NAPLAN Numeracy Year 7: Measurement and Geometry

This document contains Year 7 Measurement and Geometry resources including items for:

- Using units of measurement
- Shape
- Location and transformation
- Geometric reasoning.

These items aim to develop and test Year 7 students' proficiency with the content of this sub-strand.

Please note that these resources do not encompass all that should be taught and learned for Measurement and Geometry in Year 7. Not all of the content of the curriculum can be effectively assessed in a written test format.

Perimeter of rectangles

Background information/teaching focus

A key concept for students to learn is that for certain types of shapes there are relationships between lengths of its edges and its perimeter, its area and its volume. Common formulae are a shorthand way of describing these relationships and are useful to help work out perimeters, areas and volumes more easily than measuring them directly. Students should investigate measurement relationships in a range of ways, developing their own short cuts for solving practical problems. Students can find perimeters directly or by measuring edges and adding. They will need encouragement to explain their own shortcuts, eg measuring one side of a pentagon and multiplying by five, or measuring two adjacent sides of a rectangle, adding and doubling. Memorising formulae is less important than understanding the relationships involved. Developing activities and questions that focus students on understanding these relationships will help students to build fluency and the capacity to solve problems involving perimeter.

For further related information see *First Steps in Mathematics Measurement*: (book two):

- Chapter 4: Estimate
  - Key understanding 1: We can make judgements about order and size without actually measuring. We should think about how confident we can be of our estimate. p.72

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Western Australian Curriculum

- Year 5 – Calculate the perimeter and area of rectangles using familiar metric units (ACMMG109).
- Year 6 – Solve problems involving the comparison of lengths and areas using appropriate units (ACMMG137).
- Year 7 – Establish the formulas for areas of rectangles, triangles and parallelograms and use these in problem solving (ACMMG159).

For more information visit the Western Australian Curriculum.

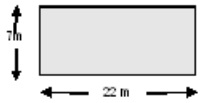
Learning experiences and activities

For ideas for activities see *First Steps in Mathematics: Measurement* (book two):

- Shortcuts for perimeters p. 16
- Fencing for paddock p. 16
- Three rectangles p. 20
- Turf and rope p. 20
- Perimeter or area? p. 21

Question 1

Three students measured the perimeter of a rectangular garden bed.



Shade the boxes which show the number sentences they could have used to calculate the perimeter.

- 22 + 7 + 22 + 7
- (22 + 7) x 2
- 22 x 7
- (22 + 7) x (22 +7)
- (2 x 7) + (2 x 22)

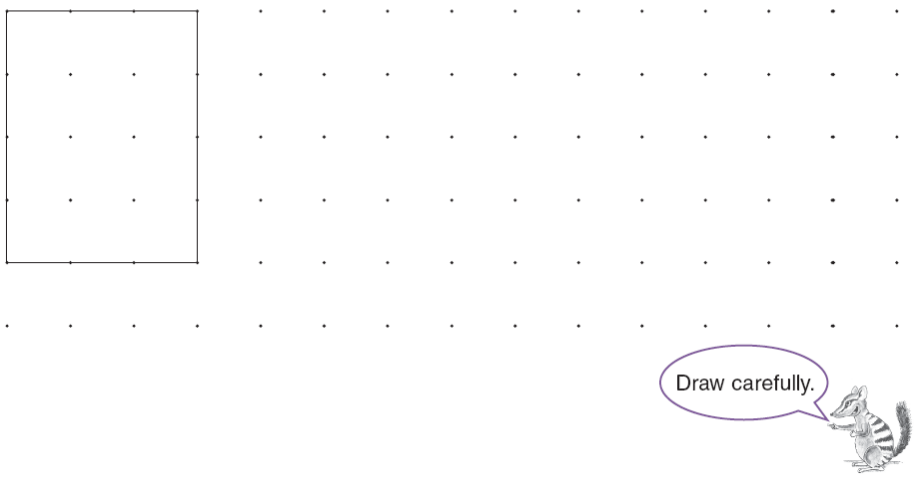
Skill: Students recognise efficient ways of calculating the perimeter of a rectangle.
Answer key: a, b, e

Additional questions:

1. Which method would you have used? Explain.
2. Why couldn't 22 x 7 be used to find the perimeter?
3. Why couldn't (22 + 7) x (22 +7) be used to find the perimeter?

Question 2

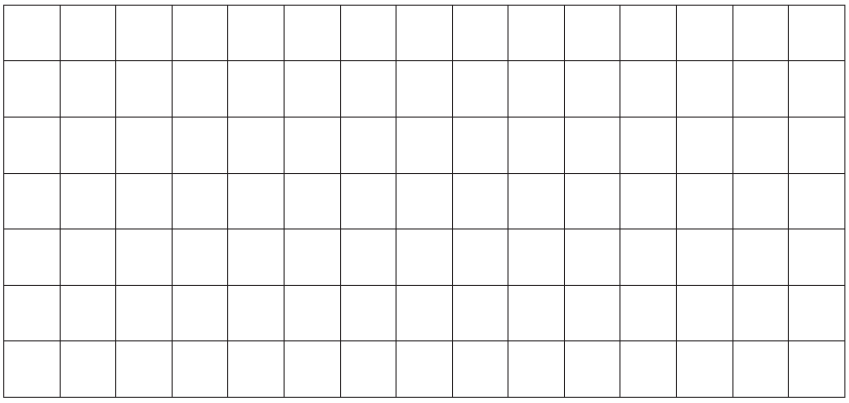
Draw a rectangle **half** the length and width of the rectangle shown.



