

Summary of students' performance by the end of Grade 8

Reasoning and problem solving

Students solve routine and non-routine mathematical problems in a range of contexts. They represent and interpret problems and solutions in numeric, algebraic, geometric or graphical form, using correct terms and notation. They choose and use appropriate mathematical techniques and tools to solve a problem, including ICT. They use diagrams and explanatory text to explain the solution to a problem and support it with evidence. They present a concise, reasoned argument orally and by using symbols. They use step-by-step reasoning to deduce properties or relationships in a given geometrical figure. They find a counter-example to show that a conjecture is false and begin to consider special cases. They find alternative solutions to problems.

Number and algebra

Students solve routine and non-routine problems by calculating accurately with positive and negative whole numbers, decimals and fractions, and with percentages, ratios and proportions. They select mental, written or calculator methods as appropriate, applying the commutative, associative or distributive laws. They estimate and calculate positive integer powers of numbers, and square and cube roots, using the power and root keys of a scientific calculator where appropriate. They simplify and evaluate algebraic expressions and formulae, and find the sum or difference of simple algebraic fractions with integer denominators. They formulate and use linear expressions to model situations. They construct and solve linear equations, including those with simple fraction coefficients, and determine whether given values satisfy an equation. They extend and find missing terms in numeric, geometric or algebraic sequences, and generalise the relationship between one term and the next, or describe the n th term, using symbols. They interpret and sketch graphs of proportional or linear functions representing practical situations, including distance–time and conversion graphs. Given the graph of a function, they identify intercepts on axes and intervals where the function increases, decreases or is constant.

Geometry and measures

Students identify all the symmetries of 2-D shapes. They calculate interior and exterior angles of polygons. They solve problems using angle and symmetry properties of polygons and angle properties of parallel and intersecting lines. They identify the reflection, rotation or translation of a 2-D shape, and draw simple transformations, including a combination of two transformations. They recognise similar shapes and enlarge shapes by a positive integer scale factor. They construct 2-D shapes from given information, including scale drawings. They visualise and describe 3-D shapes in different orientations. They convert measurements within systems of units. They solve problems involving speed or density, or the volume and surface area of cubes, cuboids, prisms and cylinders, using a calculator where appropriate. They recognise that measurements are not precise.

Data handling

Students solve problems by selecting and using an appropriate method of data collection, including from secondary sources. They collect and record continuous data using equal class intervals. They recognise that inappropriate grouping of data can be misleading. They construct bar charts, frequency diagrams and pie charts. They compare two data sets, using the range, median or mean, and the shape of the corresponding frequency distributions. They interpret data sets by drawing conclusions, making predictions, and estimating values between and beyond given points. They use data from experiments to estimate probability for favourable outcomes and understand that different outcomes may result from repeating an experiment. They use problem contexts to calculate theoretical probabilities for possible outcomes.

Content and assessment weightings for Grade 8

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 8, about 70% of the teaching and assessment of each of the other three strands should be devoted to reasoning and problem solving.

For Grades 7 to 9, the proportion of algebra in the number and algebra strand increases as the proportion of number decreases, and so is shown separately in the table below. The weightings of the content strands relative to each other are as follows:

	Number	Algebra	Geometry and measures*	Data handling
Grade 7	30%	25%	27.5%	17.5%
Grade 8	25%	30%	27.5%	17.5%
Grade 9	15%	40%	27.5%	17.5%

* including trigonometry in Grade 9

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 8 teachers should review and consolidate Grade 7 standards where necessary.

Reasoning and problem solving

By the end of Grade 8, students solve routine and non-routine mathematical problems in a range of contexts. They represent and interpret problems and solutions in numeric, algebraic, geometric or graphical form, using correct terms and notation. They choose and use appropriate mathematical techniques and tools to solve a problem, including ICT. They use diagrams and explanatory text to explain the solution to a problem and support it with evidence. They present a concise, reasoned argument orally and by using symbols. They use step-by-step reasoning to deduce properties or relationships in a given geometrical figure. They find a counter-example to show that a conjecture is false and begin to consider special cases. They find alternative solutions to problems.

Students should:

1 Use mathematical reasoning to solve problems

1.1 Represent and interpret problems and solutions in numeric, algebraic, geometric or graphical form, using correct terms and notation.

