Grade 5

Introduction for teachers and parents

The Jamaica Primary Mathematics (NSC Edition) is designed to meet the standards, benchmarks, attainment targets and objectives detailed in the National Standards Curriculum. The material is presented sequentially in terms, with each term split into units and chapters that follow the progression outlined in the NSC. At the start of each term, you can find a simplified list of the content that will be covered in each unit.

You will notice that each chapter is colour-coded to indicate the main mathematical content strand covered:

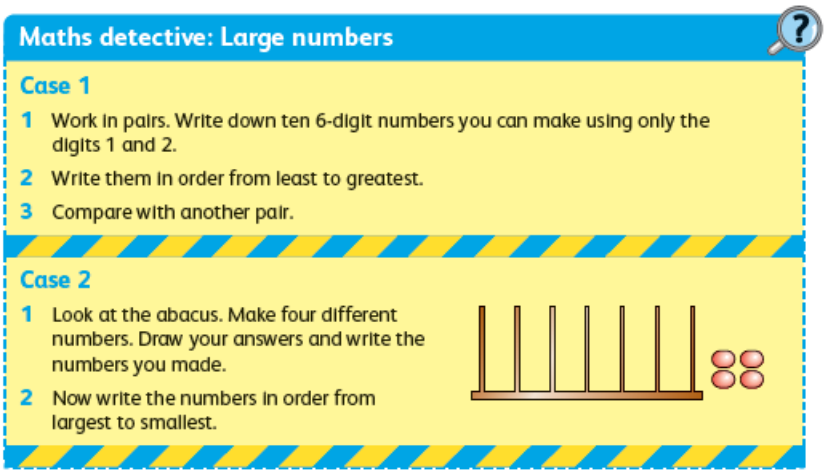
- Number (red)
- Geometry (blue)
- Statistics and probability (yellow)
- Measurement (orange)
- Algebra (green)

Each chapter opens with a **focus question** and **starting point**. This is usually a photograph or picture that is aimed to stimulate open-ended discussion and questions. There are questions or an activity related to the picture in order to get students thinking about the ideas they will be working with in that chapter.

Throughout each chapter, **Key words** are presented next to the content in a purple box.

The **real-world maths activities** indicate contextualised questions situated in recognisable, real-world contexts.

Maths detective activities are designed to develop analytical skills.



Maths detective: Large numbers

Case 1

1. Work in pairs. Write down ten 6-digit numbers you can make using only the digits 1 and 2.
2. Write them in order from least to greatest.
3. Compare with another pair.

Case 2

1. Look at the abacus. Make four different numbers. Draw your answers and write the numbers you made.
2. Now write the numbers in order from largest to smallest.

At the end of each chapter, you will find a consolidation and revision activity, titled **What I have learned**. Students can use this activity to demonstrate what they have learned in the chapter, and teachers may use it for continuous assessment of concept and skill development. There are also **Practice questions** and a **Self check** exercise for reflection.

Although we provide **answers** for most of the questions and activities, there are also many tasks which are open-ended, or do not have a fixed answer. Please use the answers as a general guideline only. Wherever possible, encourage students to share and explain where they have reached different answers or conclusions of their own. In many cases, this will offer rich opportunities for learning.

Chapter 1 Sets (pages 7–18)

- Recap different types of numbers with students to make sure they remember them correctly. Types of numbers are covered in more detail in Chapter 3.
- Explain that a prime number can only be divided by itself and one, so only two division sentences can be made. Two is a prime number because 2 ÷ 2 = 1 and 2 ÷ 1 = 2. It cannot be divided by any other number without leaving a remainder.
- Introduce the term 'composite number' to refer to numbers that can be divided by more than two numbers. Ask students if they can explain why the number one is not a prime number or a composite number.
- Create a human Venn diagram by choosing two categories, e.g.:
  - Set A: has a sibling in the school
  - Set B: has a pet

  Draw two large overlapping circles with chalk on the ground in the school yard or mark out areas with string, for example. Label each of the sets. Give students time to work out where they need to stand in the Venn diagram before inviting them to do so.
- Discuss the characteristics of each region of the Venn diagram. Revise the concept of a universal set and why students who do not have a sibling or a pet are still part of the main group. Draw or mark out a large rectangle around the sets to show the universal set so that everyone can be included.

Chapter 2 Number value (pages 19–42)

- Allow students time to physically construct numbers using place value blocks.
- Work as a class or in groups to make a million. You could use blocks of 10 or 100, or you could ask students to make their own place value apparatus for tens, hundreds and thousands. Begin by counting blocks in tens to 100, then in hundreds to 1000 and then in thousands up to 10 000. Students can then add on in steps of 10 000 on a calculator until they reach a million. They can predict and then check how many steps they need to take.
- Give students the opportunity to work on other grouping activities and ask guiding questions, such as:
  - Start with 255 popsicle sticks and group them in tens.
  - How many groups of ten are there?
  - So how many tens are in 255? (25)
  - How many extra ones are there? (5)
  - Now group tens to make hundreds.
  - How many hundreds are there? (2)
  - Can you explain why the number also has 255 ones?
- Ask students to use blocks to show the number 345. Explain that they should now increase the number by adding five more blocks of their choice: thousands, hundreds, tens or ones.
  For example, they can choose to add 3 hundreds and 2 tens to make the new number 665. Using 345 as the starting number each time, students explore how many different new numbers they can make by adding five blocks each time. Encourage them to record their findings,
  e.g. 345 + 300 + 20 = 665.
- When students work on Question 4 on page 32, note that there is more than one possible solution. In fact, there are five solutions. Below are three. Challenge students to find two more.
  - 4[6]25 46[4]8 4[9]10 [5]1[0]7 51[2]4
  - 4[6]25 46[2]8 4[9]10 [5]1[0]7 51[4]4
  - 4[4]25 46[2]8 4[9]10 [5]1[0]7 51[1]4

Chapter 3 Types of numbers (pages 43–54)

- Introduce this chapter by talking about where students see and use fractional numbers and whole numbers in real life. Check what they remember about fractions and decimals.
- Let students discuss why we often round amounts of money involving decimal numbers to the nearest whole number or to the nearest tenth or hundredth. Let them think about the coins that make up the Jamaican currency.
- Give students the opportunity to create games with different types of numbers. Challenge them to create a game about odd and even numbers, or a game about factors and multiples, or prime numbers and composite numbers, and so on. Share and play the games together. These can be board games, card games or practical games, e.g. using bean bags and hoops.
- Relate these games to the concept of the common multiple and lowest common multiple.
- Remind students that the term 'composite number' refers to numbers that can be divided by more than two numbers. Ask students if they can remember why the number one is not a prime number or a composite number

Chapter 4 Time and temperature (pages 55–70)

- Make sure that students know how to read the start and finish times from a schedule or timetable. Let them practise subtracting start times from finish times. Remind them that there are 60 minutes in 1 hour. Encourage them to use timelines to work out times, as shown on page 58.
- Challenge students to find out about ten different events that happened in the world in each decade of the 20th century. See if they can find at least one event from each continent of the world. Remind them that a decade is a period of 10 years and a century is a period of 100 years, so they need to look at the tens or hundreds place in the year.
- Give students the opportunity to collect information about temperature over a period of time, e.g. over one week at school. They can compare inside and outside temperatures, and calculate the difference between them. Let them represent the data in the form of graphs.
- Let students use the internet or travel brochures to research minimum and maximum temperatures across a year in different holiday destinations. Ask them to present their findings to the class.
- A number line will help students calculate the difference between positive temperatures, as well as the difference between positive and negative temperatures.

Important safety notes

- If you intend to use medical thermometers, make sure that you thoroughly sterilise the thermometer before and after each use.
- Be very careful when boiling water in the classroom if you intend to demonstrate high temperatures. Make sure kettles are in a safe place where they cannot fall or spill. Do not allow students to touch boiling water.

Chapter 5 Length, mass and capacity (pages 71–88)

- Have a variety of measuring instruments available for students to examine and discuss. They already have experience of measuring from earlier grades, so they should be able to recall the purpose of a scale, measuring jug, thermometer and tape measure. Discuss what we might use each item to measure as well as the units we would use.
- Give students the opportunity to design and create their own version of an instrument used to measure length. They can pretend they are inventors and present their design to a manufacturer.

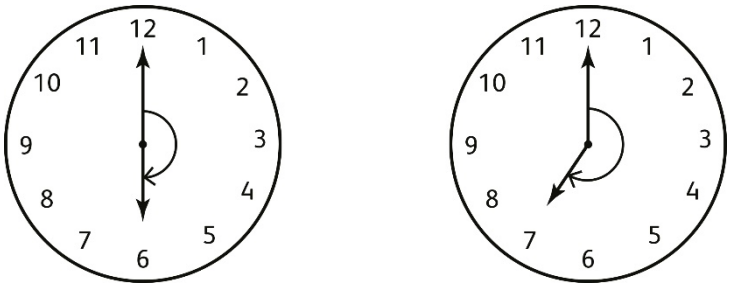
- Students might enjoy trying to work out where in the world the sign on page 80 might be located and where it definitely could not be located. Ask guiding questions, such as: Why do you think the sign cannot be in Cuba?
- Give students the opportunity to explore other relationships between units of measurement, e.g. 1 cm^3 = 1 millilitre = 1 gram.
- As in earlier grades, when teaching mass, focus on the relative masses of 1 g and 1 kg, and remind students that 1 kg is equal to 1000 g. This means that:
  - 1 kg = 1 g × 1000, and
  - 1 g = 1 kg ÷ 1000, or
  - 1 g = $\frac{1}{1000}$ × 1 kg.
- When students learn about decimals in Chapter 11, revisit mass and let them work out that 1 g = 1 kg × 0.001.
- In the same way, when teaching capacity, focus on the relationship between millilitres and litres.
- Make sure that students understand the difference between capacity and volume. We use 'volume' to measure how much space a container takes up and we use 'capacity' to measure how much a container holds.

Chapter 6 Lines and line segments (pages 89–95)

- Make sure that students understand the difference between a point, a line and a line segment. A 'point' is a position in space. When we join two points, we draw a 'line segment'. A line segment has a definite start point and end point.
- Let students identify line segments in the classroom or the environment, e.g. lines created by desks, chairs and shelves, the lines where tiles meet, outlines of walls or buildings, road markings and street signs.
- Remind students that a line passes through two points and continues infinitely in both directions. We show this by drawing arrow heads at either end of a line and we name it with any two points along it.
- Remind students that intersecting lines meet up or cross each other. Perpendicular lines meet up or cross at right angles or 90°. They can be slanted. Parallel lines are the same distance apart along their entire length. They can be horizontal or vertical, or they can also be slanted at an angle.

Chapter 7 Types of angles (pages 96–105)

- Remind students that an angle is created where two lines intersect or where two line segments or rays meet. The size of an angle is the degree of 'turn', which is measured in units called 'degrees'. The symbol for this (°) is the same as the degrees symbol used for temperature.
- Make sure that students can identify the different types of angles and distinguish between them.
- Allow enough time for students to practise estimating and measuring angles.
- When estimating, make sure students use 45°, 90° and 180° as benchmarks for their estimates.
- When measuring angles, students may struggle to decide whether to use the inside or outside scale on a protractor. Remind them to first identify whether the angle they are measuring is acute or obtuse, as this will help them know whether to use the side of the protractor closer to the base line or the other side. Remind them that they can read the inside or outside scale, but that they always need to start from zero at the base arm and turn towards the second arm.
- Use the Maths detective activity on pages 100–102 to make sure students understand that angles measure turn, e.g. the angles below show how far the hour hand has turned from 12 o'clock.



- Try to arrange for a builder, carpenter or cabinet-maker to visit your class. Encourage students to find out which tools they use to make sure the lines in their work are straight and that the angles are accurate.

Chapter 8 Collecting information (pages 106–113)

- Introduce the concept of sampling by finding out the class results for students' favourite TV show.
- Introduce the concept of bias by discussing whether the class results would be the same as the results if students' parents or grandparents were asked the same question.
- Have a class discussion about fairness and bias. The avoidance of bias is a very important aspect of research and there are many aspects to it. The word 'bias' can also mean 'tilted to one side' or 'skewed'. Any researcher comes to a study with their own inherent beliefs and views, and it is very easy for these to affect their research. There are many kinds of bias and you may find it fruitful to discuss some of the most common forms of bias with students:
  - Selection bias: If the sample group is not selected randomly, some groups may be over- or under-represented.
  - Observation bias: People behave and respond differently when they know they are being observed or studied. For example, they may give the answer they feel the researcher wants. This can skew the data.
  - Confirmation bias: The researcher has a point of view and seeks out responses or information that confirms this point of view.
- Discuss with students how to collect information accurately. Link this with previous learning about biased samples.

Chapter 9 Presenting and interpreting data using charts and graphs (pages 114–127)

- Discuss the use of pictographs to show information. Let students compare the way information is shown in pictographs with other charts and graphs they know – bar graphs, line graphs and tables of results.
- Link the information shown in pie charts to fractions. Discuss how the pie chart in the example on page 115 shows that half of the students like science best. Compare pie charts with other graphs that do not show proportions so clearly.
- Let students collect a range of charts and graphs from newspapers or reliable online sources. Display them in the classroom and let students discuss them as a class. Explore the purpose of each chart or graph. Discuss the choices made by the person who created the chart or graph.
- Spreadsheets are very powerful tools and students can start using them in many ways at this level (see pages 122–123). To begin with, they should learn to input data into tables. They can experiment with sorting the data in different ways and with using the software tools to generate graphs. There are many fun online resources that can help students to develop their spreadsheet skills from an early age, from playing battleships to learning basic spreadsheet skills for art and design projects.

Chapter 10 Solving problems with fractional numbers (pages 133–154)

- Together with students, look at the role of zero as a place holder in the numbers in the Key maths idea on page 135. Explain that all four digits, 0, 3, 5 and 7, can be used to make each of the numbers, e.g. 3.750, but because we only tend to use zero as a place holder, it is not needed at the end of this decimal number.
- Explore what happens to the zero when you input 3.750 on a calculator and then press an operation button, e.g. '+'.
- It is important to explain that it is useful to know, for example, that 3.75 can be expressed as 3.750 when calculating or converting some units of measurement, e.g. 3.75 km is equivalent to 3 km 750 m.
- Let students work in groups to find the prices of various items with whole and decimal numbers from magazines, newspapers, brochures, price lists, menus, etc. They should read the prices and record them in a table. Can they record prices in different ways, e.g. \$1.99 as \$1 and $\frac{99}{100}$ of a dollar? You may need to use materials that show prices in US dollars, as Jamaican dollars tend not to use the cents denominations. Let students discuss and share their findings with the class.
- Look at the way we often use rounding to make quantities easier to work with in different contexts. Give examples such as:
  - My journey today was 32.599 km.
  - My luggage has a mass of 27.85 kg.
  - It took 23.75 hours to complete the work.
  - 3.843 million people have visited the website so far, and so on.

  Ask students:
  - How might it be best to round the quantity in each of these contexts?
  - Why might you choose to round in different ways?
- Look at the role of rounding when estimating calculations. Give students practice with examples involving whole numbers and money, e.g. \$375 x 3.
- Students need plenty of practice in counting on and back in decimal steps of $\frac{1}{10}$ and $\frac{1}{100}$, e.g.:
  - Count on in tenths from 3.5 to give the sequence 3.5, 3.6, 3.7, …
  - Count on in tenths from 3.83 to give the sequence 3.83, 3.93, 4.03, …
  - Count back in hundredths from 6.46 or from 6.465, and so on.
- Give students the opportunity to work in groups to measure their heights in metres (up to two decimal places) and compare them. Ask them to work together to calculate the difference between the heights of various pairs of students in the group. Ask:
  - What is the smallest difference and greatest difference you can find?
  - Can you round the heights to the nearest tenth of a metre to help estimate which group of students will make the longest line in total when they lay head-to-toe?

  Encourage them to compare totals with other groups and use computer software to show their findings using a statistical representation.

Chapter 11 Working with fractions (pages 155–174)

- Remind students of the use of fractional numbers and how they used pie charts to depict fractions. Check that they remember how to convert between fractions and decimals.
- When finding equivalent fractions, remind students that they have to multiply the numerator and denominator of a fraction by the same number to get an equivalent fraction.
- Give students sufficient opportunity to practise common factors to simplify fractions and find their simplest form. Remind them that simplifying is the inverse of finding equivalent fractions – they divide the numerator and denominator by their common factors.