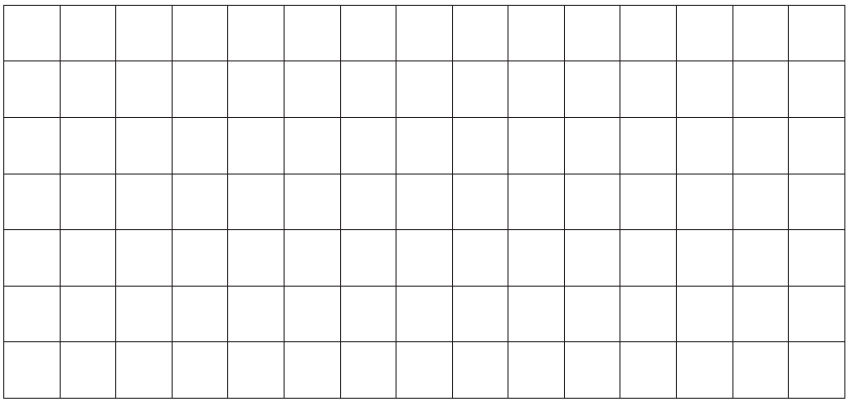
Skill: Students interpret geometric language to construct a specific shape.

Additional questions:

1. What is the perimeter of each rectangle?
2. Draw a rectangle that has twice the length and width of the original rectangle. What is the perimeter of this rectangle?



3. Draw a rectangle one-third the length and width of the original rectangle. What is the perimeter of this rectangle?

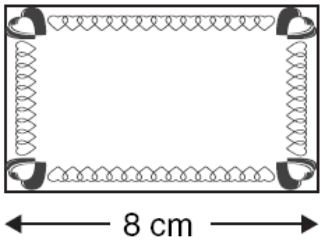


Question 3

The perimeter of this note paper is 22 cm.

The length is 8 cm. What is its width?

- ○ 14 cm
- ○ 8 cm
- ○ 6 cm
- ○ 4 cm
- ○ 3 cm
- ○ 2 cm



Not to scale

Skill: Given the perimeter and the length, students calculate the width of a rectangle.
Answer key: E (3 cm)

Additional questions

1. What would the width of the note paper be if the length was 8 cm but the perimeter was 26 centimetres?
2. What would the width of the note paper be if the length was 8 cm but the perimeter was 35 centimetres?

Question 4

A piece of rectangular notepaper has a length of 8 centimetres and an area of 32 square centimetres.

What is the perimeter of this piece of notepaper?

Skill: Students use the relationship between area and perimeter of a rectangle.
Answer key: 24 cm.

Additional questions

1. What is the formula for finding the area of a rectangle?
2. How does understanding the properties of a rectangle help with this problem?
3. If the note paper had a length of 12cm and an area of 48 square centimetres, what would the perimeter be?

Curriculum references

Department of Education and Training Western Australia 2005, *First Steps in Mathematics: Measurement* (book two):

- Chapter 3: Indirect measure
  - Key understanding 1: For certain types of shapes we can describe the relationship between the lengths of its edges and its perimeter, its area and its volume. p.12
  - Key understanding 4: We can calculate one measurement from others using relationships between quantities. p.54

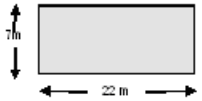
Student worksheet

Focus

Perimeter of rectangles

Question 1

Three students measured the perimeter of a rectangular garden bed.

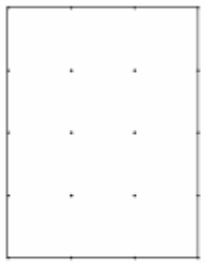


Shade the boxes which show the number sentences they could have used to calculate the perimeter.

- ○ 22 + 7 + 22 + 7
- ○ (22 + 7) x 2
- ○ 22 x 7
- ○ (22 + 7) x (22 +7)
- ○ (2 x 7) + (2 x 22)

Question 2

Draw a rectangle **half** the length and width of the rectangle shown.

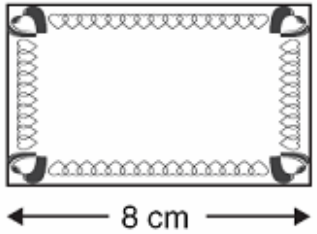


Question 3

The perimeter of this note paper is 22 cm.

The length is 8 cm. What is its width?

- ○ 14 cm
- ○ 8 cm
- ○ 6 cm
- ○ 4 cm
- ○ 3 cm
- ○ 2 cm



Not to scale

Question 4

A piece of rectangular notepaper has a length of 8 centimetres and an area of 32 square centimetres.

What is the perimeter of this piece of notepaper?

Area of a rectangle

Background information/teaching focus

Finding the area or volume of objects directly is more complex that finding length or capacity. Some of the complexity relates to the use of a physical representation of the unit of choice and some to the use of rectangular arrays and grids. For finding area, students need to build up their knowledge of rectangular arrays and how they link to multiplication.

Another key concept for students to learn is that for certain types of shapes there are relationships between lengths of its edges and its perimeter, its area and its volume. Common formulae are a shorthand way of describing these relationships and are useful to help work out perimeters, areas and volumes more easily than measuring them directly. Students should investigate measurement relationships in a range of ways, developing their own short cuts for solving practical problems.

For further related information see:
First Steps in Mathematics Measurement (book one):

- Chapter 4: Direct measure
  - Background notes p. 161

First Steps in Mathematics: Measurement (book two):

- Chapter 3: Indirect measure
  - Background notes p. 68

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Western Australian Curriculum

- Year 5 – Calculate perimeter and area of rectangles using familiar metric units (ACMMG109).
- Year 7 – Establish the formulas for areas of rectangles, triangles and parallelograms and use these in problem solving (ACMMG159).

For more information visit the Western Australian Curriculum.