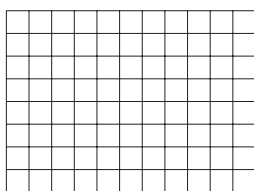
Put brackets into this expression to make it correct.

$$10^2 \div 10 \div 10 \div 10 \div 10 = 100$$

This is a centimetre grid.

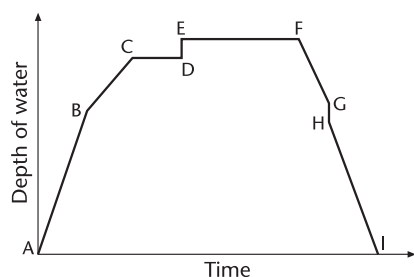
On the grid draw a triangle that has an obtuse angle and an area of 7.5 cm^2 .

Use a ruler.



A child is having a bath.

The simplified graph shows the depth of the water in the bath.



From A to B both taps are turned full on.

What might be happening at point B?

Which part of the graph shows the child getting into the bath?

Key standards

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

Cross-references

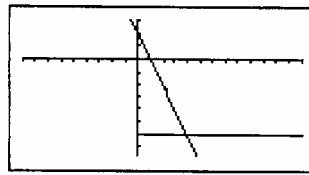
Standards are referred to using the notation RP for reasoning and problem solving, NA for number and algebra, GM for geometry and measures and DH for data handling, e.g. standard NA 2.4.

Examples of problems

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

- 1.2** Choose and use appropriate mathematical techniques and tools to solve a problem, including ICT.

Use a graphics calculator to draw some straight line graphs passing through $(4, -6)$.

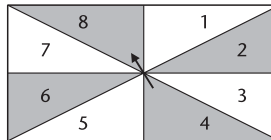


- 1.3** Use diagrams and explanatory text to explain the solution to a problem and support it with evidence.

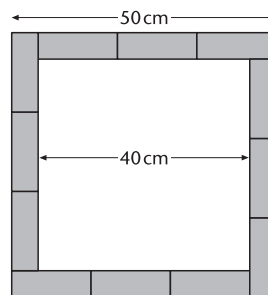
All the sections on this rectangular spinner have equal areas.

Maryam says: 'All the numbers on the spinner have the same probability of coming up.'

Explain why Maryam is not correct.



12 rectangles, all the same size, are arranged to make a square, as shown in the diagram. Calculate the area of one of the rectangles.

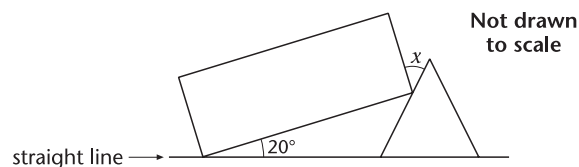


- 1.4** Present a concise, reasoned argument orally, in writing and by using symbols.

Explain why the sum of two consecutive odd numbers is even.

- 1.5** Use step-by-step reasoning to deduce properties or relationships in a given geometrical figure.

The diagram shows a rectangle that just touches an equilateral triangle.



Find the size of the angle marked x .

Explain how you worked out your answer.

- 1.6** Find a counter-example to show that a conjecture is false and begin to consider special cases.

'The sum of four even numbers is divisible by 4.'

Is this statement always true, sometimes true or never true?

Justify your answer.

- 1.7** Find and explain alternative solutions to problems.

Two numbers are in the ratio $3 : 2$.

One of the numbers is 0.6 .

There are two possible answers for the other number.

What are the two possible answers?

Number and algebra

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Students should:

2 Solve numerical problems, including problems involving measures

- 2.1 Estimate and calculate positive integer powers of whole numbers and decimals; know cube roots of perfect cubes to ± 216 ; use the cube root sign $\sqrt[3]{}$; find approximate values of square roots of whole numbers to 100.

a	a x a	a	a x a
3	9	3.4	11.56
3.1	9.61	3.41	11.6281
3.2	10.24	3.42	11.6964
3.3	10.89	3.43	11.7649
3.4	11.56	3.44	11.8336
3.5	12.25	3.45	11.9025
3.6	12.96	3.46	11.9716
3.7	13.69	3.47	12.0409
3.8	14.44	3.48	12.1104
3.9	15.21	3.49	12.1801
4	16	3.5	12.25

$\sqrt{12} = 3.46$ to two decimal places

- 2.2 Use the x^2 , \sqrt{x} and x^y keys of a scientific calculator.