- When students compare and order fractions, remind them how to compare fractions that have unlike denominators. Comparison of fractions builds on equivalent fractions too.
- When converting improper fractions to mixed numbers and vice versa, remind students that they can use rounding to round off mixed numbers to the nearest whole number (see page 162). Also remind them *how* to round a mixed number to the nearest whole number.
- Encourage students to use visual methods to help them understand and do multiplication of proper fractions.

Chapter 12 Perimeter and area (pages 175–194)

- Work with students and use an online interactive world map to create shapes by joining locations. Use the real measurements for each side of the shapes to help calculate perimeters.
- Make sure that students can calculate the perimeter of any shape by adding up the lengths of the sides.
- Students should be comfortable using the formula for calculating the perimeter of a rectangle.
- When calculating the perimeter of regular polygons, remind students of the definition of 'regular polygon' (a shape with all sides equal in length) and that they can use multiplication to calculate the perimeter.
- Challenge students to make different shapes with tangrams. Ask them to draw around the shapes on grid paper and then find the area. They should explore and find shapes they can make with the same area, a smaller area or a larger area.
- Remind students what an array is (see page 186) – an arrangement of objects in rows and columns. Show them a presentation in which workers install tiles or other types of floor covering. Students can then design a floor plan for a house. Remind them to think about the appropriate units to use. Include calculation of floor areas to be tiled or covered, and introduce them to computer software if available.
- Let students find the area of shapes by counting squares. Use maps or an online interactive world map to explore areas of different squares, rectangular or triangular regions. Use a calculator where needed to multiply larger numbers. Encourage students to think about how they can express these larger areas in hectares.
- Students should solve a variety of situations in which they use square units of cm^2, m^2 and hectare.

Chapter 13 Properties of triangles and quadrilaterals (pages 195–203)

- Use the folding exercise on page 197 to allow students to explore the shapes of triangles and to help them classify triangles based on their properties. Students can make and draw different types of triangles, first using a ruler and protractor to draw the different types of angles, and then join up the third sides to make triangles.
- Remind students that quadrilaterals are polygons with four sides, four angles and four vertices. An easy way for them to remember this is to think of the prefix 'quad' in quadrilateral, which means 'four'. Remind them of the different types of quadrilaterals and their properties, as shown on page 198.
- As a group activity, let students search for triangles or quadrilaterals in the school environment. They can photograph or sketch them and then label them with the correct properties and classifications. Remind them how to add the short lines to indicate equal lengths on triangles and quadrilaterals.
- Challenge students to make different shapes with tangrams. Let them explore and find quadrilaterals using different tangram shapes.

Chapter 14 Properties of polygons (pages 204–213)

- Students generally enjoy working with regular and irregular polygons, and exploring symmetrical designs. Start this chapter by letting them check shapes for symmetry by first cutting out different shapes and then folding them in various ways. They can also use mirror reflections to explore symmetry.
- Remind students of the names of the different types of polygons and make sure they can define and identify 'regular polygons' and 'irregular polygons'.
- Remind students that regular polygons have all sides equal in length and all inside angles equal in size. They should be able to use this information to identify regular and irregular polygons.
- Let students complete symmetrical shapes or patterns. Ask each student to fold a piece of paper in half and cut out a shape along the fold line. They then place the folded paper onto another sheet of paper and try to draw what the shape will look like when they unfold it. They can then unfold the paper to check how accurately they drew.

Chapter 15 Transformations (pages 214–221)

- It is important to remind students that when we describe a point that is translated, we first go across (horizontally) and then we go up (vertically). A good way for students to remember this is: *across* the landing and *up* the stairs.
- To 'transform' something means to change it. In geometry, transformation of figures means change. When we translate, reflect or rotate a figure, we change it by moving it.
- Students should practise using compass directions to describe positions and turns. Remind them of the four cardinal points and how to describe turns using direction (right or left, or clockwise or anticlockwise) and angles (quarter turn, half turn, three-quarter turn and full turn).
- Remind students how to describe sliding a shape across a plane, rotating a shape about a given point (turn), rotating a shape to a new position and reflecting a shape in a mirror line (flip).
- Make sure that students understand that 'similar' shapes do not have to be the same size. However, they do have the same number of sides and their corresponding inside angles are equal.

Chapter 16 Patterns and rules (pages 222–229)

- With the patterns in this chapter, encourage students to notice how the number patterns relate to the shape patterns. For example, explain why the number of sticks in the pattern on page 223 increases by four each time by telling them to think about how many sticks need to be added to each side of the square. Not all patterns have a link to a multiplication table, but it is a useful property to look out for.
- Give students ample opportunities to explore patterns and draw up tables of shape numbers and number of sticks (or other shapes) in each new term.
- Help students describe a rule to explain how a specific pattern changes. The rule in a pattern is usually an operation, e.g. 'add 3' or 'add 1, then double'. Let students think about the number operations they could use to find the next number in a pattern.
- Relate the rules in a pattern to the mathematical symbols that students know and let them use the symbols <, >, = and ≠ to describe patterns they investigate.

Chapter 17 Expressions and variables (pages 230–237)

- Students have already been introduced to the order of operations and have worked with unknown values in lower grades. You might find that some students find it difficult to transition to using letters (such as *a, b* or *n*) to represent variables. You may need to remind them that the letter is just a name we give to a number whose value is not known or that may change.

- Remind students to use the correct order of operations to calculate the solution to a problem (the BODMAS rule).
- Give students ample time for writing expressions using variables. Remind them of the terms 'expression' and 'algebraic expression', and point out that an algebraic expression uses numbers, letters and operation symbols.
- Let students work in pairs to create expressions to represent an amount in a story problem or a puzzle. They can then evaluate each other's expressions.

Chapter 18 Multiply and divide larger numbers (pages 243–262)

- Give students the opportunity to work in pairs to play games, use flash cards with facts, or use interactive online multiplication games to practise multiplication and division facts. Encourage them to increase their speed, perhaps using a timer to monitor how long they take to answer a set of 20 flashcards or complete a game.
- Give each pair of students a set of 0 to 9 digit cards. They pick six cards each time to make a 4-digit number and a 2-digit number for a division sentence. They should take turns to give their answers, first discussing estimates and tests of divisibility. Give them plenty of opportunity to create new division sentences to increase fluency.
- Students can practise using the relationship between division and multiplication to help find related facts, including inverse operations and the use of place value to make up more facts, e.g. 11 × 2 tens = 22 tens, so 11 × 20 = 220 and 22 tens ÷ 11 = 2 tens, so 220 ÷ 11 = 2.
- Let students explore the tests of divisibility for 5, 8 and 9 on pages 248–49.
- Point out that it is useful to use rounding to help make estimates, to check whether answers are reasonable. Students should also be reminded to use multiplication to check divisions.
- Make sure that students know how to express a division sentence as an improper fraction and how to give an answer as a whole or mixed number.
- Encourage students use different strategies when working with 3-digit divisors (see page 258).

Chapter 19 Solving real-life problems (pages 263–278)

- Revisit the various functions of the basic keys on a simple calculator. Work together through a series of calculations for each of the four operations. Include some two-step calculations, e.g. 40 + 6 × 10, and consider the results. Ask: Why might some calculators give different results?
- Note that only algebraic calculators will calculate following these rules. Suggest to students that, for this chapter, they complete each step of a calculation separately to avoid any errors. Repeat the process with some fractional numbers. For all examples, discuss sensible estimates.
- Show students a video presentation of some of the activities being carried out by a financial institution. Encourage them to work in groups to list as many activities as possible that are related to money and to then share their findings as a class. You could also organise a visit to a financial institution.
- Give students the opportunity to create PowerPoint presentations about financial institutions and their functions to then share with the class.

Chapter 20 Circles (pages 279–287)

- A circle is the path formed by all the points that are equidistant from a given point (the centre). The second activity in the Starting point on page 279 aims to create a practical model of this, but other ways can work too if they are more appropriate for your classroom. For example, you could pin up a sheet of paper on a feltboard or corkboard on the wall and fix a pin with a string attached

to a pencil. You can then use the pencil to draw several points equidistant from the pin before increasing the number of points and eventually joining them to draw a circle.

- Common mistakes that students make when drawing circles with a compass (see page 280) include the centre point slipping or the radius changing if the centre point and pencil are not firmly fixed. Draw students' attention to making sure the centre point is held stable in the same place and that they do not open or close the compass, causing a change in the radius.
- Let students explore the relationship between radius and diameter through experiment and measurement. They may note that all diameters are chords, but not all chords are diameters.
- Note that the everyday use of words such as 'segment', 'sector' and 'arc' are similar to their mathematical meanings, but not exactly the same. We may talk about a segment of an orange, which usually means a wedge. A rainbow or other curve may be described as an arc. In geometry, however, these terms refer to the specific parts of circles, as explained on pages 282–283.

Chapter 21 Polygons (pages 288–297)

- Before talking about concave and convex polygons, revise the different types of angles with students to refresh their memories about angles and turns. They should remember that:
  - A full turn is equal to 360°.
  - A right angle is 90°.
  - Acute angles are greater than 0° and less than 90°.
  - Obtuse angles are greater than 90° and less than 180°.
  - Reflex angles are greater than 180° and less than 360°.
- You may wish to make a class poster showing the different geometry terminology. Make sure to include sketches or diagrams of each type of polygon and angle.
- There are a variety of methods that students can use to construct perpendicular and parallel lines. One way to construct a perpendicular line is to use a set-square or other square corner. To draw a parallel line, they can construct a perpendicular line and then set up the set-square to run parallel to the first line.
- The Real-world maths activity on page 295 offers many possibilities for covering the extended learning activities suggested in the NSC. You may wish to choose an option that is most suitable for your class. Some students may take on more of these assignments as enrichment work.

Chapter 22 Properties of pyramids (pages 298–303)

- Provide students with construction materials or card and tape to practise forming nets and 3D models of the shapes on pages 299–300. They could also use sticks and clay or putty as construction materials.
- Draw students' attention to the relationship between the different constructions and the properties of different pyramids, including the number of faces, vertices and edges.
- Ensure that students can identify and label the parts of a pyramid (base, faces, vertex, apex). They can use any of the diagrams of pyramids in this chapter for this. Ensure that they know:
  - A triangular-based pyramid has a triangle as its base and four vertices.
  - A square-based pyramid has a square as its base and eight edges where the faces meet.
- Let students discuss the similarities and differences between different pyramids. Remind them what is the same and what is different about the bases and other faces of each type of pyramid.

Chapter 23 Variables and equations (pages 304–311)

- Make sure that students understand they cannot solve an expression unless they have been given the values of the variables. Expressions do not have an equality to define the value required. An expression cannot be true or untrue, but it can be evaluated by substituting a particular value for the variable.

- Let students practise writing algebraic expressions with variables to represent problems. Work through the Key maths idea on page 305 with them and make sure they know how to use a letter to write an expression.
- Then move on to substitution of values to evaluate an expression. Give students opportunities to practise how to replace a letter with a given value to find the value of an expression.
- The Real-world maths activity on page 310 will help students relate algebraic equations to real-life problem solving.

Chapter 24 Solving problems with equations (pages 312–319)

- Keep reminding students that expressions cannot be solved, as they do not have an equality to define the value required. An expression therefore cannot be true or untrue.
- Students continue working with substitution of values into formulae (pages 313–314). Remind them to replace the variable (letter) with the known value (number or quantity) to work out the value of the expression.
- Monitor students' understanding of the concept of inequalities and make sure they write the inequalities systematically. Assess whether they are ready to move from visual aids (the balance scales on pages 314–315) to completing activities that only contain numbers.
- Make sure that students use the inequality symbols correctly. Refer them to the activities on pages 314–315 to practise using the symbols <, > and ≠.
- Students move on to interpreting and solving word problems using algebraic expressions and equations. Make sure they are able to create algebraic equations to help them solve a story problem.

Chapter 25 Averages (pages 320–328)

- The mean is a measure of central tendency. Explain to students that we also call it the 'average' in everyday language. In this chapter, students will work with the mean and three other measures of central tendency – mode, median and range.
- Explain how the mean can be affected by outliers, because it is a sum of all the data items and shares them evenly. (Students will investigate outliers – data points that are very different from nearly all the other values – in Grade 6.)
- The median is a useful form of average that is not skewed by outliers, whereas the mean can be affected. Have a class discussion about this to help students understand why there are two different averages – mean and median.
- Remind students how to find the range of a set of data.
- Make sure that students know the term 'modal value' of a set of data means the same as the 'mode' of the data set – the most common value in the data set.
- Let students practise finding the mean of various data sets. Remind them that they need to add together *all* the values and divide by the number of addends.
- The median value or median means 'middle value'. Make sure that students can find the median of both odd and even numbers of data values.

Chapter 26 Probability (pages 329–336)

- Begin this chapter by discussing the likelihood of certain events occurring in your area. Include ridiculous examples, such as snow falling on a summer's day, winning a million dollars, and so on, to establish the *impossible* end of the probability scale. Then use *very likely* events, such as the bell will ring in 15 minutes' time to establish the other end of the scale. Students tend to enjoy these activities, as ridiculous situations appeal to their sense of humour. Extend the activity by asking students to think up their own scenarios and test each other.

- Move on to other simple activities in which students describe specific events using the language of probability, e.g. flipping coins, drawing cards from a deck or drawing coloured marbles from a bag with a known mix of colours or sizes. For example, if you have a pack of cards, you could ask each student to draw a card from the pack, giving predictions of what they think may be drawn next and why. You could also separate out certain parts of the pack (e.g. a set of aces) and then ask what the possible outcomes are of drawing from the pack after that.
- Remind students that probability is often described on a scale from 0 to 1:
  - A probability of 0 is impossible.
  - A probability of 1 is certain.
  - A probability between 0 and 1 is possible.
  - The closer to 1, the more likely the probability.
  - A probability can never be greater than 1 or less than 0.
- Draw students' attention to the way we can express probabilities as percentages (fractions out of 100). For example, 100% simply means $\frac{100}{100}$ or a certain probability, which is equal to 1. Students then practise using the language of probability to describe the chance of events. On page 330 the terms are shown on a probability scale.
- Go through the Key maths idea on page 332 with students. Explain how the sample space of an event shows all the possible outcomes of a probability experiment in a table and how this can be used to predict the results of the experiment.
- Let students work in groups of two or more to complete a probability experiment and interpret the results, such as the coin flipping experiment on page 332.
- Have a class discussion on how probability is used in gambling and on televised gameshows, based on the spinning wheel shown on page 334. What are the possible outcomes on the spinning wheel? Challenge students to describe the probability of winning a big prize in a game of chance. Students can use the internet to investigate other situations that use probability for gambling and write a short explanation of how gambling can have negative outcomes for people.

Chapter 1 Sets

What is a set? (pages 8–9)

1 a Student's own work, for example: They are all items to play with.

b Set = {ball, tennis racket, spinning top, jumping rope}

c Student's own work, for example: sphere-shaped, set = {ball, globe, ball of wool}

2 a 1-digit even numbers

Even numbers from 0 to 8

b Student's own work

3 a Set A = {Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Sunday}

Set B = {triangle, square, pentagon, hexagon, septagon} (Other polygons also accepted)

Set C = {Africa, Europe, Asia, North America, South America, Australia, Antarctica}

Set D = $\left\{\frac{2}{4}, \frac{3}{6}, \frac{4}{8}, \frac{5}{10}\right\}$ (Other fractions equivalent to a half also accepted)

b Sets A and C

4 Student's own work

5 V: Multiples of five

W: Solid shapes

X: Four legs

6 Student's own work

7 Polygons do not have curved sides.

Finite and infinite sets (page 10)

1 a Infinite

b Finite; set = {62, 64, 66, 68}

c Infinite

d Finite; set = {10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90, 95}

e Finite; student's own work

f Infinite

g Finite; set = {January, February, March, April, May, June, July, August, September, October, November, December}

2 a Multiples of three; infinite

b Odd numbers between 0 and 100; finite

c Negative integers; infinite

d Continents; finite

3 Student's own work

Subsets (pages 11–12)

1 a Fish, frog

b Bird, butterfly

c Worm, butterfly

d Student's own work

2 a Set = {dolphin, shark, fish, frog, salamander}

Animals that can survive in water.

b {frog, salamander} is a subset of {dolphin, shark, fish, frog, salamander}.

Animals that can survive in water and on land.