Learning experiences and activities

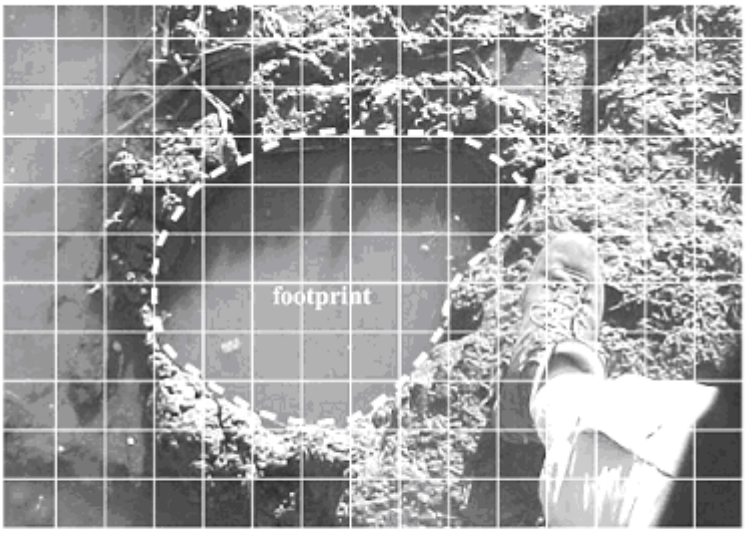
- Provide rectangles to students where the rectangle has its dimensions clearly marked in cm squares. Gradually move onto graphics that have fewer lines marked. Eventually provide blank rectangles and have students use cm squares to cover rectangles without gaps or overlaps.
- Everyday situations involving measures derived from completing a calculation rather than directly measuring need lots of exploration and discussion.
- Experiences need to be provided where students can calculate the area of a rectangle where the sides are not whole numbers. This is harder as students cannot automatically see the array and the relationship is not intuitive.
- Students need many experiences that help them distinguish between the attributes of perimeter and area and realise that one figure can have a bigger perimeter than another but smaller area and vice versa.

For further ideas for activities see *First Steps in Mathematics: Measurement* (book two):

- Turf and rope p. 20
- Irregular area p. 20
- Square straws p. 20
- Perimeter or area? p. 21
- Five triangles p. 24
- Using a formula p. 60

Question 1

An elephant left a footprint in the mud.



Use the grid to estimate the area of the elephant's footprint, in square units.

_____ square units

Skill: Students estimate the area of a shape drawn on grid paper.
Answer key: Any estimate in the range of 30 to 32 square units.

Additional questions

1. Round your estimate to the nearest whole number of square units if it is not already a whole number. Then use grid paper to draw a rectangle that has the same area as the elephant's footprint.
2. Draw a different rectangle that also has the same area as the elephant's footprint.

Question 2

The hopscotch grid is made up of squares.
The perimeter of each square is 200cm.

What is the area of each square?

_____ **cm** ^{2}

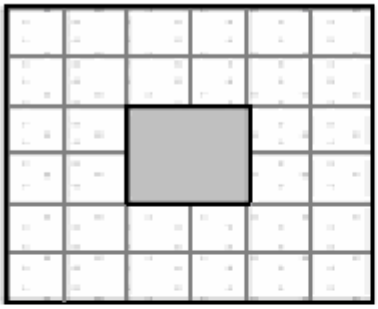
Skill: Given the perimeter, students calculate the area of a square.
Answer key: 2 500 cm^2.

Additional questions

1. The perimeter of a square is 400 cm. Find its area.
2. If the area of each square of the hop scotch grid was 1 square metre, what would be the perimeter of the whole hop scotch grid?
3. The area of a square is 9 000 square centimetres. What is its perimeter?

Question 3

Here is a plan of Jim's backyard



The area of the square garden in the middle is 16 m^2.

What is the area of the paving in Jim's backyard?

20 m^2 ○ 32 m^2 ○ 128 m^2 ○ 144 m^2 ○

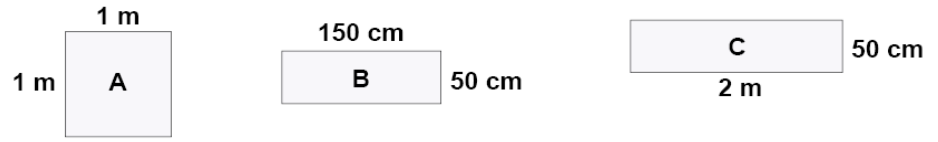
Skill: Students calculate area using informal and formal units.
Answer key: C

Additional questions

1. Draw diagrams of two differently shaped rectangular backyards that both have an area of 128 square metres.
2. A rectangular backyard has an area of 168 square metres and length of 12 metres. What is the width of the backyard?
3. A rectangular backyard has an area of 95 square metres and length of 10 metres. What is the perimeter of the backyard?

Question 4

Which of these shapes have an area of 1 m^2?



- All of them
- A and B
- A and C
- A only

Skill: Students use shortcuts for area of a rectangle.
Answer key: A and C

Additional questions

1. A rectangle has a length of 70 cm and width of 2 m. What is its area?
2. A rectangle has an area of 3 square metres and width of 25 cm. What is its length?
3. A rectangle has an area of 6 square centimetres and width of 15 mm. What is its length?

Curriculum references

Department of Education and Training Western Australia 2005, *First Steps in Mathematics: Measurement* (book two):

- Chapter 3: Indirect Measure
  - Key Understanding 1: For certain types of shapes we can describe the relationship between the lengths of its edges and its perimeter, its area and its volume. p.12
  - Key Understanding 4: We can calculate one measurement from others using relationships between quantities. p.54

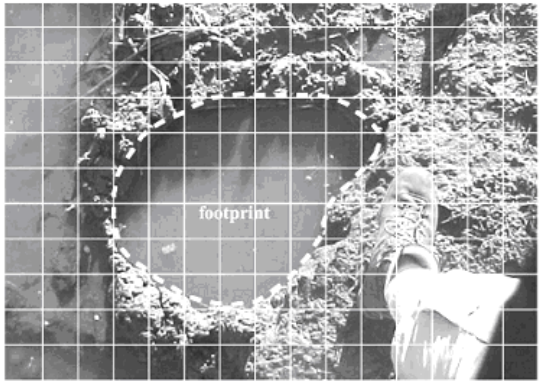
Student worksheet

Focus

Using units of measurement

Question 1

An elephant left a footprint in the mud.