Jamal thinks of a number. He uses his calculator to multiply the number by itself and then adds 10. His answer is 34.01. What is Jamal's number?

- 2.3 Know the general principles of the commutative, associative and distributive laws and how they underpin mental and written calculations.

Which of the following is FALSE when a, b and c are different numbers?

- A. $(a + b) + c = a + (b + c)$ B. $ab = ba$ C. $a + b = b + a$
 D. $(ab)c = a(bc)$ E. $a - b = b - a$

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Use of ICT

Function graph plotters, graphics calculators and spreadsheets help to explore ideas in number and algebra.

Powers and roots

Include positive and negative square roots and cube roots.

Exclude laws of indices.

Use a calculator or spreadsheet to find approximate values of square roots.

- 2.4** Use mental, written and calculator methods for the four operations to solve problems involving whole numbers, decimals, money or measures, interpreting the calculator display and rounding answers appropriately.

*A stack of 200 identical sheets of paper is 2.5 cm thick.
What is the thickness of one sheet of paper?*

- A. 0.008 cm B. 0.0125 cm C. 0.05 cm D. 0.08 cm

Which of these is 89.0638 rounded to the nearest hundredth?

- A. 100 B. 90 C. 89.1 D. 89.06 E. 89.064

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- 2.5** Check answers for accuracy by using inverse operations.
- 2.6** Check answers for reasonableness by using an estimate based on approximations and by considering the context of the problem.

3 Calculate with fractions, percentages, ratios and proportions, and use them to solve problems

- 3.1** In appropriate cases, use mental methods to:

- compare, add, subtract, multiply and divide proper fractions;
- calculate using percentages;
- divide a quantity in a given ratio, or find the ratio of two or more quantities.

Write a proper fraction that is larger than $\frac{23}{24}$.

*The price of a sack of rice is raised from QR 60 to QR 75.
What is the percentage increase in the price?*

- A. 15% B. 20% C. 25% D. 30%

*Majed combines 5 litres of red paint, 2 litres of blue paint and 2 litres of yellow paint.
What is the ratio of red paint to the total amount of paint?*

- A. $\frac{5}{2}$ B. $\frac{9}{4}$ C. $\frac{5}{4}$ D. $\frac{5}{9}$

Adapted from TIMSS Grade 8

- 3.2** Use written methods for combined operations with mixed numbers, including brackets.

Calculate:

1. $\frac{3}{4} + 2\frac{2}{3} - 1\frac{3}{8}$

2. $\frac{3}{4} + \left(\frac{2}{3} \times \frac{1}{4}\right)$

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- 3.3** Use a scientific calculator to calculate with fractions, percentages, ratios or proportions.

- 3.4** Solve routine and non-routine problems involving fractions, percentages, ratios or proportions.

Two groups of tourists each have 60 people.

$\frac{3}{4}$ of the first group and $\frac{2}{3}$ of the second group travel by air.

How many more people in the first group than the second group travel by air?

Calculations

Exclude tedious calculations when use of a calculator is not allowed.

Ratios and fractions

Include writing $x : y = a : b$

as $\frac{x}{y} = \frac{a}{b}$.

Problems

Include problems involving scale drawings.

Last year there were 1175 students at a school.
 This year there are 16% more students than last year.
 Approximately how many students are at the school this year?

- A. 1700 B. 1600 C. 1500 D. 1400 E. 1200

The table shows the values of x and y , where x is proportional to y .

x	3	6	P
y	7	Q	35

What are the values of P and Q ?

- A. $P = 14$ and $Q = 31$
 B. $P = 10$ and $Q = 14$
 C. $P = 10$ and $Q = 31$
 D. $P = 14$ and $Q = 15$
 E. $P = 15$ and $Q = 14$

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4 Write, simplify and evaluate linear expressions and formulae, and solve linear equations

- 4.1** Add, subtract, multiply and divide simple expressions containing variables; add and subtract simple algebraic fractions with integer denominators.

Simplify:

- $3a \times 5ab$
- $3m^3n \div 9m$
- $\frac{x}{3} + \frac{x-4}{2}$
- $\frac{2x}{3} - \frac{3(x-5)}{2}$

- 4.2 Simplify and compare algebraic expressions to determine their equivalence.

- 4.3** Evaluate linear expressions or formulae by substituting given integer values of the variables.

- 4.4** Formulate linear expressions or equations to model a situation.

Write an equation to represent the following sentence.

'When half of x is added to 10, the result is 24.'