3 Student's own work

4 a True

b False

c False

d False

e True

5 Seven subsets:

{}

{apple}

{banana}

{cherry}

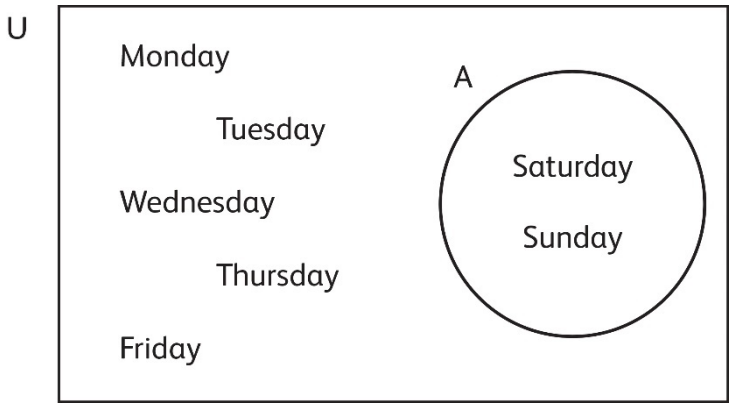
{apple, banana}

{apple, cherry}

{banana, cherry}

Venn diagrams (pages 13–14)

1 a



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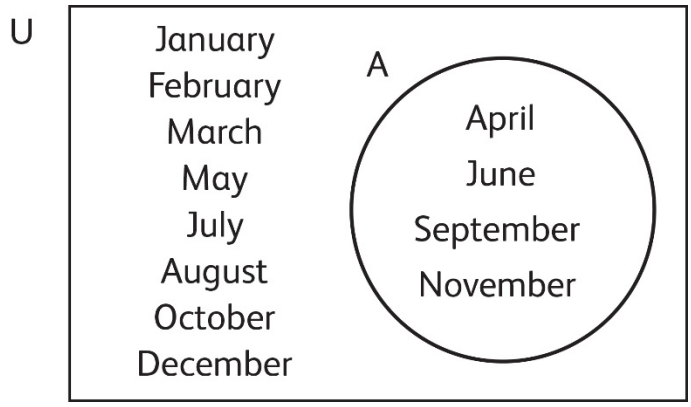

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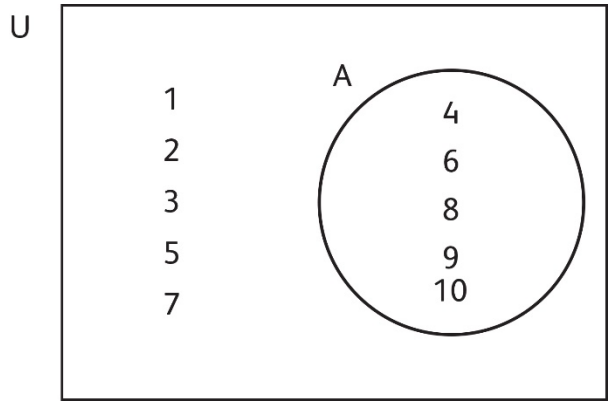

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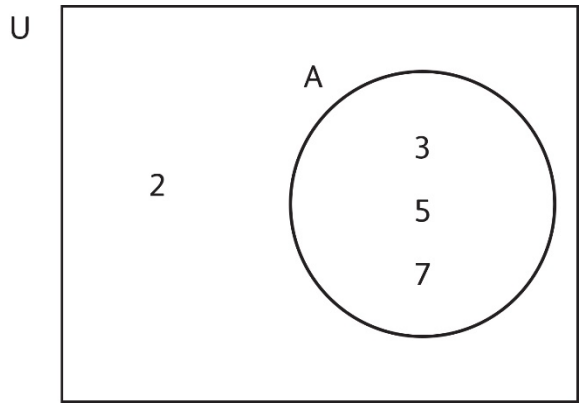
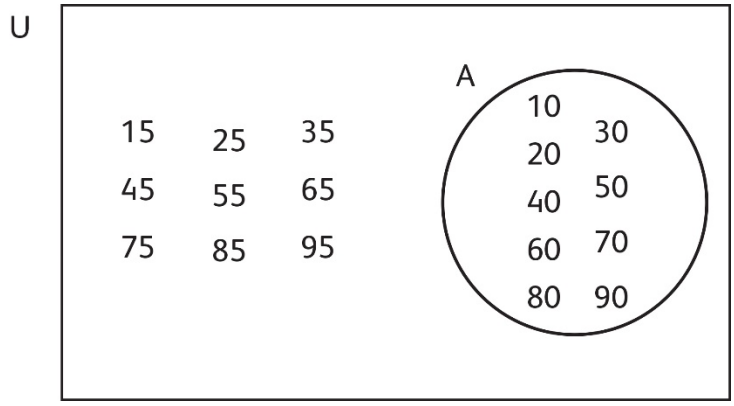
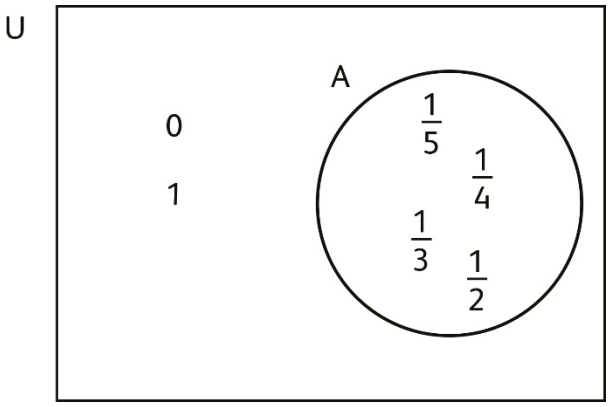


e



f



2 a Set X contains 2D (plane) shapes and Set Y contains 3D (solid) shapes.

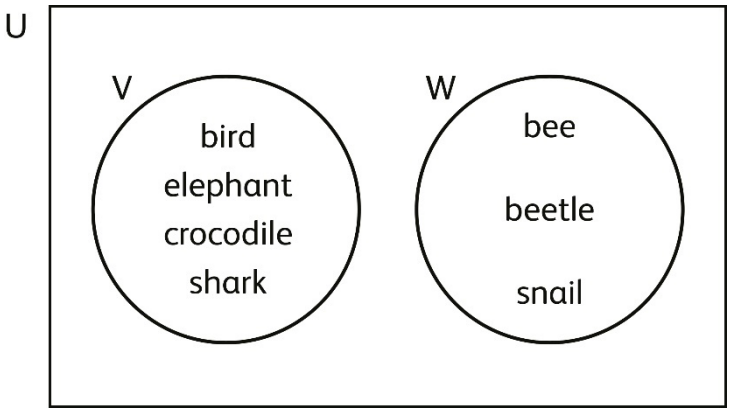
b X = {pentagon, triangle, semi-circle}

Y = {cube, sphere, cuboid}

c Six members

d Student's own work, for example a square in Set X and a pyramid in Set Y

3



Intersection of sets (pages 14–16)

1 a A = {4, 6, 10, 12, 18, 20}

b B = {5, 10, 15, 20, 25}

c Intersecting set = {10, 20}

d 10 and 20 are multiples of both two and five.

2 a U = {submarine, fish, whale, spider, bird, helicopter, kite}

b Both an animal (or living thing) and can fly.

d It is neither an animal (or living thing), nor can it fly.

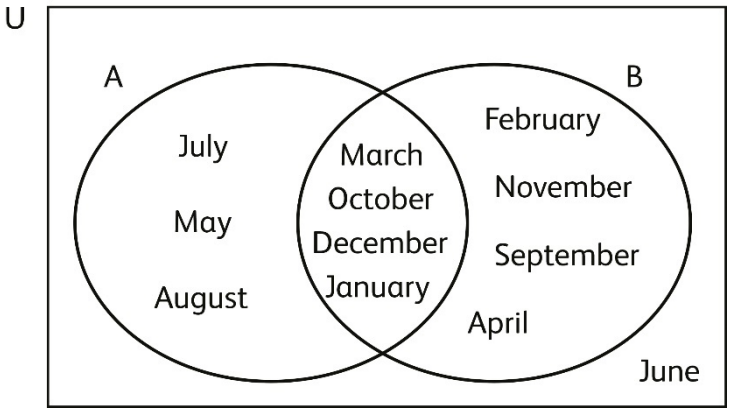
3 a Intersection (Accept: member of both sets)

b It is a triangle and it has sides of equal length (it is a regular polygon). (Accept: it has corners of equal size)

c They are neither a triangle, nor a regular polygon.

4 Student's own work

5



Practice questions (pages 17–18)

1 Students should notice:

a All members of the set are red.

b The main set is fish and tuna is a subset.

c These are disjoint sets.

d These are jointed sets. The members of the first set are odd, the members of the second set have two digits. The intersection shows that 19 and 15 are members of both sets, because they are odd 2-digit numbers.

2 a 12

b Sue has a cat.

Terrence has a cat and a dog.

Harry has a dog.

Kristen does not have a cat or a dog.

c CATS = {Tyrone, Sue, Sonya, Kailyn, Bernadette, Terrence}

DOGS = {Kailyn, Bernadette, Terrence, Steven, Harry}

CATS ∩ DOGS = {Kailyn, Bernadette, Terrence}

Chapter 2 Number value

Our number system (pages 20–21)

1 a Twenty-three thousand, two hundred and twelve

b Forty thousand, one hundred and thirty-one

2 Student's own work

3 a

HTh	TTh	Th	H	T	O
2	4	3	4	0	5

HTh	TTh	Th	H	T	O
4	0	8	4	9	9

M	HTh	TTh	Th	H	T	O
4	3	1	4	2	1	2

TM	M	HTh	TTh	Th	H	T	O
4	4	5	1	3	8	6	7

b The first digit 4 has a value that is 100 times larger than the second digit 4.

c **243 405:**

First digit 4: 40 000

Second digit 4: 400

The first digit 4 is 100 times as large as the second digit 4.

408 499:

First digit 4: 400 000

Second digit 4: 400

The first digit 4 is 1000 times as large as the second digit 4.

4 314 212:

First digit 4: 4 000 000

Second digit 4: 4000

The first digit 4 is 1000 times as large as the second digit 4.

44 513 867:

First digit 4: 40 000 000

Second digit 4: 4 000 000

The first digit 4 is 10 times as large as the second digit 4.

4 Class activity

5 Student's own work

Number value (pages 22–25)

1 a 6000

b 20

c 2 000 000

d 3 000 000

2 a 26 053

b 80 179

3 a i 21 123 151

ii 2 305 374

iii 34 192 024

b i 21 123 161

ii 2 305 384

iii 34 192 034

c (Also accept numbers where students have used answers to part b instead of the original numbers on the abacus.)

i 21 133 151 (or 21 133 161)

ii 2 315 374 (or 2 315 384)

iii 34 202 024 (or 34 202 034)

d (Also accept numbers where students have used answers to part c instead of the original numbers on the abacus.)

i 21 123 051 (or 21 133 061)

ii 2 305 274 (or 2 315 284)

iii 34 191 924 (or 34 201 934)

4 Student's own work

5 a Student's own work

b 80 000 001

c 45

d Student's own work

e 90 000 000

f Student's own work, for example: 4041

6 1 885 800

3 885 800

5 885 800

7 885 800

9 885 800

Expanding numbers (pages 25–26)

1 Student's own work

2 a True

b False

256 822 = 200 000 + 50 000 + 6000 + 800 + 20 + 2

c False

3 702 145 = 3 000 000 + 700 000 + 2000 + 100 + 40 + 5

d False

37 021 459 = 30 000 000 + 7 000 000 + 20 000 + 1000 + 400 + 50 + 9

e True

3 a $3475 = 3000 + 400 + 70 + 5

$1999 = 1000 + 900 + 90 + 9

$609 = 600 + 9

$1500 = 1000 + 500

b $34 750 = 30 000 + 4000 + 700 + 50

4 Student's own work

Representing numbers in different ways (pages 27–28)

1 a 300, 40

b 300

c 142

d 100, 42 (Accept other pairs of numbers that total 142, for example 120, 22)

e 300, 20, 20 (Accept other trios of numbers that total 340)

f 100

2 Student's own work, for example: 445 cents on Monday, 200 cents on Tuesday and 200 cents on Wednesday

3 a False

48 017 = 40 000 + 8000 + 10 + 7

b False

248 017 = 200 000 + 40 000 + 8000 + 10 + 7

c False

208 107 = 200 000 + 8000 + 107

d True

e True

f True

g False

23 250 = 20 000 + 3200 + 50

h False

423 502 = 400 000 + 23 000 + 500 + 2

4 Class activity

Comparing numbers (pages 29–30)

1 a

HTh	TTh	Th	H	T	O
5	6	0	1	2	3
	6	5	1	8	4

560 123 > 65 184

b

HTh	TTh	Th	H	T	O
1	4	6	2	3	5
1	4	2	2	3	5

146 235 > 142 235

c

HTh	TTh	Th	H	T	O
	2	5	6	4	4
2	5	6	0	4	2

25 644 < 256 042

d

TM	M	HTh	TTh	Th	H	T	O
1	0	7	0	2	2	2	2
1	0	6	9	9	9	9	9

10 702 222 > 10 699 999

2 No: 211 473 is larger than 85 324, because the 2 in 211 473 is in the hundred-thousands position and has the value 200 000.

3 a <

b >

c <

d >

4

Less than or equal to 599 999	Greater than or equal to 600 000
85 745 60 000 599 999 Student's own work	5 999 999 605 378 600 000 1 325 327 Student's own work

5 a Antarctica, Australia, Europe

b Asia

c North America

d Bigger

Ordering numbers (pages 31–32)

1 a 32 584, 35 824, 308 492, 315 634

b 43 219, 920 413, 921 437, 921 493

c 45 000, 71 992, 78 106, 700 021

2 a Dominican Republic, Jamaica, Trinidad and Tobago, St Lucia, Antigua, Barbados, St Vincent and the Grenadines, Grenada

b Dominican Republic, Jamaica, Trinidad and Tobago, Barbados, St Lucia, St Vincent and the Grenadines, Grenada, Antigua

c Dominican Republic, Jamaica, Trinidad and Tobago

d Antigua, Grenada, St Vincent and the Grenadines

e Trinidad and Tobago, Jamaica, Dominican Republic

3 Student's own work, for example:

A: 322 000

B: 334 000

C: 356 000

D: 377 000

E: 388 000

4 There are several possible solutions. Below are two:

4[6]25	46[4]8	4[9]10	[5]1[0]7	51[2]4
4[6]25	46[2]8	4[9]10	[5]1[0]7	51[4]4

Decimal fractions (pages 32–34)

1 a $\frac{1}{2}$, 0.5

b $\frac{3}{10}$, 0.3

c $\frac{7}{10}$, 0.7

d $\frac{70}{100}$ (or $\frac{7}{10}$), 0.7

e $\frac{7}{1000}$, 0.007

2 a Five-tenths or half

b Five-hundredths

c One-tenth

d One-thousandth

e Six-hundredths

f Six-thousandths

3 No: 0.9 is larger than 0.009 because the 9 in 0.9 is in the tenths position.

4 a Check that students have shaded eight-tenths (80 small squares) of the first square and eight-hundredths (8 small squares) of the second square. The squares can be shaded in any way, as long as the proportions are correct.

b Class discussion

Decimal number values (page 35)

1 a 0.54

b 0.69

2 a–d Check that students' representations correctly match the decimal in each case.

e 0.25 and 0.75

3 (Also accept answers written as: three-tenths, three-hundredths, etc.)

a 0.3

b 0.03

c 0.3, 0.003

d 0.03

e 0.3

Decimal numbers (pages 36–37)

1 a Whole number: 17

Decimal fraction: 0.5

b Whole number: 1

Decimal fraction: 0.75

2 a C

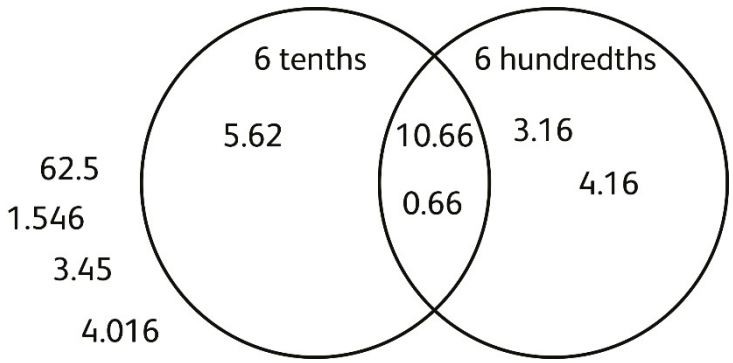
b B

c A

d 3.91 (3, 0.9 and 0.01)

3 a No: 62.5 has 6 tens, not 6 tenths.

b



c Student's own work

Practice questions (page 41)

1 a 2000

b 20 000

c 5000

d 50 000 000

50 000 000 + 4 000 000 + 700 000 + 50 000 + 7000 + 600 + 30

2 a 10 000 000

b 239 000

c 12 405 000

3 a >

b >

c <

4 a 54 650 219, 54 650 129, 45 650 219, 45 560 219

b 21 250 000, 12 520 000, 1 252 000, 125 200

5 a 0.6

b 0.65

c 0.65

Chapter 3 Types of numbers

Fractional numbers (page 44)