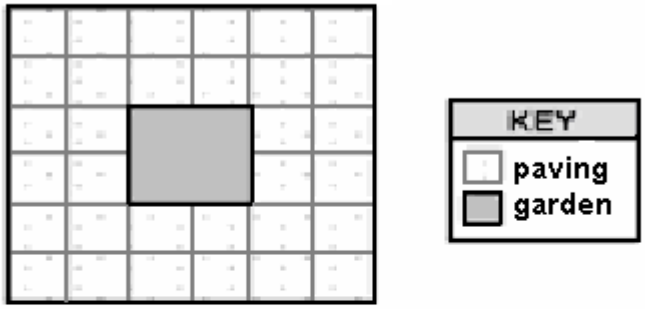


Use the grid to estimate the area of the elephant's footprint, in square units.

_____ square units

Question 3

Here is a plan of Jim's backyard



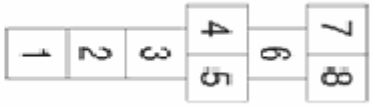
The area of the square garden in the middle is $16\,m^2$.

What is the area of the paving in Jim's backyard?

- $20\,m^2$
- $32\,m^2$
- $128\,m^2$
- $144\,m^2$

Question 2

The hopscotch grid is made up of squares.
The perimeter of each square is 200cm.



What is the area of each square?

_____ cm^2

Question 4

Which of these shapes have an area of $1\,m^2$?

- All of them
- A and B
- A and C
- A only

Finding the volume of a prism

Background information/teaching focus

For certain types of 3D shapes there are relationships between specified lengths and the surface area and volume. Formulae are a shorthand way of describing these relationships and are useful to help work out the volume more easily than measuring them directly. Memorising formulas is less important than understanding the relationships involved and students need activities and experiences to understand these relationships. Students should investigate measurement relationships in a range of ways, developing their own short cuts for solving practical problems.

Western Australian Curriculum

- Year 7 – Calculate volumes of rectangular prisms (ACMMG160).
- Year 8 – Develop formulas for volumes of rectangular and triangular prisms and prisms in general. Use formulas to solve problems involving volume (ACMMG198).

For more information visit the Western Australian Curriculum.

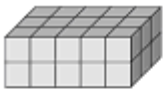
Learning experiences and activities

Using 24 cubes have students construct various rectangular prisms recoding the dimensions in a table. Ask students how they know they have built every possible rectangular prism. Encourage them to construct their own formulas in working out how many cubes in any given rectangular prism.

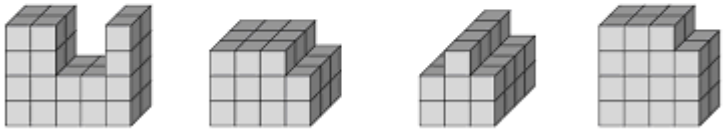
For further ideas for activities see *First Steps in Mathematics: Measurement* (book two):

- Building p. 19
- The sealed room pp. 19
- Cubic straws p. 23
- Fractional dimensions p. 23

Question 1



Tom builds the object above out of cubes.
Which object has the same volume as Tom's object?



Skill: Students find the volume of a prism made of unit cubes.
Answer key: D

Additional questions

1. What name is given to the object Tom built?
2. What are the dimensions of Tom's object?
3. Use grid paper to draw other rectangular prisms with a volume of 30 cubes.

Question 2

Con built this model using four cubes.

How many **more** cubes would he need to make a model twice the height, twice the length and twice the width of this one?

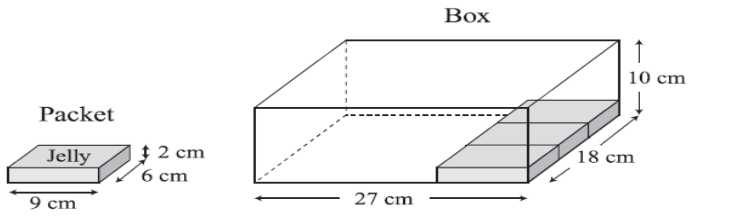
- 8
- 12
- 16
- 28

Skill: Students visualise a model with doubled dimensions and calculate the volume.
Answer key: 12

Additional questions

1. How did you work out your answer?
2. After the enlargement, what is the height of the prism? Width? Length?
3. If all the dimensions are twice the size why is the volume not doubled?
4. If you make each dimension three times the size of the drawing in the example, what will be the volume? Use blocks and build this shape.

Question 3



How many packets of jelly would fit in this box when it is full?

- 55
- 45
- 42
- 15
- 9

Skill: Students use informal units to measure volume of a prism.
Answer key: 45

Additional questions

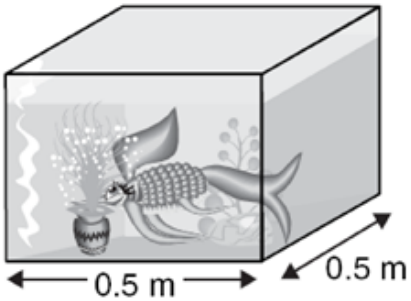
1. What is the volume of the packet of jelly?
2. What is the volume of the box?
3. If the packet of jelly had different dimensions but the same volume, what could the dimensions be? List three sets.

Question 4

This fish tank has a volume of 0.1 m^3.
Its width and length are shown.

What is its height?

_____ m



Not to scale

Skill: Given the volume and two dimensions, students find the third dimension of a prism.
Answer key: 0.4 m

Additional questions

1. What would be the height of the fish tank above if it had a volume of 1 m^3?
2. A fish tank is built in the shape of a rectangular prism. It has a volume of 0.2 m^3. What could be the dimensions of the fish tank? List three sets.