Ibrahim wanted to find three consecutive whole numbers that add up to 81.

He wrote the equation $(n - 1) + n + (n + 1) = 81$.

What does the n stand for?

- A. The least of the three whole numbers
 B. The middle whole number
 C. The greatest of the three whole numbers
 D. The difference between the least and the greatest of the three whole numbers

TIMSS Grade 8

- 4.5 Factorise simple algebraic expressions by removing common factors.

Factorise:

- $ax + ay$
- $2m^2 + 6mn$

- 4.6** Determine whether given integer values satisfy a given linear equation.

Algebraic expressions

Include use of the terms *coefficient, variable, constant, linear, expression.*

- 4.7** Solve linear equations or inequalities with fractional coefficients (whole-number denominators), and simple cases of decimal coefficients; verify the solution.

$\frac{x}{2} < 7$ is equivalent to:

- A. $x < \frac{7}{2}$ B. $x < 5$ C. $x < 14$ D. $x > 5$ E. $x > 14$

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Solve:

1. $\frac{1}{2}x + 5 = x - \frac{1}{3}$
2. $2 + 0.6x = 2x$
3. $\frac{x}{3} + \frac{x-2}{4} = 3$

- 4.8** Solve problems by writing and solving linear equations or inequalities.

*There are 54 kilograms of apples in two boxes.
The second box of apples weighs 12 kilograms more than the first.
How many kilograms of apples are in each box?*

TIMSS Grade 8

5 Generate sequences and plot graphs of functions

- 5.1** Use a graphics calculator to generate sequences and plot graphs.

- 5.2** Extend and find missing terms in numeric, algebraic or geometric patterns or sequences (term-to-term or position-to-term rules).

*The numbers in the sequence 2, 7, 12, 17, 22, ... increase by fives.
The numbers in the sequence 3, 10, 17, 24, 31, ... increase by sevens.
The number 17 occurs in both sequences.
If the two sequences are continued, what is the next number that will be seen in both sequences?*

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- 5.3** Generalise the relationship between one term of a sequence and the next, or describe the n th term, using symbols.

Enter the terms and sum for row 7 in the table below.

Row	Terms	Sum
Row 1	1	1
Row 2	1 + 3	4
Row 3	1 + 3 + 5	9
Row 4	1 + 3 + 5 + 7	16
:		
Row 7		
:		

*Without writing out all the terms, what is the sum for row 20?
What is the value of the sum for row n ?*

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- 5.4** Know that a function is a relation between two sets called the *domain* and the *range* in which each member of the domain is related to precisely one member of the range, called its *image*.
- 5.5** Recognise that functions can be represented as ordered pairs, tables, graphs, words or equations; given a function in one representation, generate an equivalent representation.

Linear equations

Include the forms

$$x/a = b$$

$$x/a = b/c$$

$$x/a + x/b = c$$

$$x/a + b = x/c + d$$

where a , b , c and d are integers.

Sequences

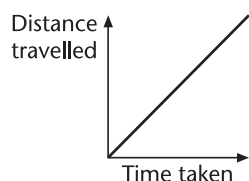
Include the sequence of triangular numbers, and cube numbers.

ICT opportunity

Include the extension of number sequences using a spreadsheet or graphics calculator.

- 5.6** Interpret and sketch graphs of proportional and linear functions using data from practical situations, including distance–time and conversion graphs.

I went for a walk. The distance–time graph shows information about my walk.



Which of these statements describes my walk?

- A. I was walking faster and faster.
 - B. I was walking slower and slower.
 - C. I was walking north-east.
 - D. I was walking at a steady speed.
 - E. I was walking uphill.
- 5.7** Given the graph of a function, identify attributes such as points that lie on the graph, intercepts on axes and intervals where the function increases, decreases or is constant.

A straight line graph passes through the points (3, 2) and (4, 4).

Which of these points also lies on the line?

- A. (1, 1) B. (2, 4) C. (5, 6) D. (6, 3) E. (6, 5)

TIMSS Grade 8

Geometry and measures

By the end of Grade 8, students identify all the symmetries of 2-D shapes. They calculate interior and exterior angles of polygons. They solve problems using angle and symmetry properties of polygons and angle properties of parallel and intersecting lines. They identify the reflection, rotation or translation of a 2-D shape, and draw simple transformations, including a combination of two transformations. They recognise similar shapes and enlarge shapes by a positive integer scale factor. They construct 2-D shapes from given information, including scale drawings. They visualise and describe 3-D shapes in different orientations. They convert measurements within systems of units. They solve problems involving speed or density, or the volume and surface area of cubes, cuboids, prisms and cylinders, using a calculator where appropriate. They recognise that measurements are not precise.