1 a

Whole numbers	Fractional numbers
8 75 34	0.8 $\frac{8}{10}$ $\frac{3}{4}$ 0.75 $\frac{2}{5}$

b Student's own work

2 a $\frac{1}{2}$, 0.5

b $\frac{3}{4}$, 0.75

c $\frac{4}{10}$, 0.4

3 Check that students have correctly represented each fractional number. Look for diagrams and number line examples.

Odd and even numbers (page 45)

1 a Even

b Even

c Odd

2 a Set = {52, 54, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78}

b Set = {31, 33, 35, 37, 39, 41, 43, 45, 47, 49}

c Set = {100, 102, 104, 106, 108, 110, 112, 114, 116, 118}

d Set = {81, 83, 85, 87, 89, 91, 93, 95, 97, 99}

3 a 3689

b 3698

c 9863

d 9836

e 6983

f 8936

Factors (pages 46–47)

1

Number	Factors	How many factors?
9	1, 3, 9	3
11	1, 11	2
14	1, 2, 7, 14	4
28	1, 2, 4, 7, 14, 28	6
36	1, 2, 3, 4, 6, 9, 12, 18, 36	9

2 a 18

b 9

c 6

d 3

e 2

f 1

3 a Factors of 8: 1, 2, 4, 8

Factors of 12: 1, 2, 3, 4, 6, 12

Common factors: 1, 2, 4

b Factors of 12: 1, 2, 3, 4, 6, 12

Factors of 21: 1, 3, 7, 21

Common factors: 1, 3

c Factors of 10: 1, 2, 5, 10

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

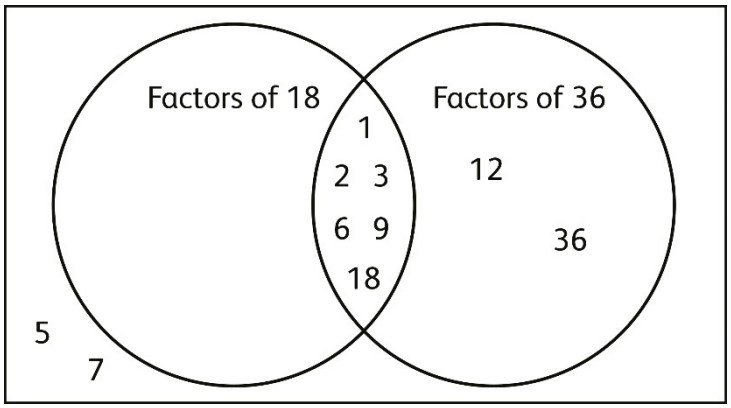
Common factors: 1, 2, 5, 10

d Factors of 16: 1, 2, 4, 8, 16

Factors of 24: 1, 2, 3, 4, 6, 8, 12, 24

Common factors: 1, 2, 4, 8

4 a



b The intersection represents the numbers that are factors of both 18 and 36.

c All of them are also factors of 36.

d 18

Multiples (pages 48–49)

1 a 4, 8, 12, 16, 20, 24, 28, 32, 36, 40

b 5, 10, 15, 20, 25, 30, 35, 40, 45, 50

c 8, 16, 24, 32, 40, 48, 56, 64, 72, 80

d 10, 20, 30, 40, 50, 60, 70, 80, 90, 100

2 a 8, 16, 24, 32, 40

b 10, 20, 30, 40, 50

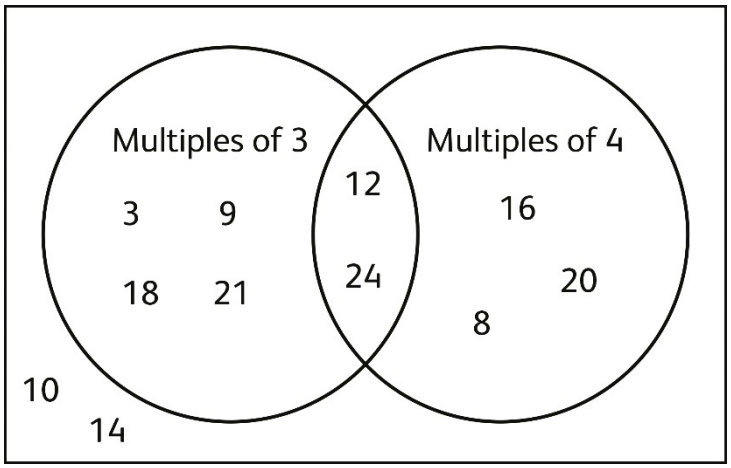
c 20, 40

d 40

e 8

f 20

3 a



b Common multiples of 3 and 4

c 12

d Student's own work

4 a 30, 60, 90

b 60, 120, 180

c 18, 36, 54

5 a They are all the array of the lowest common multiple (12) repeated.

b All common multiples are divisible by 12.

c 48 and 60 are multiples of 12, while 40 is not.

6 a 20, 40, 60, 80, etc.

b The common multiples of 4 and 5 are all multiples of 20.

Prime and composite numbers (pages 50–51)

1 Student's own work

a 1-digit prime numbers: 2, 3, 5, 7, 9

b 1-digit composite numbers: 4, 6, 8

2

Number	Factors	Prime or composite?
24	1, 2, 3, 4, 6, 8, 12, 24	Composite
38	1, 2, 19, 38	Composite
83	1, 83	Prime
15	1, 3, 5, 15	Composite
21	1, 3, 7, 21	Composite
17	1, 17	Prime
64	1, 2, 4, 8, 16, 32, 64	Composite
91	1, 7, 13, 91	Composite
82	1, 2, 41, 82	Composite

3 A: 2

B: 5, 29, 53

C: 1, 9, 15, 49, 81

D: 36

4 No, because all 2-digit prime numbers are odd. (Also accept any response that apart from 2, all prime numbers are odd.)

5 a False, because 5 is a multiple of 5 and is also prime.

b True

c False, because 33 and 63 are multiples of 3 so they are not prime.

Practice questions (pages 52–53)

1 Whole numbers: 5, 25, 75, 14
Fractional numbers: $\frac{1}{3}$, 0.5, $\frac{2}{5}$, 0.75, $\frac{1}{4}$

2 a 34, 48, 120, 56

b Even numbers

c Odd numbers

3 a 1, 2, 3, 4, 6, 12

b 1, 3, 5, 15

c 1, 3

d 3

4 a 3, 6, 9, 12, 15, 18, 21, 24, 27, 30

b 5, 10, 15, 20, 25, 30, 35, 40, 45, 50

c 15, 30

d 45, 60

These are multiples of the lowest common multiple, 15.

e 15

5 a

Prime numbers	Composite numbers
19	9
11	35
5	27
2	82
7	21
17	
31	

b 1

c It can only be divided by one number (1), itself.

Chapter 4 Time and temperature

The 24-hour clock (pages 56–57)

1 a 00:00

b 05:45

c 08:55

d 10:30

e 11:15

f 12:00

g 14:45

h 16:20

i 19:55

j 22:30

2 a 7:35 p.m.

b 7:35 a.m.

c 3:05 a.m.

d 3:05 p.m.

e 10:10 a.m.

f 10:10 p.m.

3 a 06:15, 08:45, 11:45, 13:30, 15:00, 19:20, 21:16, 23:55

b 20:46, 05:45, 18:50, 23:25

c 13:45, 09:00, 15:15, 12:00

4 Mr Harris should have arrived at 6:50 a.m., not 6:50 p.m.

Schedules and timetables (pages 58–59)

1 Jogging: 45 minutes

Breakfast: 15 minutes

Lunch: 50 minutes

2 a 40 minutes

b 3 hours 55 minutes

c 1 hour 5 minutes

3 a 72 minutes

b 1 hour 15 minutes

c 165 minutes

d 1 hour 52 minutes

e 209 minutes

f 2 hours 59 minutes

4 a 1 hour 45 minutes

b 45 minutes

c 20:43

d 2 hours 27 minutes

e Students should give an explanation that 24-hour notation avoids any confusion between the a.m. and p.m. times on the 12-hour clock. They may give examples such as 15:25 appears only once on the 24-hour clock, whereas 3:25 appears twice on the 12-hour clock – once in the morning and once in the afternoon.

5 1:00 p.m.

6 Student's own work

Working with calendars (pages 60–61)

1 a There were only 28 days in February.

b 45 days

c 8 March

d 45 days

e 11 January

2 a 13 December

b 17 May

c 8 weeks, 5 days

d 10 weeks, 6 days

3 11 May, 17 May, 23 May, 29 May, 4 June

4 a New York, 12 days

Jamaica, 2 days

Accra, 5 days

Kingston, 7 days

London, 15 days

b Letter from London

5 1 May, 08:41

Years, decades and centuries (pages 62–63)

1 a 10

b 3

c 50, century

d 1

e 10

f 1000

g 10

2 a 1989 AD

b 1066 BC

c 100 BC

d 2012 AD

3 a

1960s	1970s	1980s	1990s	2000s	2010s
Rome 1960, Mexico City 1968, Tokyo 1964	Munich 1972	Los Angeles 1984	Atlanta 1996, Barcelona 1992	Athens 2004, Sydney 2000	Rio de Janeiro 2016, London 2012

b Sydney and Athens

4

16th century	17th century	18th century	19th century	20th century	21st century
1502: Columbus made his last voyage to the Caribbean	1653: Taj Mahal completed	1788: European settlers arrive in Sydney, Australia	1850: Human population reached 1 billion 1876: Alexander Graham Bell invents the telephone	1939: Start of World War 2 1961: First humans in space	2011: Earthquake and tsunami in Japan

Years, events and time intervals (pages 64–65)

1 a 16th century

b 3 decades

c Paul Bogle

d 75 years

e Norman Manley

f Bustamante, 93 years

2 a 25 years

b 125 years

c 1840 years

d 241 years

3 Student's own work

Temperature (pages 65–67)

1 a 8 °C

b 10 °C

c Munich

d –7 °C

e Moscow

2 a 20 °C

b 0 °C

c 18 °C

d –4 °C

e –4 °C

f 7 °C

4 a 7 °C and 22 °C; difference 15 °C

b –7 °C and 12 °C, difference 19 °C

3

Description	°C	°F	Thermometer
Oven temperature for baking	180	356	c
Boiling point for water	100	212	a
Cup of tea	60	140	f
Hot bath	40	104	g
Healthy body temperature	37	98.6	b
Warm summer day in the Caribbean	28	82.4	e
Freezing point of water	0	32	d

5

Degrees Celsius (°C)	14	18	20	25	33	42	100
Degrees Fahrenheit (°F)	58	66	70	80	96	114	230

Practice questions (page 69)

1 a 07:15

b 10:40

c 12:00

d 15:48

e 23:30

f 00:00

2 a 12:35

b 20:50

c 13:45

3 a 4:15 p.m.

b 5:20 p.m.

4 a 35 minutes

b 1 hour 33 minutes

c 47 minutes

5 a 14 April 1985, 5 March 1901, 2 August 1949, 19 April 1967

b 23 June 1861

c 1 October 2003

6 a A: 12 °C

B: 11 °C

C: 8 °C

D: 11 °C

b –4 °C

Chapter 5 Length, mass and capacity

Revising what you know about measurement (page 72)

1 Class activity

2 a B

b D

c C

d G

e E

f F

g A

3 Student's own work

4 b 1.5 t

c 0.485 t

d 0.017 t

e 2.209 t

f 0.002 t

5 b 500 kg

c 250 kg

d 1 kg

e 1005 kg

f 65 081 kg

g 100 018 kg

h 19 084 kg

Units of measurement (pages 73–74)

1 a 1000 times as long

b 1000 times as long

c 2000 times as long

d 5 times as long

2 a Millilitre

b Hundredth

c Kilogram

d Thousandth

3 a 5000

b 10

c 12 000

d 250

e 4.5

f 4

4 a 10 centimetres

b 10 cm is one-tenth of a metre (100 cm) because 10 is one-tenth of 100.

5 a Bucket A: 2 litres + 3000 ml + $1\frac{1}{2}$ litres = 6.5 litres > 4 litres + 2000 ml + 200 ml = 6.2 litres

b Student's own work

Working with length and height (pages 75–76)

1 Check that students have measured accurately. You can also ask students to measure four actual items of stationery.

2 Drawings may vary. Check that lines are drawn to the following lengths:

a 15.5 cm

b 6 cm

c 4.75 cm

d 19 cm

e 19.5 cm

3–5 Student's own work

More about perimeter (pages 77–78)

1 Check that students have measured accurately.

a Equilateral triangle, perimeter = 12 cm

b Regular hexagon, perimeter = 12 cm

c Regular octagon, perimeter = 16 cm

2 Check that students have measured accurately. Remind them that they can use the formula for a rectangle to make calculation easier.

a Perimeter = 12 cm

b Perimeter = 14.6 cm

c Perimeter = 16 cm

3 a A: Hexagon

B: Triangle (isosceles)

C: Pentagon

b A: 246 mm

B: 23.4 cm

C: 270 mm

c Student's own work

4 a 10 metres

b 7.5 metres

c 6 metres

d 5 metres

Working with distance (pages 79–80)

1 a 1200 metres

b 7.6 kilometres

c 201 kilometres

d They are equal.

2 a 3.5 km, 2.4 km, 2.6 km, 3.2 km, 0.85 km

b 12.55 km

c Tuesday and Wednesday

d 2700 m (or 2.7 km)

e 12.05 km

f 12 050 m

3 a 1029 miles

b 122 miles

c Student's own work

d No, the distance to Paris is approximately 7700 km.

Working with mass (pages 80–81)

1 a Correct

b Incorrect

c Incorrect

d Incorrect

2 a 1.7 kg

b 0.9 kg

c 1.1 kg

3 a $\frac{1}{2}$ kg, $\frac{3}{4}$ kg, 1000 g, 1.75 kg, 2 kg

b 750 g, $1\frac{3}{4}$ kg, $2\frac{1}{4}$ kg, 2.5 kg, 3000 g, 1 t

4 Student's own work

5 a 11 000 kg

b 18 t

c 12 t

Working with capacity (pages 82–83)

1 a A: 4.25 ℓ; 4,250 mℓ

B: 2.75 ℓ; 2,750 mℓ

C: 1.5 ℓ; 1,500 mℓ

D: 0.75 ℓ; 750 mℓ

b A: 4 litres

B: 3 litres

C: 2 litres

D: 1 litre

c Student's own work. (Accept any answer that is equal to or greater than 3 litres, but is less than 3.5 litres.)

2 Student's own work

3 a 1136 mℓ

b 4544 mℓ

c 2272 mℓ

d 5680 mℓ

e 100 pints

4 a 4 buckets

b 1 litre

Problem solving (page 84)

1 a 88.5 kg (farmer + chicken across the river)

b Second crossing: 84 kg (farmer back again)

Third crossing: 86.5 kg (farmer + corn across the river)

Fourth crossing: 88.5 kg (farmer + chicken back again)

Fifth crossing: 98 kg (farmer + fox across the river)

Sixth crossing: 84 kg (farmer back again)

Seventh crossing: 88.5 kg (farmer + chicken across the river)

2 a 25 m

b 75 m

c 25 m

d 175 m

3 a 1 hour 24 minutes

b 16:24

4 1300 mℓ, calculations will differ. (Accept 1050 mℓ if the farmer empties 250 mℓ at the end of the last crossing.)

Practice questions (pages 87–88)

1 a =

b >

c >

d >

e =

f =

2 a 224 mm

b Two planks

3 a 100 mm

b Monday

c Saturday

4 Seven trips

5 Seven batches

6 450 g

Chapter 6 Lines and line segments

Lines and line segments (page 90)

1 a line segment AB

b line CD

c line EF

d line segment GH

e line IJ

f line segment KL

2 Answers could include:

a The ladder is oblique, the wall is vertical, the bricks in the wall are laid horizontally.

b The net has two horizontal lines top and bottom, the net posts are vertical, the mesh of the net is a criss-cross of oblique lines.