Curriculum references

Department of Education and Training Western Australia 2005, *First Steps in Mathematics: Measurement* (book two):

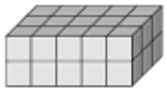
- Chapter 3: Indirect Measure
  - Key Understanding 1: For certain types of shapes we can describe the relationship between the lengths of its edges and its perimeter, its area and its volume. p.12
  - Key Understanding 4: We can calculate one measurement from others using relationships between quantities. p.54

Student worksheet

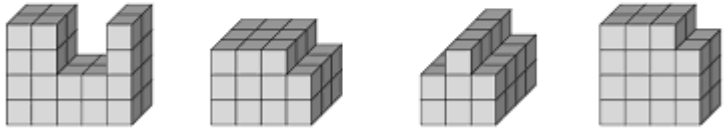
Focus

Finding the volume of a prism

Question 1



Tom builds the object above out of cubes.
Which object has the same volume as Tom's object?



Question 2

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How many **more** cubes would he need to make a model twice the height, twice the length and twice the width of this one?

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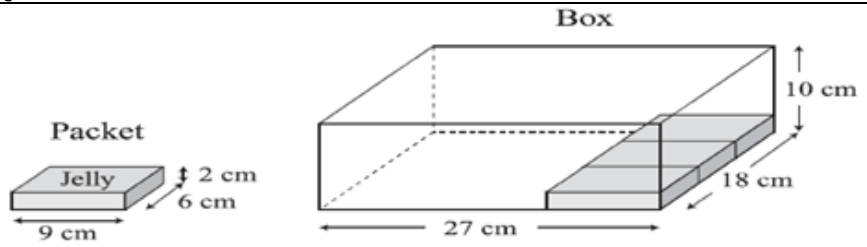
- 28

Question 3



How many packets of jelly would fit in this box when it is full?

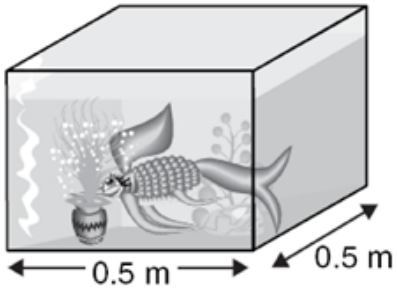
- 55
- 45
- 42
- 15
- 9

Question 4

This fish tank has a volume of 0.1 m^3.
Its width and length are shown.

What is its height?

_____ m



Not to scale

Revised October 2016

Perimeters and areas of composite shapes

Background information/teaching focus

Students need many experiences that help them distinguish between the attributes of perimeter and area and realise that one figure can have a bigger perimeter than another but smaller area and vice versa. Ordering figures using perimeter and area can help students to realise this.

Students need to understand and use formula for the area of shapes other than rectangles. For example they may see a triangle as half a rectangle or could rearrange a parallelogram to form a rectangle of the same area. Memorising formulas is less important than engaging students in activities and experiences to understand the relationships involved. Students should investigate measurement relationships in a range of ways, developing their own short cuts for solving practical problems.

For further related information see *First Steps in Mathematics: Measurement* (book one):

- Chapter 3: Indirect measure
  - Key understanding 1: For certain types of shapes we can describe the relationship between the lengths of its edges and its perimeter, its area and its volume. p.12
  - Key understanding 4: We can calculate one measurement from others using relationships between quantities. p.54

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Western Australian Curriculum

- Year 6 – Solve problems involving the comparison of lengths and areas using appropriate units (ACMMG137).
- Year 7 – Establish the formulas for areas of rectangles, triangles and parallelograms and use these in problem solving (ACMMG159).

For more information visit the Western Australian Curriculum.

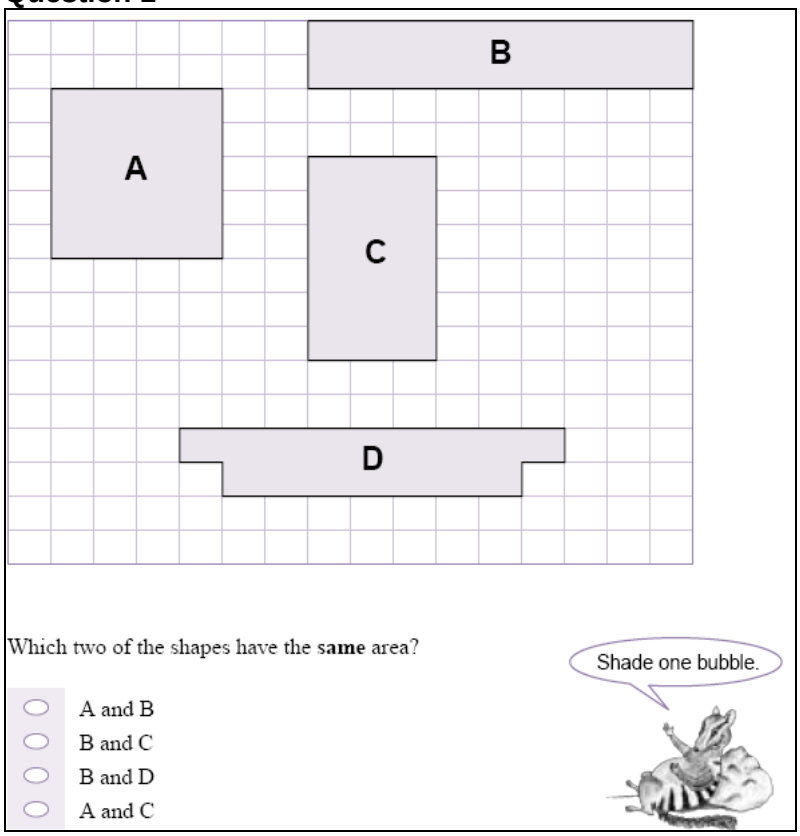
Learning experiences and activities

- Cutting up shapes and rearranging them will help students understand that no matter how you arrange a shape the area will remain the same.
- Everyday situations need to be explored where the measures have been derived from completing a calculation rather than directly measuring.