Students should:

6 Identify properties of and relationships in geometric shapes

Angles, shapes and geometric reasoning

- 6.1** Calculate interior and exterior angles of polygons.

Prove that the interior angle of a regular hexagon is 120° .

In a quadrilateral, two of the angles are 110° , and a third angle is 90° .

What size is the remaining angle?

- A. 50° B. 90° C. 130° D. 140° E. None of these

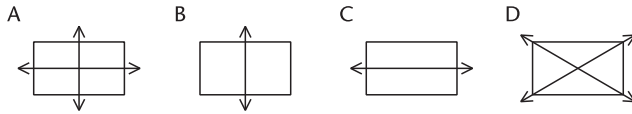
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Use of ICT

Geometry is enhanced with use of a dynamic geometry system, or DGS, which provides an interactive means for investigating and hypothesising results that can then be proved.

- 6.2** Identify reflection and rotation symmetry properties of 2-D shapes, including triangles, quadrilaterals and regular polygons, and draw 2-D symmetrical figures.

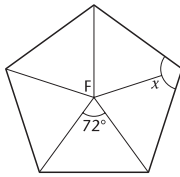
Which shows all the lines of symmetry for a rectangle?



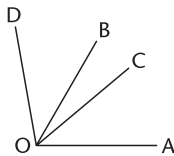
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- 6.3** Use knowledge of angle properties of intersecting and parallel lines, and of the angle, side and symmetry properties of triangles, quadrilaterals and polygons, to conjecture or deduce properties in a given figure.

In the figure below, F is the centre of a regular pentagon. Work out the value of angle x. Explain how you worked out your answer.



In the figure below, $\angle AOB$ is 70° , $\angle COD$ is 60° and $\angle AOD$ is 100° . What is the size of $\angle COB$?



Adapted from TIMSS Grade 8

- 6.4** Identify similar shapes; know that corresponding sides of similar shapes are in the same ratio.

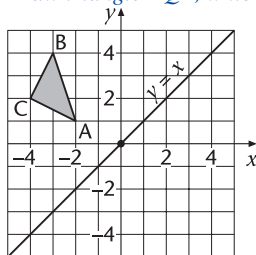
Transformations

- 6.5** Draw transformations of a simple 2-D shape, including:

- reflection in lines parallel to or at 45° to the axes;
- rotation about the origin, or a vertex of the shape, or a mid-point of a side, through multiples of 90° ;
- translation parallel to one of the axes;
- enlargement by a whole-number scale factor using a given centre of enlargement;
- the combination of two of the above transformations.

The diagram shows triangle ABC and the line $y = x$.

Draw triangle PQR, which is the reflection of triangle ABC in the line $y = x$.



Symmetry

Include the terms *line of symmetry*, *centre* and *order of rotation symmetry*.

Similarity

Link to scale drawings and enlargements (GM 6.9 and 6.5).

Transformations

Include the terms *line of reflection (mirror line)*, *centre and angle of rotation*, *centre of enlargement*, *scale factor*.

Include defining the *scale factor* as the ratio of two corresponding line segments.

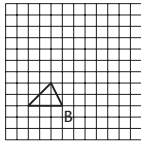
Include the use of Cartesian coordinates.

ICT opportunity

Transformations are best developed through the use of a dynamic geometry system (DGS).

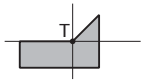
Here is a shape on a square grid.

The shape is rotated 90° clockwise about point B and enlarged by a scale factor of 2. Use a ruler to draw the enlarged shape in its new position.

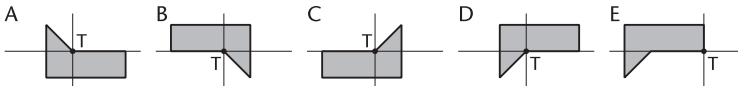


6.6 Identify the reflection, rotation, translation or enlargement of a 2-D shape.

A half turn about point T is applied to the shaded figure.