3 Student's own work

Horizontal and vertical lines (page 91)

1 Student's own work

2 No, because the lines are parallel, so they will never cross and therefore will not be able to create a closed shape.

3 Yes, you can create a rectangle with only oblique lines if the angles of the shape are still 90°.

4 No, you need a third line to close the triangle.

5 Yes, you can use oblique lines to connect the horizontal lines and make a trapezium/rhombus/parallelogram.

6 Student's own work

Perpendicular and parallel lines (pages 92–93)

1 a Parallel

b Perpendicular

c Intersecting

d Two sets of parallel lines intersecting one another to form a parallelogram

2 Student's own work

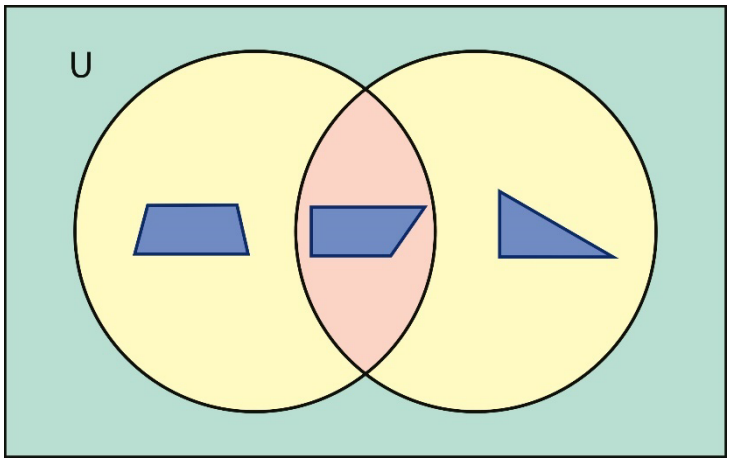
3 a A, C, E

b B, C

c A, E

Practice questions (page 95)

1 Answers will vary and could include these shapes:



2 Student's own work

Chapter 7 Types of angles

Angles (page 97)

1–2 Class activity

Identifying and measuring angles (pages 98–100)

1 a 40°

b 140°

c 30°

d 90°

2 a The definition of an angle is the degree of turn between two lines that meet or intersect at a point.

b An acute angle is between 0° and 90°.

c A reflex angle is greater than 180° and less than 360°.

3–5 Student's own work

Practice questions (page 104)

1 a Obtuse

b Reflex

c Acute

d Obtuse

2 a 30°

b 152°

c 45°

d 172°

3 Parallel lines could be formed in many ways, for example: AE and BD are parallel, FB and EC are parallel, DF and CA are parallel.

Perpendicular lines can be formed as follows: AE and FC, BD and FC, AD and BF, AD and CE, BE and AC, BE and FD.

Chapter 8 Collecting information

Populations and samples (pages 107–108)

1 a 45 students

b No, it is less than a tenth of the school's population and therefore not a fair sample size.

c 120 students

2 Banana chips, patties and chopped fruit because these were the most popular snacks in the list and are what most students would most like.

3 a 5 students

b 19 students

c 83 students

4 a What type of music do children and adults listen to?

b 13 adults and 14 children (27 total)

c Student's own work

Fairness and bias (pages 108–109)

1 a The staff at a hospital will understand more about Covid-19 than the average population.

b The boys in the football club all like football, while other students might not like football and are not fairly represented.

c Students who are bullied might not want to stand up in assembly.

2 They all asked people they are close to and have shared interests with. It is not possible to conclude what the most popular type of music is from such a small, biased sample. The first girl only asked three people, which is not representative of the whole student population. The boy only asked people in his own class, not other students in the school. The third girl asked her family, who are not even students at the school and are therefore an irrelevant sample.

3–4 Student's own work

Collecting information (pages 110–111)

1–3 Class activity

Practice questions (page 113)

1 Student's own work

2 6400 people

3 Student's own work

Chapter 9 Presenting and interpreting data using charts and graphs

Using and interpreting pie charts (pages 115–116)

1 Science = $\frac{1}{2}$; Art: $\frac{1}{10}$; History: $\frac{1}{5}$; Geography: $\frac{1}{5}$

2–3 Student's own work

Bar graphs and double bar graphs (pages 116–118)

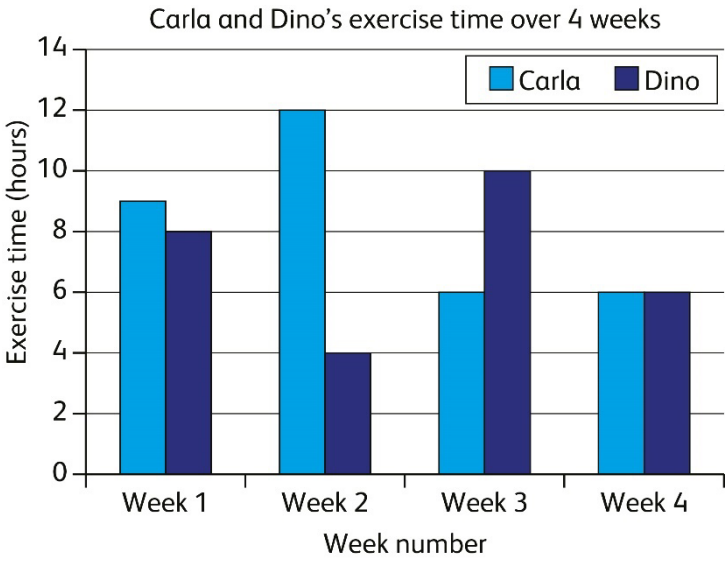
1 a 31 students

b 16 girls

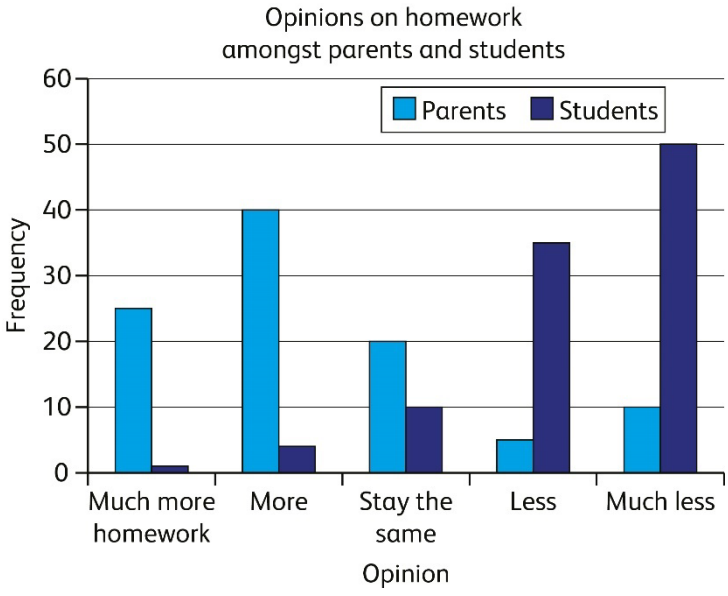
c 15 boys

2 Student's own work

3



4 a



b In the parent group, the trend is that parents want children to have more homework. In the student group, the trend is that children want less homework. This might be because the parents want their children to be successful academically and well prepared for the future, and they might think that homework achieves this. While the students might feel overwhelmed by the workload they already have, and feel stressed and pressured. They might want a more balanced lifestyle and to not only focus on their studies all the time.

Line graphs (pages 119–120)

1 a 3.5 m

b Day 14

c The water reservoir is empty.

d It means that as the days go by, the water in the reservoir is decreasing.

2 a Day 4. That is when the first height measurement is not zero.

b Day 7. The plant grew 4 cm in the day and the graph has the steepest part of the curve then.

c The data is always increasing. As the days go by, the plant is growing more and is not shrinking.

d Answers will vary. Students may refer to the fact that the plant could shrink if it is not watered properly.

3 a 1 cm

b 6 cm

c 18 cm

d 24 cm

e 28 cm

Choosing graphs (page 121)

1 Class activity

Practice questions (pages 126–127)

1 c

2 Students tend to score higher in tests when they are prepared for the tests.

3 a Approximately 35 mm

b Bridgetown: 30°C

Kingston: 31°C

4 a 38 metres

b At around 14 years old

c Answers will vary, for example there was a lightning strike, a storm, the tree fell or was heavily pruned, and then after 15 years it began growing again.

PEP task: Fitness fanatic (pages 128–131)

Part 1

1 Check that students have correctly drawn the plan with a scale of 2 cm to 1 metre.

The fitness centre should have dimensions on the scaled plan of 19 cm by 15 cm, and so on.

2 Answers will vary depending on the way students have arranged the treadmills.

Each treadmill will have a footprint on the plan of 1.6 cm wide by 3.5 cm long.

Part 2

1 a Elaine

b 21 bpm

2 a Elaine

b 5:57 a.m.

c 27 minutes

3 a Elaine: $\frac{1}{2}$ hour

Jeffrey: $\frac{3}{10}$ hour

b 12.5 km/hr

c 2.4 km

d 6 km

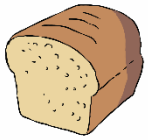
e Faster. She ran 6.95 km in the second half of her training, while running only 6.25 km in the first half of training. She therefore ran faster in the second half of training.

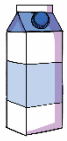
4 Elaine: 750 m

Jeffrey: 480 m

Part 3

1 a

 = 5000 loaves of bread

 = 5000 litres of milk

 = 55 000 kilograms of fruit and vegetables

 = 80 000 meals

b Check that students' copy of the key matches the correct figures from question 1.

c $2\frac{2}{3}$ loaves per person

d Yes, the number of meals divided by the number of athletes is 128, so 130 is a good approximation.

2 a Fruit and vegetables

b $\frac{1}{4}$

c Grains and carbohydrates

d Light

e Healthy

3 Check that students' diagrams show 25% ($\frac{1}{4}$) fruit and vegetables, 25% ($\frac{1}{4}$) lean protein and 50% ($\frac{1}{2}$) grains and carbohydrates.

4 a Hard training days require 25% ($\frac{1}{4}$) fruit and vegetables, 25% ($\frac{1}{4}$) lean protein and 50% ($\frac{1}{2}$) grains and carbohydrates. Students might answer the question by drawing up a list of foods eaten according to category, for example three sources of protein (egg, fish, chicken), four carbohydrate items (sandwich, pasta, yam, dumpling) and four types of fruit and vegetables (broccoli, mango, pineapple, apple). Students could argue that the athlete is eating more fruit and vegetables than necessary (four out of 11 items) and too little carbohydrates (they should eat at least five or six carbohydrate items out of 11). Accept all reasonable answers.

b Make sure that students draw the items in the correct part of the diagram. They should indicate in writing or by drawing that the athlete should include more carbohydrates on the plate and slightly more protein, and eat less fruit and vegetables. Again, accept all well-reasoned answers.

Chapter 10 Solving problems with fractional numbers

Decimal place value (pages 135–137)

1 a 0.25, decimal fraction

b 0.9, decimal fraction

c 1.57, decimal number

2 a Decimal number: 10.09

b Whole number: 15

Decimal fraction: 0.425

3 a The numbers get 10 times smaller each time. As a result, digits move one place to the right each time.

b The number increases by one unit each time, for example 10, 20, 30 increases by one unit of 10 each time.

4–5 Student's own work

Expanding decimal numbers (pages 137–138)

1 Student's own work

2 a $45.36 = $40 + $5 + $0.30 + $0.06

b $453.60 = $400 + $50 + $3 + $0.60

c 15.25 km = 10 km + 5 km + 0.2 km + 0.05 km

d 1.525 km = 1 km + 0.5 km + 0.02 km + 0.005 km

e 23.99 kg = 20 kg + 3 kg + 0.9 kg + 0.09 kg

f 2.399 kg = 2 kg + 0.3 kg + 0.09 kg + 0.009 kg

3 a True

b False

3.451 = 3 + 0.4 + 0.05 + 0.001

c False

3.702 = 3 + 0.7 + 0.002

d False

37.021 = 30 + 7 + 0.02 + 0.001

e True

Equivalent decimal fractions (pages 138–139)

1–2 Student's own work

3 No, they all ran the same distance.

4 Student's own diagrams. Check that their flags have colours that match the given fractions and that they have expressed each part as a decimal fraction. Students should use what they know about equivalence to recognise that the flag must be $\frac{3}{10}$ red (0.3), $\frac{2}{10}$ blue (0.2), $\frac{4}{10}$ yellow (0.4), and $\frac{1}{10}$ green (0.1).

Comparing decimal fractions (page 140)

1 a Nine hundredths are less than nine tenths.

0.09 is less than 0.9.

0.09 < 0.9

b Seven tenths are less than eight tenths and five hundredths.

0.7 is less than 0.85.

0.7 < 0.85

c Five tenths are greater than two tenths and five hundredths.

0.5 is greater than 0.25.

0.5 > 0.25

d Six tenths and five hundredths are less than six tenths, seven hundredths and five thousandths.

0.65 is less than 0.675.

0.65 < 0.675

e Four tenths are greater than three tenths, seven hundredths and five thousandths.

0.4 is greater than 0.375.

0.4 > 0.375

2 a Mass X

b Mass Y

c Mass X

d Mass X

e Mass Y

Ordering decimals (pages 141–142)

1 a Any five numbers from the following, in order: 0.123, 0.132, 0.213, 0.231, 0.312, 0.321

b Student's own work

2 a 5.99, 5.49, 5.45, 5.18, 5.108

b 17.321, 17.23, 13.55, 13.2, 11.15

3 a 2.002 m, 2.02 m, 2.112 m, 2.2 m, 2.222 m

b 13.05 m, 13.321 m, 13.35 m, 13.436 m, 13.5 m

Rounding numbers (pages 142–144)

1 a Nearest 10: 4510

Nearest 100: 4500

Nearest 1000: 5000

b Nearest 10: $6460

Nearest 100: $6500

Nearest 1000: $6000

2

Number	Rounded to the nearest whole number	Rounded to the nearest tenth (0.1)	Rounded to the nearest hundredth (0.01)
0.451	0	0.5	0.45
1.514	2	1.5	1.51
5.14	5	5.1	5.14
4.051	4	4.1	4.05

3 Student's own work

4

Penguin species	Adelie	Chinstrap	King	Emperor	Gentoo
Mass (kg)	**4.9**	**4.49**	**13.8**	**22.45**	**5.921**
a) rounded to the nearest whole kg	**5 kg**	**4 kg**	**14 kg**	**22 kg**	**6 kg**
b) rounded to the nearest tenth of a kg	**4.9 kg**	**4.5 kg**	**13.8 kg**	**22.5 kg**	**5.9 kg**

5 a $25, $35, $25, $35, $30

b $25.10, $34.90, $29.60

6 3.461, 3.462, 3.463, 3.464

Adding and subtracting decimal numbers (pages 144–146)

1 a 92.6

b 37.8

c 760.74

d 298.08

e 3.787

f 1.159

g 97.25

h 34.35

2 a 1.9 cm

b 3.7 cm

c 1.8 cm

d 0.4 cm shorter

e 1.6 cm

f From 12 weeks. It loses its tail as it turns into a frog.

3 a Yes, she can.

b $31.75

c Student's own work

4 a $349.50 + $86.73

$86.73 + $185.49

$86.73 + $164.75

$164.75 + $185.49

b $164.75 + $185.49 + $86.73

c He bought the items that cost $349.50 and $86.73.

5 a 1.32 litres

b 3.61 m

c 11.167 kg

Multiplying decimal numbers by 10, 100 or 1000 (pages 147–148)

1 a 635.2, 63 520, 63 520 000

b 90.17, 9017, 9 017 000

c 0.435, 435, 435 000

2 a 10

b 100

c 10

d 71.4

e 1000

f 19.432

g 100

h 23

3 a False

3.45 m is 10 times as far as 0.345 m.

b True

c False

3600 kg is 1000 times as heavy as 3.6 kg.

d False

145 000 kg is 10 000 times as heavy as 14.5 kg.

e False

75.5 litres is 10 times as much as 7.55 litres.

f False

$36.00 is 10 times as much as $3.60.