For further ideas for activities see *First Steps in Mathematics: Measurement* (book two):

- Three rectangles p. 20
- Irregular area p. 20
- Perimeter or area? p. 21
- House plans p. 22
- Triangle in a rectangle p. 23
- Rearranging parallelograms p. 24
- Area Problems p. 62
- Can you do it? p. 63

Question 1

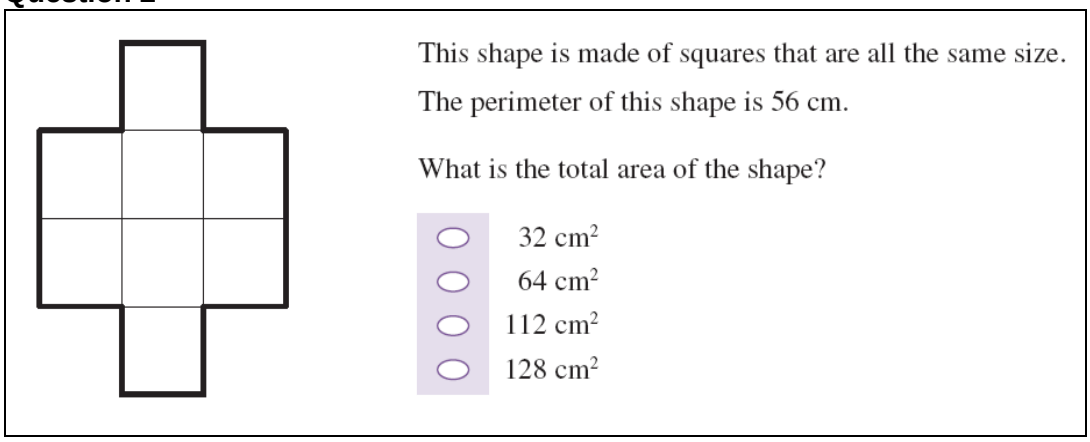


Skill: Students calculate the area of shapes on grid paper.
Answer key: B

Additional questions

1. What is the perimeter of each shape?
2. What is the area of each shape?
3. List the shapes in order from the **smallest to the largest** perimeter and then **largest to smallest** area? What do you notice?

Question 2

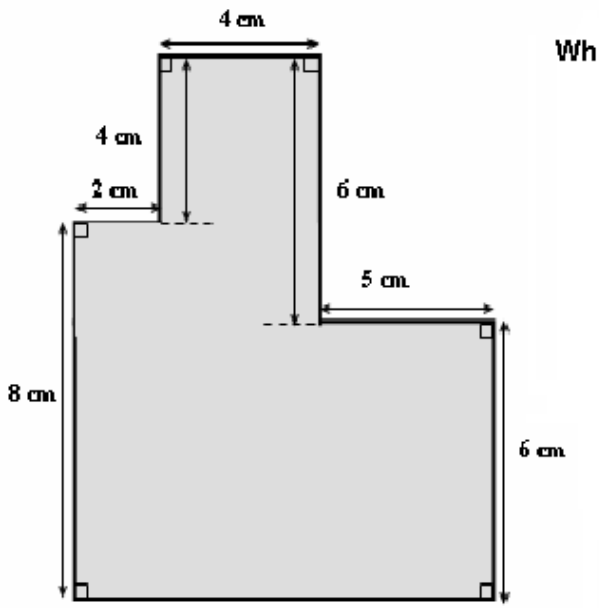


Skill: Students use relationships between perimeter and area.
Answer key: D

Additional questions

1. Draw a diagram of a rectangle that would have the same area as this shape.
2. Draw a diagram of a triangle that would have the same area as this shape.

Question 3



What is the perimeter of this shape?

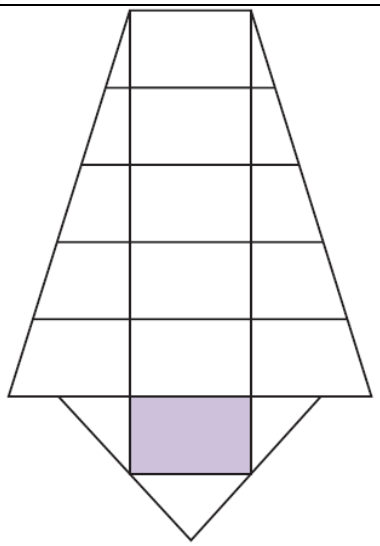
- ○ 35 cm
- ○ 36 cm
- ○ 42 cm
- ○ 46 cm

Skill: Students calculate the perimeter of a shape composed of rectangles.
Answer key: D

Additional questions

1. What is the area of this shape?
2. Draw a diagram of a rectangle that would have the same area as this shape.

Question 4



The area of the shaded rectangle is 100 square centimetres.

The approximate total area of the whole shape in square centimetres will be

- ○ 600
- ○ 1100
- ○ 1200
- ○ 1900

Skill: Students calculate area in square centimetres, given a unit of 100 square centimetres.
Answer key: C
Comment: The most common mistake was B, based on not counting the shaded rectangle.

Additional questions

1. What strategy did you follow to calculate the number of rectangles?
2. Draw a diagram, and clearly show the dimensions, of a triangle with an area of 1 200 square centimetres.
3. Draw a diagram of a shape, which is neither a rectangle nor triangle, with an area of 1 200 cm^2. Clearly show the dimensions of the shape.