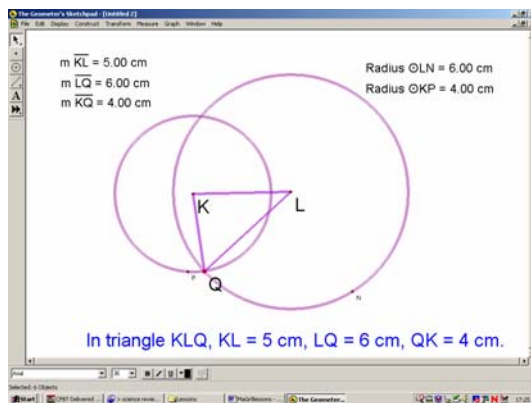


Which of these shows the result of the half turn?



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6.7 Use ICT to explore transformations and to explain or establish geometrical properties.

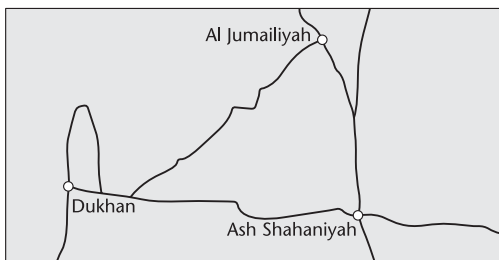


Constructions

6.8 Use ruler, set square, protractor and compasses to construct geometrical figures from given data, on paper and using ICT.

6.9 Construct and interpret scale drawings.

1 centimetre on the map represents 8 kilometres on the land.



About how far apart are Dukhan and Al Jumailiyah on the land?

- A. 4 km B. 16 km C. 35 km D. 50 km

Adapted from TIMSS Grade 8

Transformations

Exclude finding a line of reflection, centre or angle of rotation, scale factor or centre of enlargement.

ICT opportunity

Use a dynamic geometry system (DGS).

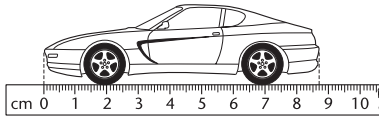
Constructions

Include drawing parallel lines, given the distance between them.

ICT opportunity

Use a dynamic geometry system (DGS) to explore constructions and scale drawings.

Here is a drawing of a model car.
2 centimetres on the model represents 1 metre on the real car.

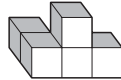


What is the length of the model?
Give your answer in centimetres, correct to one decimal place.

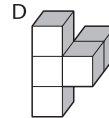
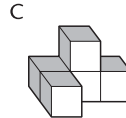
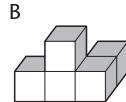
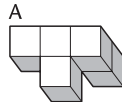
The height of the model is 2.8 centimetres.
What is the height in metres of the real car?

6.10 Visualise, describe and draw 3-D shapes in different orientations.

This solid will be turned to a different position.



Which of these could be the solid after it is turned?



TIMSS Grade 8

7 Use a range of measures, including compound measures, to solve problems

7.1 Use relationships among units for conversions within systems of units.

Which of these is the longest time?

- A. 15 000 seconds B. 1500 minutes C. 10 hours D. 1 day

A paper clip is made from 9.2 centimetres of wire.

What is the greatest number of paper clips that can be made from 10 metres of wire?

A bag of rice contains 1.5 kilograms. Sara uses 60 grams of rice each day.

How many days does the bag of rice last?

The number of 750 ml bottles that can be filled from 600 l of water is:

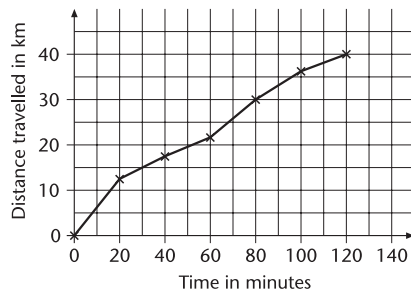
- A. 8 B. 80 C. 800 D. 8000

Adapted from TIMSS Grade 8

7.2 Solve problems involving average speed, distance or time, using a calculator as appropriate.

Noura went on a 40-kilometre cycle ride.

This is a graph of how far she had travelled at different times.



How many minutes did Noura take to travel the last 10 km of the ride?

What was her average speed in km per hour for the last 10 km of the ride?

Use the graph to estimate the distance travelled in the first 20 minutes of the ride.

What was her average speed in km per hour for the first 20 minutes of the ride?

ICT opportunity

Use a graphics calculator to generate conversion tables and graphs.