4 a Example answers:

Blade of grass: 0.025 m

Flower: 0.25 m

Bush: 2.5 m

Tree: 25 m

b Student's own work

Multiplying whole numbers and decimals (pages 149–151)

1

Product is less than the whole number factor	Product is equal to the whole number factor	Product is more than the whole number factor
a, c, f	b, e, h	d, g

2 a 42, 0.42, 0.42; student's own observations

b 40, 4, 4; student's own observations

c 30, 3, 3; student's own observations

3 a $5 \times 0.6 = 3$ or $0.6 \times 5 = 3$

b $6 \times 0.08 = 0.48$ or $0.08 \times 6 = 0.48$

c $4 \times 0.005 = 0.02$ or $0.005 \times 4 = 0.02$

4 a 2.45

b 3.78, 3.825, 12.78

5.34, 5.358, 17.34

4, 2, 52

5 Trudy spent the most. She spent $317.05 more than Mark, who spent the least.

6 3 × 1.85 m

Practice questions (pages 152–153)

1 a 0.45 = 0.4 + 0.05

b 3.45 = 3 + 0.4 + 0.05

c 4.35 = 4 + 0.3 + 0.05

d 4.035 = 4 + 0.03 + 0.005

e 3.254 = 3 + 0.2 + 0.05 + 0.004

2 a 40

b 7

c 1000

d 100

3

Number	Rounded to the nearest whole number	Rounded to the nearest tenth (0.1)	Rounded to the nearest hundredth (0.01)
2.359	2	2.4	2.36
3.451	3	3.5	3.45
4.035	4	4.0	4.04
5.999	6	6.0	6.00

4 a 0.004, 0.04, 0.075, 0.3, 0.325

b 5.306, 5.63, 6.035, 6.305, 6.35

5 a $37 455

b $18 831

c $11 215

d $42 315

6 a 34.5 km, 266.75 km, 9.99 km

b 345 km, 2667.5 km, 99.9 km

c 3450 km, 26 675 km, 999 km

7 a 12

1.2

0.12

0.012

0.12

b 45

4.5

4.5

0.45

0.045

Chapter 11 Working with fractions

Equivalent fractions (pages 156–157)

1 Class activity

2 Check that students have shown different patterns of dots that are equivalent to:

a Purple: $\frac{2}{5}$

Blue: $\frac{3}{5}$

b Purple: $\frac{3}{8}$

Blue: $\frac{5}{8}$

c Purple: $\frac{6}{8}$

Blue: $\frac{2}{8}$

3 a $\frac{16}{25}$

b $\frac{15}{20}$

c $\frac{7}{8}$

d $\frac{9}{32}$

4 a Amari and Adjani

b Tia

More about fraction and decimal equivalence (pages 158–159)

1 a $\frac{8}{10}$

b $\frac{5}{10}$

c $\frac{4}{10}$

d $\frac{5}{10}$

2 a 0.2

b 0.6

c 2.5

d 6.8

3 a $\frac{30}{100}$, 0.3

b $\frac{75}{100}$, 0.75

c $\frac{40}{100}$, 0.4

d $\frac{25}{100}$, 0.25

e $\frac{10}{100}$, 0.1

f $\frac{38}{100}$, 0.38

g $\frac{12}{100}$, 0.12

h $\frac{25}{100}$, 0.25

4 a 5, 0.05

b 6, 0.6

c 24, 0.24

d $\frac{8}{10}$, 7.8

5 a 6, $\frac{3}{5}$

b 8, $\frac{2}{25}$

c 10, $1\frac{4}{5}$

Simplifying fractions (pages 159–160)

1 $\frac{1}{2}, \frac{5}{8}, \frac{2}{5}$

The numerators and denominators of these fractions cannot be divided by a common factor other than one.

2 a True

b False: $\frac{15}{25} = \frac{3}{5}$

c False: $\frac{40}{50} = \frac{4}{5}$

d True

e False: $\frac{70}{100} = \frac{7}{10}$

3 Example answers: $\frac{8}{9}, \frac{3}{10}, \frac{2}{15}, \frac{4}{5}$

Comparing and ordering fractions (pages 160–161)

1 a $\frac{2}{4} < \frac{5}{8}$

b $\frac{2}{4} < \frac{3}{5}$

c $\frac{2}{3} > \frac{5}{8}$

d $\frac{2}{3} > \frac{6}{10}$

e $\frac{4}{5} < \frac{7}{8}$

2 a $\frac{3}{10}, \frac{2}{5}, \frac{4}{5}$

b $\frac{1}{4}, \frac{5}{7}, \frac{3}{4}, \frac{7}{8}$

c $\frac{1}{3}, \frac{4}{9}, \frac{2}{3}, \frac{7}{9}$

d $\frac{1}{3}, \frac{1}{2}, \frac{4}{6}, \frac{5}{6}$

3 a Benjamin

b $\frac{1}{2}, \frac{7}{10}, \frac{4}{5}$

4 Blue: $\frac{3}{12}$ (or $\frac{1}{4}$)

Green: $\frac{4}{12}$ (or $\frac{1}{3}$)

White: $\frac{2}{12}$ (or $\frac{1}{6}$)

Purple: $\frac{2}{12}$ (or $\frac{1}{6}$)

Orange: $\frac{1}{12}$

Students should first identify the fraction that each colour represents in the diagram. They should then make comparisons, such as green is greater than white because $\frac{4}{12} > \frac{2}{12}$. Encourage them to use <, > or = to show how the fractions compare.

Proper fractions, improper fractions and mixed numbers (pages 162–163)

1 a $\frac{5}{5}$ is equivalent to 1 and a proper fraction is less than 1.

b $\frac{6}{1}$ is an improper fraction simplifying to 6.

c $\frac{9}{8}$ is an improper fraction because it is not less than 1.

2 Check the fraction bars that students have drawn.

a $1\frac{3}{5}$

b $2\frac{1}{4}$

c $3\frac{1}{2}$

d $2\frac{2}{10}$ or $2\frac{1}{5}$

e $3\frac{2}{5}$

3 a $\frac{11}{2}$

b $\frac{11}{4}$

c $\frac{19}{5}$

d $\frac{53}{10}$

4 A: $1\frac{1}{8}$

B: $1\frac{9}{10}$

C: $2\frac{1}{3}$

D: $2\frac{3}{4}$

E: $3\frac{3}{10}$

F: $3\frac{5}{8}$

G: $4\frac{1}{2}$

H: $4\frac{7}{8}$

5 a Example answer: I can find which two whole numbers the mixed number sits between. If it is halfway or more than halfway, I round up to the next whole number. If it is less than halfway, I round down to the previous whole number.

b A: $1\frac{1}{8} \approx 1$

B: $1\frac{9}{10} \approx 2$

C: $2\frac{1}{3} \approx 2$

D: $2\frac{3}{4} \approx 3$

E: $3\frac{3}{10} \approx 3$

F: $3\frac{5}{8} \approx 4$

G: $4\frac{1}{2} \approx 5$

H $4\frac{7}{8} \approx 5$

6 a No, $3\frac{3}{8}$ rounds to 3, not to 4.

b Student's own work

Fractions that total 1 (page 164)

1 a 2

b 9

c 10

d 3

e $\frac{2}{6}$ or $\frac{1}{3}$ or $\frac{3}{9}$

2 Student's own work

3 a $\frac{3}{12}$ or $\frac{1}{4}$

b $\frac{4}{20}$ or $\frac{1}{5}$

Adding and subtracting fractions (pages 165–166)

1 a $1\frac{2}{5}$

b $1\frac{3}{6}$

c $1\frac{2}{8}$

d $1\frac{2}{9}$

e $2\frac{2}{5}$

f $4\frac{3}{6}$

g $7\frac{2}{8}$

h 3

2 a $\frac{5}{10}$

b $\frac{1}{8}$

c $\frac{2}{6}$

d $\frac{4}{9}$

e $1\frac{5}{10}$

f $\frac{1}{8}$

g $\frac{5}{6}$

h $1\frac{1}{9}$

3 a $\frac{3}{4}$

b $1\frac{1}{4}$

c $1\frac{8}{9}$

d $2\frac{1}{2}$

e $\frac{11}{14}$

f $1\frac{1}{15}$

g $4\frac{2}{15}$

h $2\frac{27}{40}$

4 a $\frac{1}{8}$

b $\frac{5}{12}$

c $1\frac{2}{9}$

d $1\frac{3}{10}$

e $\frac{7}{18}$

f $\frac{1}{12}$

g $1\frac{7}{15}$

h $1\frac{1}{20}$

5 Student's own work

6 a $1\frac{1}{4}$ kg

b $\frac{19}{40}$ litre

c $\frac{2}{15}$

Subtracting fractions from whole numbers (pages 166–167)

1 a $1\frac{1}{6}$

b $\frac{6}{7}$

2 Check students have drawn appropriate diagrams or number lines.

a $4\frac{1}{4}$

b $5\frac{3}{8}$

c $\frac{5}{10}$

d $4\frac{2}{3}$

e $\frac{5}{12}$

f $1\frac{1}{5}$

3 a $1\frac{1}{3}$

b $2\frac{2}{3}$

c $\frac{3}{4}$

d $2\frac{3}{6}$ or $2\frac{1}{2}$

e $2\frac{1}{4}$

Finding fractions of quantities (page 168)

1 a $\frac{1}{4}$ of 16 and $\frac{1}{3}$ of 12

b $\frac{1}{7}$ of \$35 and $\frac{1}{8}$ of \$40

c $\frac{3}{8}$ of 24 hours and $\frac{1}{6}$ of 54 hours

2 Apples: 270 customers

Guavas: 120 customers

Sweetsop: 60 customers

Mango: 80 customers

Lemons: 108 customers

Papaya: 144 customers

3 a Shawna: 180 mℓ

Keeno: 216 mℓ

Jonathan: 270 mℓ

b 54 mℓ

4 a 80 children

b 240 more teenagers than adults

Multiplying proper fractions (pages 169–170)

1 a $3 \times \frac{3}{4} = 2\frac{1}{4}$ or $\frac{3}{4} \times 3 = 2\frac{1}{4}$

b $3 \times \frac{2}{3} = 2$ or $\frac{2}{3} \times 3 = 2$

c $3 \times \frac{1}{2} = 1\frac{1}{2}$ or $\frac{1}{2} \times 3 = 1\frac{1}{2}$

2 a $\frac{3}{4}$

b $\frac{9}{4}$ or $2\frac{1}{4}$

c $\frac{4}{5}$

d $\frac{12}{5}$ or $2\frac{2}{5}$

e 15

f 6

g 16

h 15

i $\frac{3}{8}$

j $\frac{2}{15}$

k $\frac{2}{18}$

l $\frac{3}{16}$

3 $2\frac{4}{8}$ litres or $2\frac{1}{2}$ litres

4 Check the methods that students use.

a $\frac{1}{8}$

b $\frac{1}{6}$

c $\frac{9}{25}$

d $\frac{7}{12}$

e $\frac{1}{6}$

f $\frac{1}{11}$

Practice questions (page 173)

1 a 4

b 12

c 10

d 3, 6

e 15, 0.15

2 a $\frac{1}{3}, \frac{2}{7}$

b $\frac{3}{5}, \frac{1}{5}, \frac{1}{2}$

3 a $\frac{4}{5} > \frac{2}{3}$

b $\frac{3}{4} < \frac{5}{6}$

c $\frac{5}{9} > \frac{3}{7}$

d $\frac{3}{4} > \frac{3}{8}$

4 $\frac{3}{8}, \frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \frac{5}{6}$

5 Student's own work

6 a $\frac{15}{6}$ or $2\frac{3}{6}$ or $2\frac{1}{2}$

b $\frac{15}{6}$ or $2\frac{3}{6}$ or $2\frac{1}{2}$

c 16

d 9

e $\frac{18}{45}$ or $\frac{2}{5}$

f $\frac{12}{20}$ or $\frac{3}{5}$

g $\frac{35}{80}$ or $\frac{7}{16}$

Chapter 12 Perimeter and area

Working with perimeter (pages 176–177)

1 a 14 cm

b 12 cm

c 10.2 cm

d 16 cm

2 Student's own drawings. Check their calculations.

a 20 cm

b 220 mm

c 120 mm

3 a 69 m

b 22 m

c 92 mm

4 Student's own work

Finding the perimeter of rectangles (pages 178–179)

1 a B will have the longest perimeter.

b A: (5 + 4) × 2 = 18 cm (Accept other calculations such as (5 × 2) + (4 × 2) and 5 + 5 + 4 + 4.)

B: (9 + 2) × 2 = 22 cm

C: (7.5 + 3) × 2 = 21 cm

2 Student's own work

3 Check that students have made a sketch of an appropriate rectangle with sides labelled: 11 m, 8 m, 11 m and 8 m.

4 a 310 cm of wood

b The perimeter is either 360 m or 480 m.

Finding the perimeter of regular polygons (pages 180–181)

1 a 20 cm

b 36 cm

c 60 cm

d 100 cm

2 Rule: Multiply the length of one side by the number of sides.

a 3 cm × 5 = 15 cm

b 4 cm × 8 = 32 cm

c 12 mm × 3 = 36 mm

d 41 mm × 6 = 246 mm

3 a 5 cm

b 5 m

c 8 cm

d 7 cm

e 33 mm

4 First target: Pentagon

Second target: Octagon

Third target: Hexagon

5 Student's own work

Measuring area (pages 182–184)

1 a 10 square units

b 10 square units

c 4 square units

d 9 square units

2 a Leaf: around 8 square units

Oval: around 28 square units

b They do not have straight lines in their perimeter, which makes it harder to estimate accurately.

3–4 Student's own work

Square units (pages 184–185)

1 a Hectares

b m^2

c cm^2

d Hectares

e cm^2

f m^2

2 70 000 m^2

Areas of rectangles and squares (pages 186–187)

1 a 12 cm^2

b 16 cm^2

c 12 cm^2

d 20.8 cm^2

2 Possible answers are: 1 cm × 24 cm, 2 cm × 12 cm, 3 cm × 8 cm, 4 cm × 6 cm, 8 cm × 3 cm, 12 cm × 2 cm, 24 cm × 1 cm.

3 a 8 m

b 9 m in length, 9 m in width

4 30 pieces

5 a 450 000 m^2

b 45 hectares

Areas of triangles (pages 188–189)

1 16 square units

2 a–c Student's own work

d 8 cm^2

3 a 4.5 square units

b 4 square units

c 3 square units

4 Answers will vary, for example a base of 3 cm and height of 12 cm.

Reasoning about perimeter and area (pages 189–190)

1 Area: 15 square units

Perimeter: 16 units

2–3 Student's own work

4 a 28 cm and 28 cm

b 20 cm and 20 cm

c 32 cm and 8 cm

d 32 cm and 84 mm

Practice questions (page 193)

1 a 12 units

b 12 units

c 18 units

d 12 units

e 12 units

2 a 110 mm

b Square

3 cm

4 Student's own explanation, which should show that:

Perimeter is the distance or path around a two-dimensional (2D) shape.

Area is a measure of the surface of a shape or object.

5 a 15 metres

b 13.5 m^2

6 Orange: 540 m^2

Red: 576 m^2

Yellow: 450 m^2

The red square has the largest area.

Chapter 13 Properties of triangles and quadrilaterals

Triangles (pages 196–197)

1 a Equilateral, acute-angled

b Scalene, right-angled

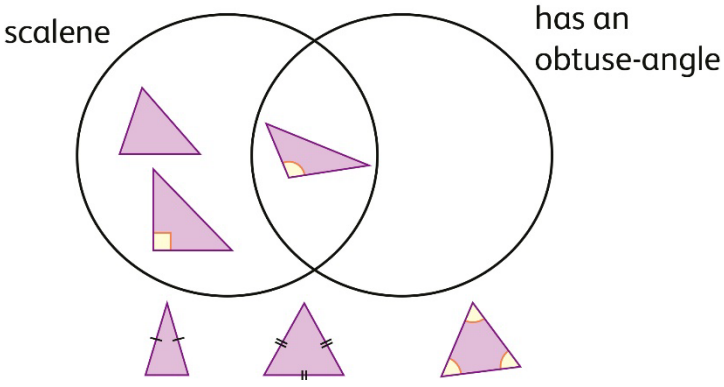
c Isosceles, acute-angled

d Scalene, right-angled

e Equilateral, acute-angled

f Scalene, right-angled

2



3 Student's own work

Quadrilaterals (pages 198–199)

1 Student's own work

2 a–b The opposite angles are the same size and the adjacent angles add up to 180 degrees.

c Student's own work

3 a–b The angles are the same size.

c Student's own work

Practice questions (pages 202–203)

1 Isosceles, right-angled

2–3 Student's own work

Chapter 14 Properties of polygons

Regular and irregular polygons (pages 205–206)

1 a and b

2 a G, H, J, K, L (Note: I is not regular because the inside angles are not all equal in size.)

b E, L

c 3 sides: A, H, triangles

5 sides: F, J, pentagons

6 sides: C, I, hexagons

7 sides: D, G, septagons or heptagons

8 sides: B, K, octagons

3 a Pentagon

b Hexagon

c Hexagon

d Pentagon

e Pentagon

f Hexagon

4 Student's own work

Symmetrical figures (pages 207–209)

1 a Mirror line

b Not a mirror line

c Mirror line

d Mirror line

e Not a mirror line

f Not a mirror line

g Not a mirror line

2 a True for these triangles

b It is not true for all triangles. Some triangles have no lines of symmetry (scalene) and equilateral triangles have three lines of symmetry.