Curriculum references

Department of Education and Training Western Australia 2004, *First Steps in Mathematics: Measurement:* (book two):

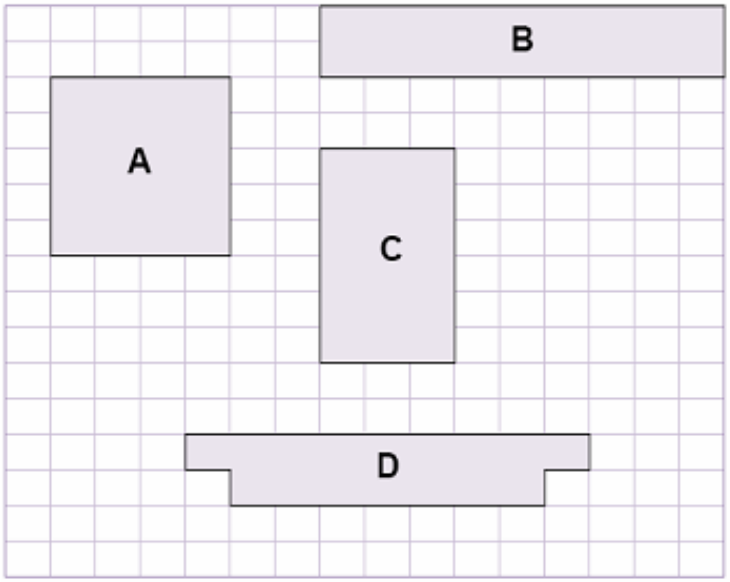
- Chapter 3: Indirect measure
  - Key understanding 1: For certain types of shapes we can describe the relationship between the lengths of its edges and its perimeter, its area and its volume. p.12
  - Key understanding 4: We can calculate one measurement from others using relationships between quantities. p.54

Student worksheet

Focus

Using units of measurement

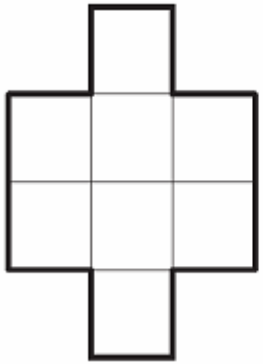
Question 1



Which two of the shapes have the **same** area?

- A and B
- B and C
- B and D
- A and C

Question 2



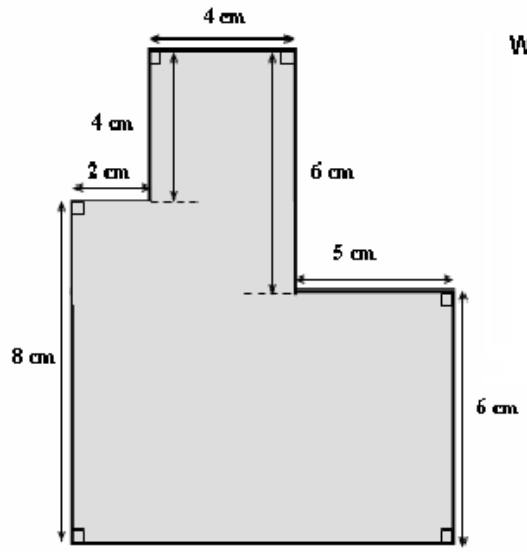
This shape is made of squares that are all the same size.

The perimeter of this shape is 56 cm.

What is the total area of the shape?

- 32 cm^2
- 64 cm^2
- 112 cm^2
- 128 cm^2

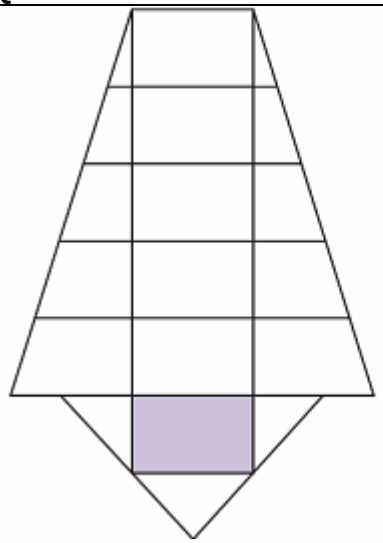
Question 3



What is the perimeter of this shape?

- ◯ 35 cm
- ◯ 36 cm
- ◯ 42 cm
- ◯ 46 cm

Question 4



The area of the shaded rectangle is 100 square centimetres.

The approximate total area of the whole shape in square centimetres will be

- ◯ 600
- ◯ 1100
- ◯ 1200
- ◯ 1900

Reading measure from calibrated scales

Background information/teaching focus

Calibrated scales can be used as a substitute for repeating units when measuring length, capacity, mass, angle and time. Students need to develop an understanding as to why it is important to line up the zero mark on a ruler or tape measure with the start of the object that is to be measured. A student who 'forgets' to line up the beginning of the object to be measured with the zero mark on the ruler may not understand the connection between measuring by repeating units and using a ruler.

Students need to understand that the starting point shows the beginning of the first unit, which means no units used and so it is labelled 0 (zero). The end of the first unit indicates one unit used and so it is marked 1; the end of each unit marks the number of units long the object is. Making their own calibrated scale will assist students to understand how these scales are made and used.

Students should learn to read a range of graduated scales which progress in complexity from:

- every mark labelled; eg 1,2,3,…to
- some of the marks not labelled, but each mark is one unit; eg every fifth mark is labelled 5,10,,15,20…
- scales involving some decimals; eg ten marks are placed between each whole but are not labelled; to
- the number of marks being fewer or greater than the number of units; eg every fifth mark is labelled 10, 20, 30, …, or every fifth mark is labelled 1,2,3,…

For related information see *First Steps in Mathematics: Measurement* (book one):

- Chapter 4: Direct measure
  - Key understanding 4: Calibrated scales can be used as a substitute for repeating units when measuring length, capacity, mass, angle and time.