7.3 Use a calculator to:

- enter and interpret numbers in time calculations in which parts of an hour need to be entered as decimals or fractions;
- convert one unit of speed to another (e.g. convert km/h to m/s).

7.4 Know that density = mass/volume; solve problems involving calculating density.

The table shows some data (July 2003) about five countries.

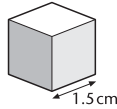
Country	Land area in km ²	Estimated population
Bahrain	620	645 000
Iraq	437 072	23 331 000
Qatar	11 437	817 000
Saudi Arabia	1 960 582	22 757 000
Jordan	92 300	5 154 000

Which country has the most people for each km²?
Which country has the fewest people for each km²?

Look at the information for Qatar.
Imagine that the area of land was shared out equally among all the people.
Calculate how much land, in m², each person would get.
1 km² = 1 000 000 m².

7.5 Find the volumes and surface areas of cubes and cuboids and related solids.

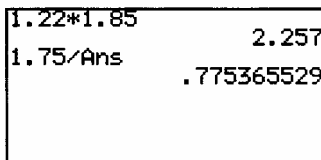
The edge of a small cube is 1.5 centimetres.
A larger cube is made out of small cubes.
The volume of the larger cube is 216 cm³.
How many small cubes are used?



A cuboid has a square base. It is twice as tall as it is wide.
Its volume is 250 cubic centimetres.
Calculate the width of the cuboid.

7.6 Recall the equivalence of 1 litre and 1000 cm³ (a cubic decimetre).

A rectangular tank is 1.22 m wide by 1.85 m long.
Find the increase in the depth of oil when 1750 litres of oil are added.



7.7 Recognise that measurements are not precise (e.g. give the upper and lower bounds of a measurement recorded as 15 cm to the nearest centimetre).

15 pupils measured two angles.
Here are their results.

Use the results to decide what each angle is most likely to measure.
How did you decide?

Angle A		Angle B	
Angle measured as	Number of pupils	Angle measured as	Number of pupils
36°	1	45°	5
37°	2	134°	3
38°	10	135°	4
39°	2	136°	3

The mass of a dolphin was reported as 170 kg, to the nearest 10 kg.
Write down a mass that might have been the actual mass of the dolphin.

TIMSS Grade 8

Density

Include problems involving population density.

Link to work on density in science.

Data handling

By the end of Grade 8, students solve problems by selecting and using an appropriate method of data collection, including from secondary sources. They collect and record continuous data using equal class intervals. They recognise that inappropriate grouping of data can be misleading. They construct bar charts, frequency diagrams and pie charts. They compare two data sets, using the range, median or mean, and the shape of the corresponding frequency distributions. They interpret data sets by drawing conclusions, making predictions, and estimating values between and beyond given points. They use data from experiments to estimate probability for favourable outcomes and understand that different outcomes may result from repeating an experiment. They use problem contexts to calculate theoretical probabilities for possible outcomes.

Students should:

8 Collect, process, represent and interpret data and draw conclusions

Statistics

- 8.1** Recognise possible sources of error in collecting and organising data and plan how to minimise the effect (e.g. bias, inappropriate grouping).

Some students wanted to find out if people liked a new biscuit.

They decided to do a survey and wrote a questionnaire.

One question was: 'How old are you (in years)?'

- 19 or younger 20 to 30 30 to 40 40 to 50 50 or older

Amna said: 'The labels for the middle three boxes need changing.'

Explain why Amna was right.

A different question was: 'How much do you usually spend on biscuits each week?'

- a lot a little nothing don't know

Amna said: 'Some of these labels need changing too.'

Write new labels for any boxes that need changing.

-

The students decide to give their questionnaire to 50 people.

Amna said: 'Let's ask 50 students in our school.'

Give one disadvantage of Amna's suggestion.

Give one advantage.

- 8.2** Choose and use an appropriate method of data collection to answer a given question (e.g. survey, experiment, data logging); design a suitable questionnaire or data collection sheet.

- 8.3** Collect data from secondary sources, including tables and lists from ICT-based sources such as CD-ROMs and the Internet.

Data handling and ICT

Data handling provides many opportunities to use ICT applications to present statistical tables and graphs. The Internet is an excellent source of real data of interest to students.

ICT opportunity

Link to data logging in science.

8.4 Represent data in charts and graphs, on paper and using ICT, including:

- frequency tables;
- bar charts and frequency diagrams for discrete and continuous data;
- pie charts.