3 8 lines of symmetry

4

Regular shape	Number of sides	Number of angles	Lines of symmetry
Triangle	3	3	3
Quadrilateral	4	4	4
Pentagon	5	5	5
Hexagon	6	6	6
Septagon	7	7	7
Octagon	8	8	8
Nonagon	9	9	9
Decagon	10	10	10

5 a Trapezium

b Pentagon

c Pentagon

d Hexagon

e Hexagon

Practice questions (pages 212–213)

1 a No, there is only one curved line.

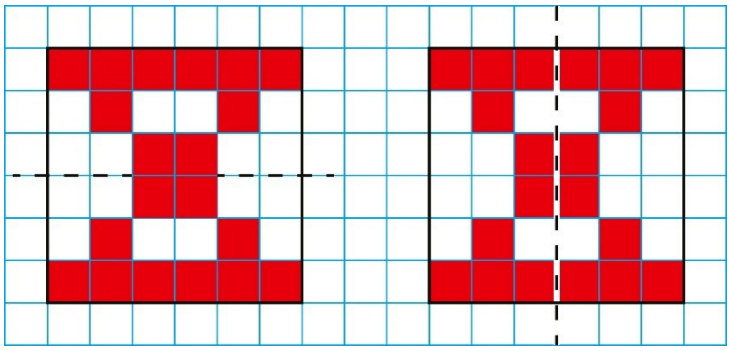
b No, there is only one curved line.

c No, the straight lines do not connect.

d No, the shape is not planar.

2 Student's own work

3



Chapter 15 Transformations

Translations (pages 215–216)

1 a 5 units right

b 4 units down

c 3 units down, 4 units right

2 a 3 units right, 4 units up

b 6 units right

c 4 units right, 3 units down

3 a 4 units right, 1 unit down

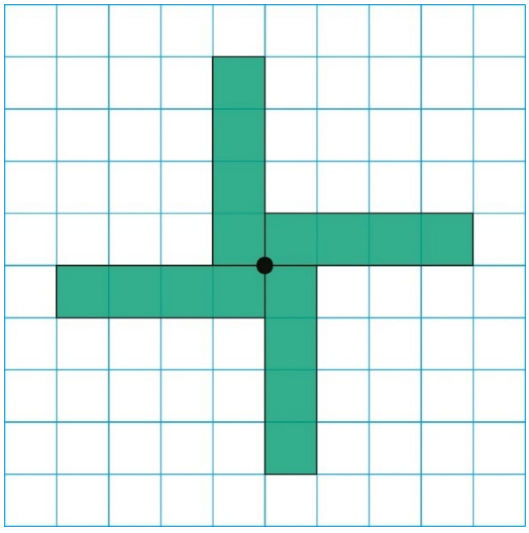
b 4 units left, 1 unit up

4 Student's own work

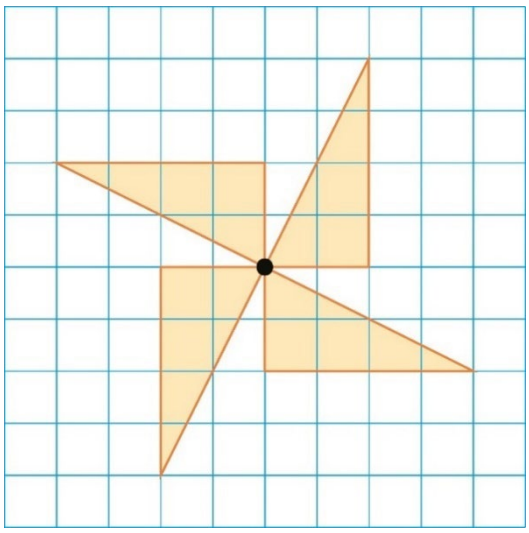
Rotation and reflection (pages 217–218)

1 Student's own work

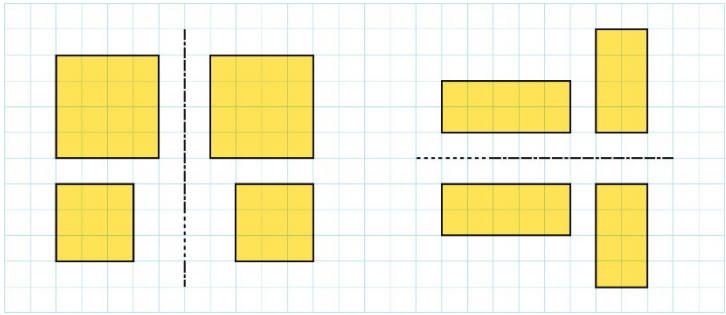
2 a



b



3



Practice questions (page 220)

1 a 1 unit left, 4 units down

b 1 unit right, 4 units up

c 4 units right, 2 units up

d 4 units left, 2 units down

2 a C, D

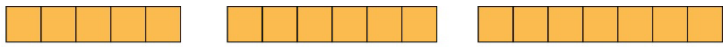
b D

c C

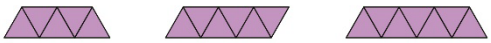
Chapter 16 Patterns and rules

Explore and predict patterns (pages 223–224)

1 a



b



c

d

2 a A square is added with each new shape.

b A triangle is added with each new shape.

c Dots are added to a new row with one more dot in each new row.

d Dots are added around the previous dots to form a bigger square with each new shape.

3 a

Shape number	1	2	3	4	5	20	99	100
Number of sticks	3	6	9	12	15	60	297	300

b

Shape number	1	2	3	4	5	20	99	100
Number of sticks	5	10	15	20	25	100	495	500

4 a 1, 4, 10, 22, 46, 94, 190, 382

b 1, 3.5, 4.75, 5.375, 5.6875, 5.843 75, 5.921 875, 5.960 9375

c 12, 30, 210, 2010, 20 010, 200 010, 2 000 010, 20 000 010

5 Student's own work

Using symbols (page 225)

1 a 2, 3, 4, 5, 6

b 7, 8, 9, 10, 11

c Example answers:

2 + 5 = 7

3 + 5 = 8

4 + 5 = 9

5 + 5 = 10

6 + 5 = 11

2 a False, $b + g = 30$

b True, $b > g$

c True if $g = 0$

d True, $b + g = 30$ and $b > g$ so $g < 30$

e False, $b + g = 30$

f True, $b + g = 30$ so $30 - g = b$

g True, $2(b + g) = 2(30) = 60$

3 a $25 - s > 10$

b Student's own work

Order of operations (page 226)

1 a 15

b 42

c 190

d 7

e 180

2 a $\frac{1}{2}$ of (10 + 20) = 15

b (60 + 60) ÷ (2 + 1) = 40

c 300 + $\frac{1}{4}$ of (800 + 200) = 550

3 Student's own work

4 a No brackets around 45 + 18

b No brackets around 25 + 100

d No brackets around 100 + 100

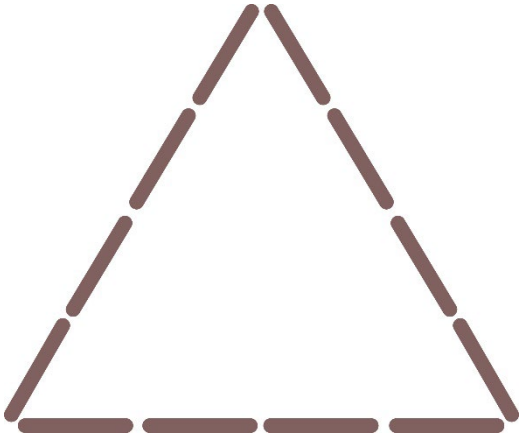
5 a 25, 19, 29

b 80, 50, 100

c 75, 66, 81

Practice questions (pages 228–229)

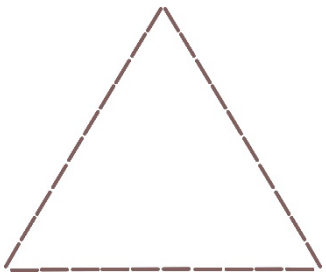
1



2

Shape number	1	2	3	4	5	6	7	8
Number of sticks	3	6	9	12	15	18	21	24

3 30 sticks



Chapter 17 Expressions and variables

Order of operations in expressions (pages 231–232)

1 a 1.5

b 147

c 15

d 7

e 11

f 10

g 1

h 3.5

2 a 20

b 30

c 0

d 100

e 30

f 25

3 Student's own work

Variables and substitution (pages 232–233)

1 a 15

b 15

c 5

d 15

2 a 80

b 1

c 87.5

d 99.25

3 a $p - 2$

b $2 - p$

c $10 + q$

d $r + 2.5$

e $x + 20$

f $20 - y$

Expressions involving multiplication and division (page 233)

1 a $2j$

b $5k$

c $\frac{m}{2}$

d $\frac{100}{n}$

e $4p - 10$

2 a 8

b 9

c 7

d 22

e 2

f 2

g 5

h 9.5

3 a 160, 130, 120, 115, 112

b 80, 60, 40, 20, 0

c 0.35, 0.45, 0.55, 0.65, 0.75

Expressions in puzzles and problems (pages 234–235)

1 a $\$(x + 10)$

b $y - \$12.99$

c $\$300p$

d $25q$ cm

e $25 - r$ litres

2 a $4a$ cm

b $5b$ cm

c $8c$ m

d $3d$ mm

3 a $5n - 3$

b $\frac{n}{10} + 2.5$

c $(100 - 2n) + 50$

Practice questions (page 237)

1 a, d

2 b

3 a 15

b 4

c 40

d 40

PEP task: Fundraising fun (pages 238–241)

Part 1

1 a Bottom row, middle spinner (with segments 1, 1, 1, 3)

b Bottom row, left spinner (with segments 1, 2, 2, 2, 3, 4, 4, 5)

c Student's own work

d Check that the sections of students' spinners labelled '1' represent only 5% of possible outcomes, for example a '1–20' spinner.

2 a $12 500

b 10 prizes

c $9844

3 a $\frac{1}{43}$

b At least 15 tickets

Part 2

1 This is a multi-step calculation. Students will need to start by measuring each part. They then calculate the area by first multiplying by five. The area of some of the parts will be trickier to work out than others. Make sure students show all calculations, including multiplying the measurements by five.

Base rectangle measures 6 × 3 cm, area = (6 × 5) × (3 × 5) = 30 × 15 = **450 cm²** (one needed)

Back of cab measures 3 × 3 cm, area = 15 × 15 = **225 cm²** (one needed)

Roof of cab measures 3 cm × 1 cm, area = 15 × 5 = **75 cm²** (one needed)

Front of cab measures 3 cm × 1.5 cm, area = 15 × 7.5 = **112.5 cm²** (one needed)

Side of cargo box measures 4 × 1.5 cm, area = 20 × 7.5 = 150 cm² (two needed): 150 cm² × 2 = **300 cm²**

Back of cargo box measures 3 × 1.5 cm, area = 15 × 7.5 = **112.5 cm²** (one needed)

Wheel diameter 1.5 cm, radius will be 0.75 × 5 = 3.75, area = πr^2 = 3.14 × 3.75 × 3.75 = 44.18 cm² (four needed): 44.18 cm² × 4 = **176.7 cm²**

Side of cab measures 2 cm base × 3 cm height × 2 (students should realise that as they will need to cut two of these shapes, they will end up with a 3 × 3 cm square), area of both pieces = 15 × 15 = **225 cm²**

Total area: 450 cm² + 225 cm² + 75 cm² + 112.5 cm² + 300 cm² + 112.5 cm² + 176.7 + 225 cm² = **1676.7 cm²**

2 a Students will find that, in theory, they could build 18 trucks from a 1.3 m × 2.4 m board:

Area of board: 130 cm × 240 cm = 31 200 cm²

Area of board divided by area of pieces of one truck: 31 200 ÷ 1676.7 = approx. 18.6

Students could not build 20 trucks from one piece of board.

b 1.2 m × 18 = 21.6 m of thick cord

c They will need to buy five packets at $295 each = $1475.

3 a 18 trucks = cost of board + cost of cord: $1883.30 + $1475 = $3358.30

Cost of making one truck: $3358.30 ÷ 18 = $186.57

b If students wish to earn $25 000 from sales, they need to add the cost to the final amount they wish to earn and divide this amount by 18 (the number of trucks they are making):

($3358.30 + $25 000) ÷ 18 = $28 358.30 ÷ 18 = $1575.46

They need to sell the trucks at $1575.46 each.

Part 3

1 $1125

2 65 posters

3 Student's own work

4 $18 850 profit

Part 4

1 Student's own work

2 Idea A because it has the highest overall rating.

Chapter 18 Multiply and divide larger numbers

Revising what you know about multiplication and division (pages 244–245)

1–2 Student's own work

3 30 720 has two zeros as digits, but it is still divisible by 15.

4 a The number does not end in zero.

b $426\frac{5}{10}$ (or $426\frac{1}{2}$)

c–d Student's own work

Multiplication and division facts (pages 246–247)

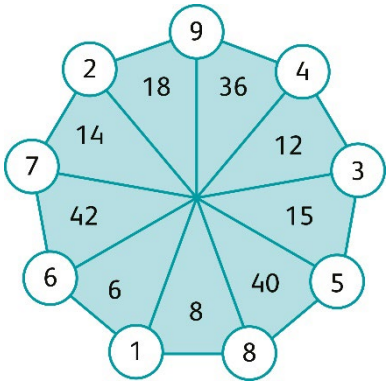
1 a 28, 4, 7, 4

b 72, 8, 8, 72

c 8, 8, 8, 8

d 0, 0, 1, 1

2



3 Student's own work

4 a

11	11	22	33	44	55	66	77	88	99	110	121	132
12	12	24	36	48	60	72	84	96	108	120	132	144

b–c Student's own work

Divisibility tests for 5, 8 and 9 (pages 248–249)

1 a

Divisible by 5	Divisible by 8	Divisible by 9
23 445 3930 8100	9352 15 336 14 312	23 445 15 336 43 659 8100

b 5692 is left over. This is not divisible by 5 because it does not have a 0 or 5 in the ones position. It is not divisible by 9 because the digit sum is not divisible by 9. Student's own reason why it is not divisible by 8.

2 Student's own work

3 Yes, all the numbers together add up to 9 as a 1-digit number.

4 Student's own work

Working with division (pages 250–252)

1 a 131

b 124

c 32

d 41

2 a 176 ÷ 8 and 133 ÷ 7

b Student's own work

c 65 ÷ 5 = 13

117 ÷ 9 = 13

176 ÷ 8 = 22

256 ÷ 8 = 32

133 ÷ 7 = 19

3 a 19 bags

b 153 bags

c $124

4 a 864 ÷ 3

b 864 ÷ 9

Division with remainders (pages 252–253)

1 a $21\frac{2}{3}$

b $16\frac{2}{4}$

c $13\frac{1}{5}$

d $9\frac{5}{7}$

e $8\frac{5}{8}$

2 a 41; no remainder

b 157 r 2

c 55; no remainder

d 60 r 5

e 92 r 1

3 a 18 bags, 3 balls left over

b $9\frac{3}{5}$ m

c 47.5 mℓ

d 16 boxes

4 Students should explore using different divisors, for example:

379 ÷ 2 = 189 r 1

379 ÷ 3 = 126 r 1

379 ÷ 4 = 94 r 3

379 ÷ 5 = 75 r 4, etc.

5 She had 78 stickers. She filled 13 pages.

Dividing larger numbers by a 1-digit number (pages 254–255)

1 a 229

b 469

c 609

d 1482

2 a

Whole number answer	Mixed number answer
2025 ÷ 5 7110 ÷ 9 8395 ÷ 5 5216 ÷ 8 7716 ÷ 4 1120 ÷ 8 2727 ÷ 9	3436 ÷ 8 8843 ÷ 9 9999 ÷ 2

b 2025 ÷ 5 = 405

7110 ÷ 9 = 790

8395 ÷ 5 = 1679

5216 ÷ 8 = 652

7716 ÷ 4 = 1929

1120 ÷ 8 = 140

2727 ÷ 9 = 303

3436 ÷ 8 = $429\frac{4}{8}$

8843 ÷ 9 = $982\frac{5}{9}$

9999 ÷ 2 = $4999\frac{1}{2}$

c Student's own work

3 a Blue square: 458 g

Yellow circle: 412 g

Red circle: 406 g

b Student's own work

4 a $205

b 1898

c 1544

d 427.6 cm

Working with 2-digit divisors (pages 256–257)

1 a 402.5

b 224

c 621

d 478

e 125

f 96

g 35

h 65

2 a 105 kg

b 142.26 minutes

c 62 tables

3 a 324 times

b 243 times

4 Student's own work

Working with 3-digit divisors (pages 258–259)

1 a 77 r 109

b 27

c 58 r 17

d 26 r 75

e 58 r 15

f 47

2 a 65 hours

b 12 grades

c 15 1-metre lengths of cord

d 12 weeks

e 34 weeks

3 Student's own work

Practice questions (pages 260–261)

1 Student's own work

2 a 800, 1845, 720

b 800, 456, 2976, 720

c 1845, 720

3 a 681

b $804\frac{3}{9}$

c 227

d $219\frac{7}{31}$

e $199\frac{5}{25}$

f $558\frac{7}{36}$

4 309 hours

5 a 66

b 203

c 66

d 406

Chapter 19 Solving real-life problems

Using calculators (pages 264–265)

1 a 23 388

b 269

c 108 700

d 818 718

e 637.5

f 295

g 66.698

h 98 729

2 $500

3 a 45, 47, 49

b 98, 99, 100, 101

4 Student's own work

The three-step problem-solving approach (pages 266–267)

1 a 63 km

b $3000

c $31 500

2 a The number of days over which Kaci saved the money

b How many students brought apples

c How much money the bonus was, and the number of weeks

3 a $150

b $800

Solving two-step problems (pages 268–269)

1 a ii and iii

b 28 + 19 = 47 students in the class.

