use Logo to construct squares and rectangles.

### Symmetry

Include identifying and visualising line symmetry in the environment.

Include finding more than one line of symmetry in a given shape.

Exclude rotation symmetry.

### Measuring scales

Include linear scales and circular dials.

What is 76 millimetres to the nearest centimetre?

Children get points for how far they jump.

Standing long jump	
over 80 cm	1 point
over 100 cm	2 points
over 120 cm	3 points
over 140 cm	4 points
over 160 cm	5 points
over 180 cm	6 points

Hassan jumped 1.25 metres. How many points does he get?

9.4 Know the fraction and decimal equivalents for one half, one quarter, three quarters, one tenth and one hundredth of 1 km, 1 m, 1 kg and 1 l, e.g. know that 0.75 kg, or three quarters of a kilogram, is 750 grams.

9.5 Measure and draw lines to the nearest millimetre.

Join the dots which are 40 millimetres apart. Use a ruler.



9.6 Solve simple problems involving:

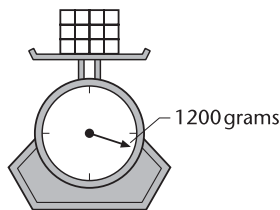
- scale;
- proportional reasoning.

A map has a scale of 6 cm to 1 km.

A road on the map is 15 cm long.

What is the length of the road in kilometres?

Ana placed 12 identical blocks on the scales as shown in the figure.



How many blocks should be removed to reduce the weight to 1000 g?

**TIMSS Grade 4**

9.7 Convert weeks to days and vice versa; know the number of days in each month; use a Western calendar to find a time interval in days and weeks; be aware of the Hijri calendar and lunar months.

9.8 Calculate a time interval of up to 1 hour in minutes, and larger time intervals that are multiples of 15 minutes.

## 10 Understand perimeter and area

10.1 Solve simple problems involving the area and/or perimeter of squares and rectangles.

A thin wire 20 centimetres long is formed into a rectangle.

The width of the rectangle is 4 centimetres. What is its length?

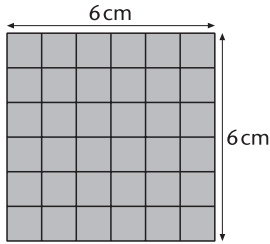
- A. 5 centimetres
- B. 6 centimetres
- C. 12 centimetres
- D. 16 centimetres

**TIMSS Grade 4**

### Area problems

Include simple problems requiring application of the formula for the area of a rectangle or square.

Rafeya has a 6 cm by 6 cm square mat.

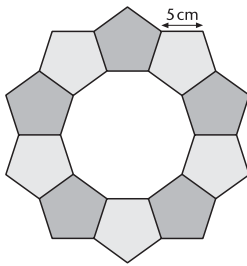


How many 2 cm by 2 cm square tiles will cover the mat?

**10.2** Recognise that shapes with the same area can have different perimeters and that shapes with the same perimeter can have different areas.

**10.3** Find the perimeter of a regular or irregular polygon with whole-number sides.

This ring is made of regular pentagons, with sides of 5 centimetres.



What is the length of the outer edge of the ring?

**Perimeters**

Include estimating and measuring perimeters.

## Data handling

By the end of Grade 4, students complete, extract and interpret information presented in lists, two-way tables and simple Carroll diagrams. They solve problems using data presented in bar charts and tables.

**Students should:**

**11 Solve problems by collecting, organising, representing and interpreting data and drawing conclusions**

**11.1** Complete a table from given information.

**11.2** Answer questions by collecting data systematically and:

- recording and interpreting information in lists, two-way tables and Carroll diagrams;
- representing and interpreting information in one- or two-variable bar charts with a scale numbered in intervals of 2, 4, 5, 10, 20 or 100.

Here is a Carroll diagram for sorting numbers.

Write one number in each box of the diagram.

	less than 100	100 or more
multiples of 20		
not multiples of 20		

**ICT opportunity**

Use data from the Internet.

**ICT opportunity**

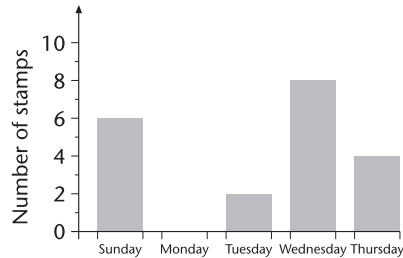
Use a spreadsheet with graphs and charts to represent data in tables and bar charts.

Here is a table of the numbers of stamps used each day in school.

Value of stamp	Sunday	Monday	Tuesday	Wednesday	Thursday
QR 1	22	11	14	32	13
QR 2	8	17	4	6	19
QR 3	6	0	2	8	4
QR 4	6	0	6	1	0
QR 5	6	0	2	12	3

How many QR 2 stamps did the school use on Wednesday?

This is a graph of one kind of stamp that the school used.

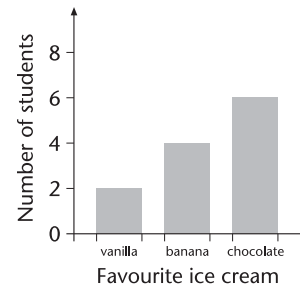


Which stamp is it?

This chart shows the results of a survey.

All of the students in Class 4 said which ice cream they like best.

Each of them chose one kind of ice cream.



How many students are in Class 4?

What fraction of Class 4 likes chocolate ice cream best?

Adapted from TIMSS Grade 4