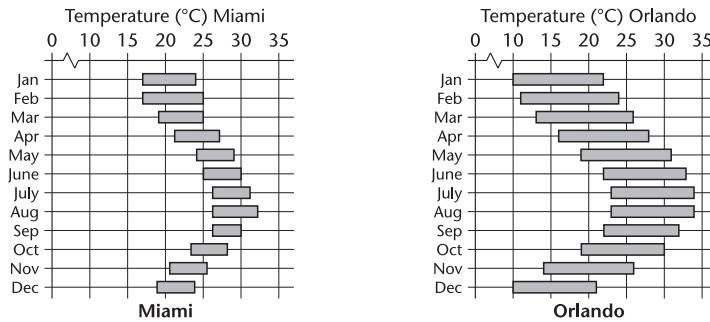
Use the data in the table below to construct a bar graph.
Indicate the scale for the percentage increase and label each bar.

Sales Increases at Super Value Stores 2003 to 2004	
Type of item	Percentage increase
CDs	80%
Food	15%
Toys	25%
TVs	40%
Clothes	120%

TIMSS Grade 8

8.5 Compare in general terms two data sets using, for example, the mean, median or range, or the shape of distribution.

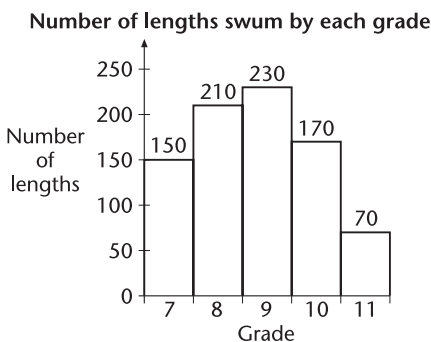
These graphs show the range in the midday temperature in Miami and Orlando each month; e.g. in January the midday temperature in Miami ranges from 17°C to 24°C.



- In which city is there the greatest variation each month in the midday temperature?*
- In which three months is the maximum temperature in Miami greater than the maximum temperature in Orlando?*
- What is the range in the minimum monthly temperature in Miami? In Orlando?*

8.6 Answer questions by interpreting data sets (e.g. draw conclusions, make predictions, and estimate values between and beyond given points).

80 students from a school took part in a sponsored swim.
The numbers of lengths swum are shown on this graph.



- Did Grade 10 have fewer pupils taking part in the swim than Grade 7?*
A. Yes B. No C. Cannot tell
- Explain your answer.*

What is the mean number of lengths swum by each of the 80 students?

Frequency tables and diagrams

Include using equal class intervals.

Pie charts

Include constructing pie charts by calculating angles.

ICT opportunity

Include the use of a spreadsheet with graphs and charts.

Comparing data sets

Use examples from science.

Five songs are recorded on tape. The playing time of each song is shown in the table.

Song	Amount of time
1	2 minutes 41 seconds
2	3 minutes 10 seconds
3	2 minutes 51 seconds
4	3 minutes
5	3 minutes 32 seconds

Estimate to the nearest minute the total time taken for all five songs to play.

Explain how this estimate was made.

TIMSS Grade 8

Probability

8.7 Use data from experiments to estimate probability for favourable outcomes.

8.8 Understand that different outcomes may result from repeating an experiment.

8.9 Use problem conditions to calculate theoretical probabilities for possible outcomes.

In a bag of cards, $\frac{1}{6}$ are green, $\frac{1}{12}$ are yellow, $\frac{1}{2}$ are white and $\frac{1}{4}$ are blue.

Someone takes a card from the bag without looking.

Which colour is it most likely to be?

A drawer contains 28 pens, some white, some blue, some red and some yellow.

The probability of selecting a blue pen is $\frac{2}{7}$.

How many blue pens are in the drawer?

TIMSS Grade 8

8.10 List systematically all the possible outcomes of an experiment.

Nabil and Soud each have three cards, numbered 2, 3 and 4.

They each choose one of their own cards.

They then add together the numbers on the two chosen cards.

The table shows all the possible answers.

		Nabil		
		2	3	4
Soud	2	4	5	6
	3	5	6	7
	4	6	7	8

What is the probability that their answer is an even number?

What is the probability that their answer is a number greater than 6?

Another time Nabil and Soud multiply together the numbers on the two chosen cards.

Draw a table to show all possible answers.

8.11 Compare experimental and theoretical probability in simple cases.