47 – 11 = 36 students present.

2 $1400

$2800			
$750	$600	$550	$900

$2800	
$1400	$1400

3 a iii

b $630

Joy's money	
$ 280	$350

4 70 minutes

Solving problems about patterns (pages 270–271)

1 a 16 dots, 20 dots, 24 dots

b 40 dots

2 a 96, 192, 384, 768

b 50, 25, 12.5, 6.25

c 125 750, 1 257 500, 12 575 000, 125 750 000

d $3\frac{3}{4}$, $3\frac{1}{4}$, $2\frac{3}{4}$, $2\frac{1}{4}$

3 a 32, 37

b 57

c No, student's own explanation

Other types of problems (pages 271–272)

1 $\frac{3}{10}$

2 T-shirt: $140

Scarf: $60

3 42 years old

4 For example:

Cows	Chickens
1	20
2	18
3	16

and so on.

5 24 different ways

Financial institutions (pages 273–275)

1 Student's own work

2 a A: $200

B: $250

C: $300

D: $356

b Account D. He will have $5356 at the end of the first year.

3 a Remind her and pay her back.

b Tell the cashier his mistake and pay for 15 kg.

4 a USD: $1542

BBD: $771.10

GBP: $2166.20

EUR: $1866.10

AUD: $1197.70

b USD: $15 420

BBD: $7711

GBP: $21 662

EUR: $18 661

AUD: $11 977

c USD: $154 200

BBD: $77 110

GBP: $216 620

EUR: $186 610

AUD: $119 770

d USD: $77 100

BBD: $38 555

GBP: $108 310

EUR: $93 305

AUD: $59 885

e Student's own work

Practice questions (page 277)

1 a $1500

b 8 hours

d $78 000

2 80, 160, 320, 640, 1280

3 a 15:40

b 7 children

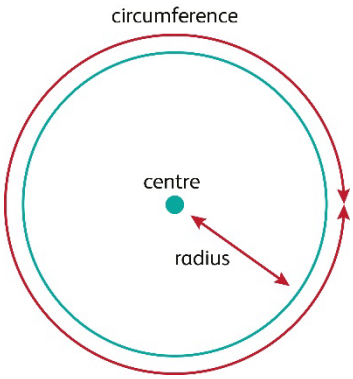
4

1 Deposit	f To put money into an account
2 Credit card	d A card that allows you to use money borrowed from a financial institution
3 Savings account	a An account where you leave your saved money
4 Interest	g Money that is paid on a loan from a financial institution.
5 Loan	h An amount of money that you borrow from a bank or a lending institution.
6 Withdrawal	b To take money out of an account, for example, from an ATM.
7 Current account	e An account you use for day-to-day transactions.
8 Debit card	c A card that uses the money you already have in your bank account.

Chapter 20 Circles

Drawing circles (pages 280–281)

1 Diagrams should correctly label the centre, radius and circumference, as shown below.



2 Circles should be drawn with the correct stated dimensions.

3 Concentric circles should match the diagram on page 281, using the correct stated dimensions.

Lines through circles (pages 281–282)

1 Check students' diagrams. A chords is a line joining two points on the circumference. The diameter must pass through the centre of the circle.

2 The diameter is always double the radius.

3 Student's own work

Segments, sectors and arcs (pages 282–283)

1 Student's own work

2 Red: $\frac{2}{12}$ or $\frac{1}{6}$

Orange: $\frac{3}{12}$ or $\frac{1}{4}$

Yellow: $\frac{1}{12}$

Green: $\frac{5}{12}$

Blue: $\frac{1}{12}$

3–4 Student's own work

Practice questions (pages 286–287)

1 A Centre

B Radius

C Circumference

D Diameter

2 Check that students have drawn each circle correctly.

3 Blue: 1.5 m

Yellow: 2.25 m

Chapter 21 Polygons

Using grids to form polygons (pages 289–290)

1 a Hexagon

b Octagon

c Pentagon

d Hexagon

2 a Concave pentagon

b Convex hexagon

c Concave septagon

d Concave hexagon

e Concave octagon

f Concave octagon

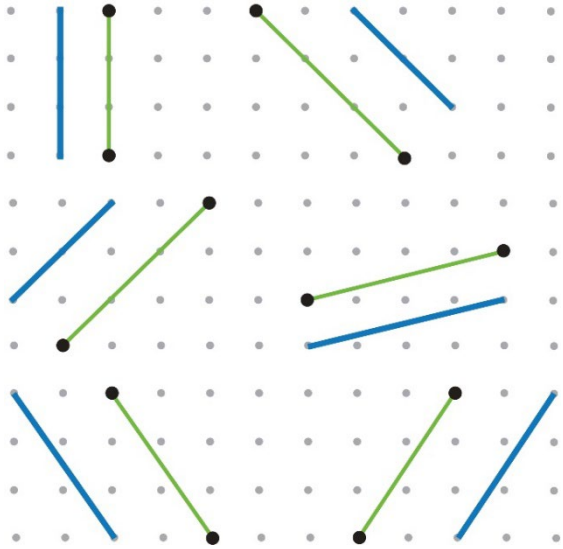
g Concave hexagon

3 Student's own work

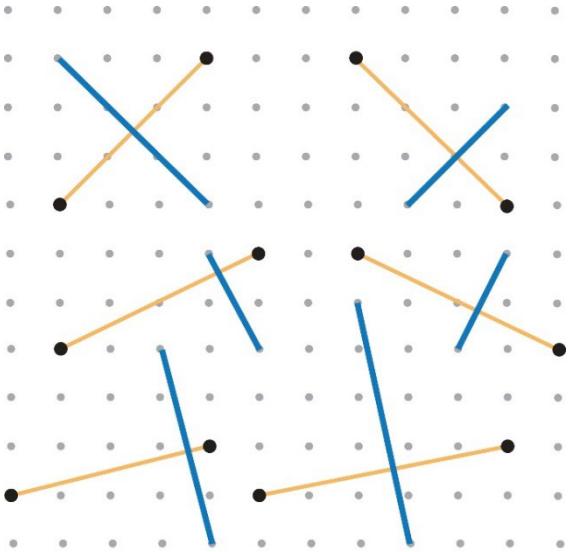
Drawing parallel and perpendicular lines (pages 291–293)

1 Student's own work

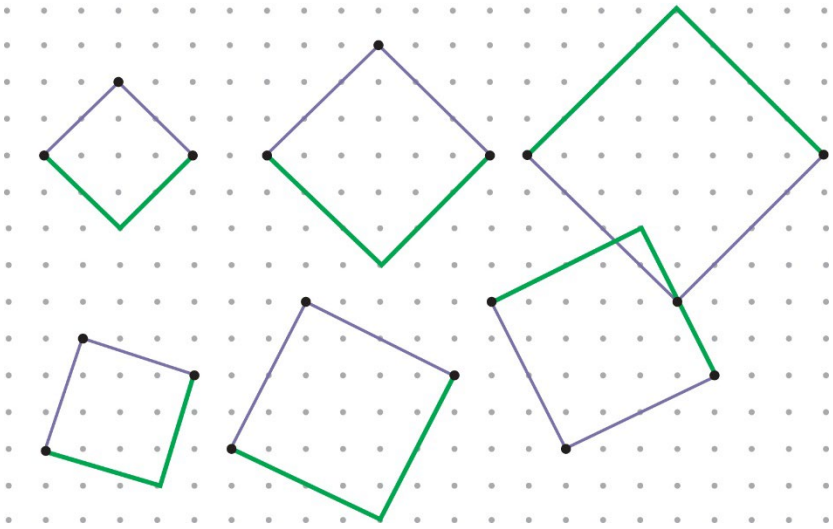
2 Example answers:



3 Example answers:



4



Composite polygons (pages 293–294)

1–3 Student's own work

4 To make a quadrilateral (kite, trapezium, square, parallelogram), you need two triangles.

To make a pentagon, you need three triangles.

To make a hexagon, you need four triangles.

To make a septagon, you need five triangles.

To make an octagon, you need six triangles.

Practice questions (pages 296–297)

1–2 Student's own work

Chapter 22 Properties of pyramids

Properties of pyramids (pages 299–300)

1–4 Class activity

Practice questions (page 302)

1 a and d

2 f

Chapter 23 Variables and equations

Variables for changing quantities (pages 305–306)

1 a x = hours worked, y = total pay

$y = 50x$

x	1	2	3	4	5	6	7
y	50	100	150	200	250	300	350

b x = days worked, y = total pay

$y = 300x$

x	1	2	3	4	5	6	7
y	300	600	900	1200	1500	1800	2100

2 Total number of buns = $18x + 24y$

3 a Total mass of potatoes = $50 + 15n$

b

n	1	2	3	5	20
Total mass	65 kg	80 kg	95 kg	110 kg	125 kg

4 a Total cost = $5 + 25n$

b

n	1	2	3	5	10	15	20
Total cost	$30	$55	$80	$130	$255	$380	$505

5

n	1	2	3	5	20
10*n*	10	20	30	50	200
10*n* + 1	11	21	31	51	201
10*n* –1	9	19	29	49	199
10*n* + 10	20	30	40	60	210
10*n* + 11	21	31	41	61	211

Student's own work.

Equations and unknown values (pages 307–308)

1 Heart: 80

Square: 4

Triangle: 8

Star: 20

2 Student's own work

3 a $a = 20$

b $a = 30$

c $a = 40$

d $a = 20$

e $a = 40$

f $a = 30$

g $a = 15$

h $a = 10$

i $a = 9$

4 a 8

b 12

c 5

d 20

e 2

f 6

5 a $j = 80$

b $k = 100$

c $m = 2.7$

d $n = 15$

e $q = 7$

f $r = 200$

g $s = 50$

h $t = 70$

Practice questions (pages 310–311)

1 a Total volume = 85 + 5*n*

b

n	1	2	3	10	25	50
Total volume	90	95	100	135	210	335

c 23 buckets

d 183 buckets

2 a Triangle: 16

b Star: 15

c Square: 36

3 a $x = 45$

b $x = 20$

c $x = 6$

4 a $a = 12$

b $a = 7$

c $a = 9$

d $a = 20$

5 a $a = \frac{1}{2}$

b $b = 80$

c $c = 5$

d $d = 180$

Chapter 24 Solving problems with equations

Using a formula (pages 313–314)

1 a 40 cm^2

b 22 m^2

c 4.125 m^2

d 495 cm^2

2 a 110 mins (or 1 hr 50 mins)

b 320 mins (or 5 hr 20 mins)

c 185 mins (or 3 hr 5 mins)

3 a Perimeter = 3*x*

30 cm, 36 cm, 7.5 cm

b Perimeter = 4*x*

40 cm, 48 cm, 10 cm

c Perimeter = $8x$

80 cm, 96 cm, 20 cm

d Perimeter = $5x$

50 cm, 60 cm, 12.5 cm

4

Length	Width	Area (m^2)	Perimeter (m)	Cost ($)
1	48	48	98	4900
2	24	48	52	2600
3	16	48	38	1900
4	12	48	32	1600
6	8	48	28	1400

Equations and inequalities (pages 314–315)

1 a $10 < 11$

b $3 < 10$

c $n < 10$

2 a $25 > 2a$

b $3b < 45$

c $15 > c$

d $10 < d + 3$

3 a <

b <

c =

d >

4 a <

b <

c >

d =

Practice questions (pages 318–319)

1 a 1, 2, 3, 4, 5, 6, 7, 8

b 1, 2, 3, 4, 5, 6

c 1, 2

2 a $7x - 11 = 66$ so $x = 11$

b $x + 50 - 48 = 52$ so $x = 50$

3 Student's own work. Any values of w and h such that $w + h = 10$.

4

Value of *t*	$\frac{1}{2}$	1	2	10	20
Value of *s*	2.75	5.25	10.25	50.25	100.25

Chapter 25 Averages

Line plots, mode and range (page 321)

1 Class activity

2 a 19 people

b 5

c 7

d Class activity

3 Class activity

Mean (pages 322–323)

1 a 0.1 km

b 8 km

c 7.9 km

d 2.9 km

e Student's own prediction

f 3.19 km

2 a Class B

b Class B

c Class A: 8

Class B: 12

d Student's own prediction

e Class A: 16

Class B: 15

3 Student's own work

Median (pages 324–325)

1 Mean: 41.8

Median: 40

Range: 9

Mode: 40

2 Mode: 35

Range: 9

Median: 35

Mean: 34.9

3–4 Student's own work

Practice questions (pages 326–327)

1 a Range: 16 kg

Mode: 10 kg

Median: 10 kg

b Range: 13 minutes

Mode: 20 minutes

Median: 20 minutes

c Range: 9 months

Mode: No mode

Median: 6 months

2 a 12.71 kg

b 20.64 minutes

c 6.2 months

3 a Range: 0.19 m

Median: 2.86 m

Mean: 2.86 m

b Student's own prediction

c Median: 2.89 m

Mean: 2.87 m

4 a Week 1:

	Rainfall (mm)	Hours of sunshine	Maximum temperature	Wind speed
Range	11	13	11	26
Mode	5	15	none	none
Mean	5.71	9.71	19.86	17.29
Median	5	10	20	19

Week 2:

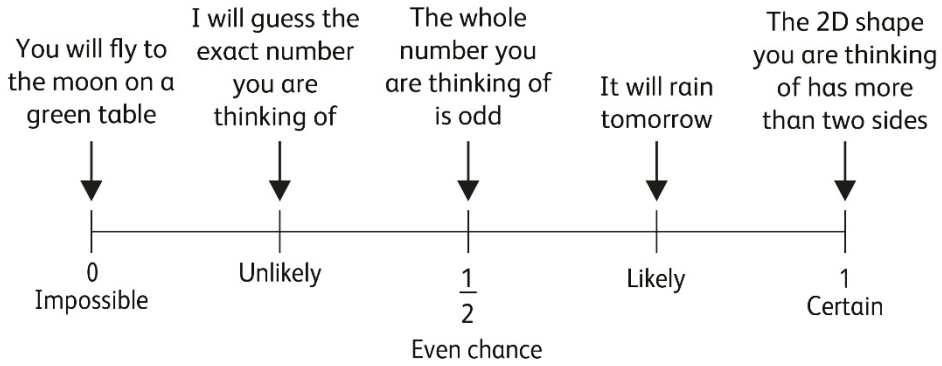
	Rainfall (mm)	Hours of sunshine	Maximum temperature	Wind speed
Range	3	1	2	29
Mode	0	16, 16.5	25	2
Mean	0.43	16.36	25	7.86
Median	0	16.5	25	3

b Student's own comparisons

Chapter 26 Probability

Language of probability (page 330)

1 Probability scales may vary. Example answer:



Example reasoning: some students may argue it is certain that a 2D shape has more than two sides, as they reason a triangle is the shape with fewest sides, though others may include circles. Accept all reasoned debate.

2–3 Student's own work

Possible outcomes (page 331)

1 a Certain

b Small chance

c Even chance

d Impossible

2 a Likely

b Very likely

c Impossible

d Very likely

e Likely chance

3 $5: 50% chance

$10: 25% chance

$20: 12.5% chance

$50: 6.25% chance

$100: 6.25% chance

Probability experiments (pages 332–333)

1–3 Student's own work

Practice questions (page 335)

1 Bag B. You cannot be certain, but it can be justified as this bag has a lot more blue balls, but also one green ball.

2 a Most likely: I guess that your number is greater than ten.

I guess that your number is odd.

I guess that your number is even.

I guess that your number ends in a zero. / is less than three.

Least likely: I guess that your number is 11.

b Student's own work