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Western Australian Curriculum

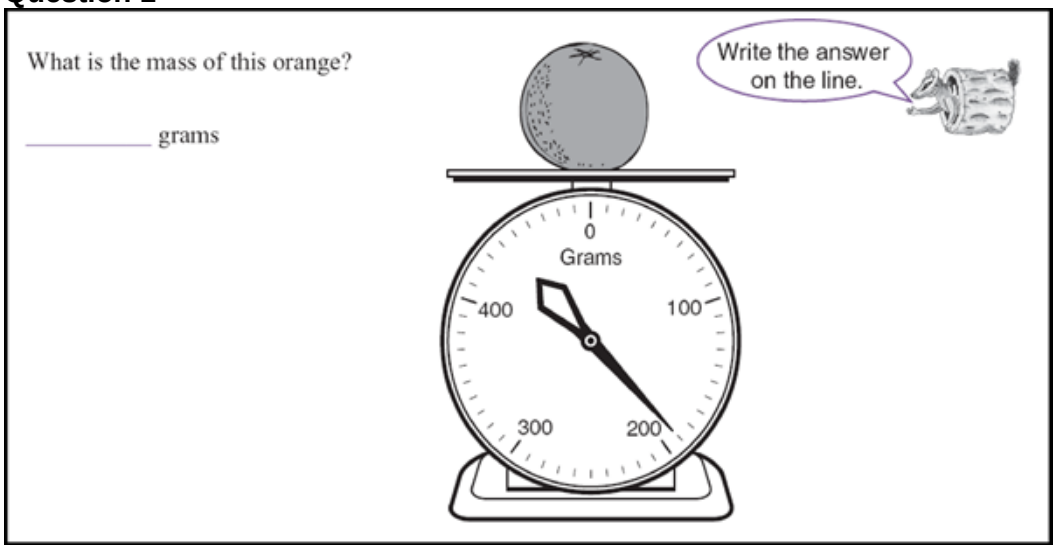
- Year 4 – Use scaled instruments to measure and compare lengths, masses, capacities and temperatures (ACMMG084).
- Year 5 – Estimate, measure and compare angles using degrees. Construct angles using a protractor (ACMMG112).

For more information visit the Western Australian Curriculum.

Learning experiences and activities

- Make a measuring jug p. 127
- Calibrated containers in litres p. 127
- Matchstick tapes p.128
- Varying measurements p. 129
- Nails and elastic p. 129
- Marks not numbered p. 132

Question 1

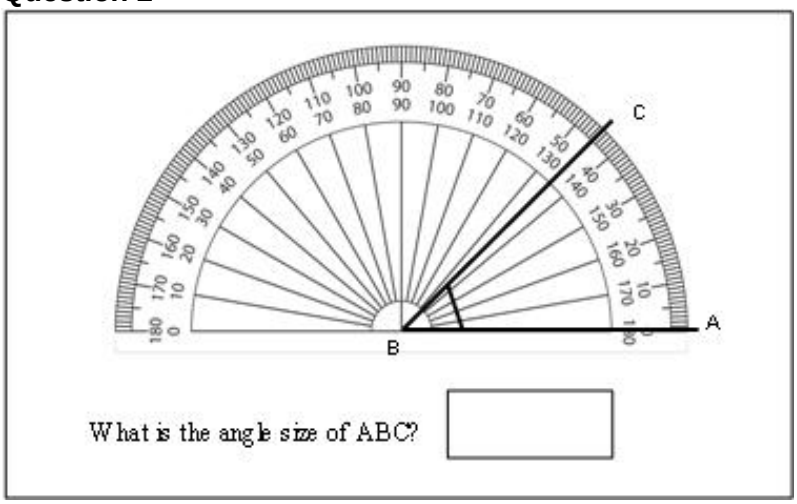


Skill: Students read a scale graduated at 10g intervals.
Answer key: 190 g

Additional questions

1. There are nine equally spaced markings between 100 and 200. What is each space between the mark worth on the scale?
2. On this scale, if there were only four equally spaced markings between 100 and 200, what is the space between each mark worth?
3. Draw an arrow pointing to 275 grams.
4. Draw an arrow pointing to 420 grams.
5. Another orange with a mass of 0.15 kg is placed on the scale; draw an arrow pointing to the total mass.

Question 2

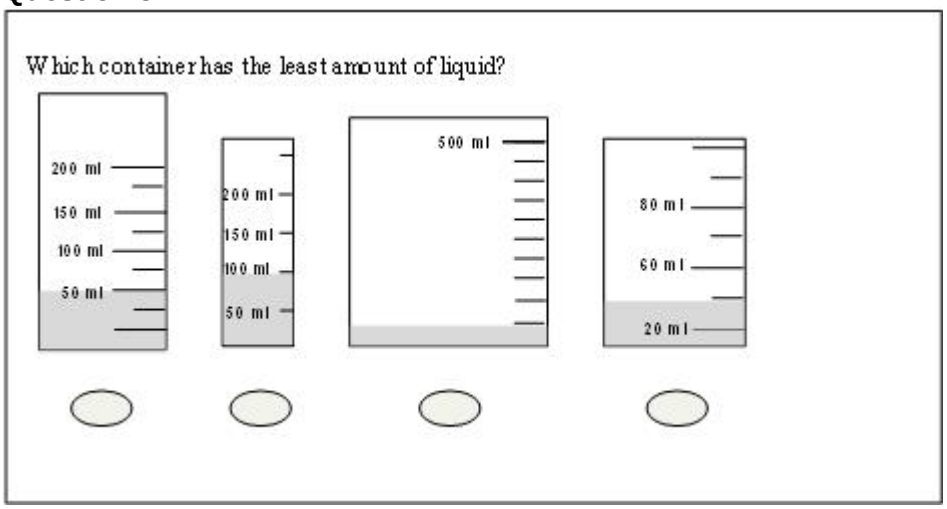


Skill: Students read the size of an angle using a calibrated scale on a protractor.
Answer key: 45°

Additional questions

1. What does each of the very small graduations mean?
2. Why does the protractor have two rows of numbers?
3. Draw three different sized angles for a partner and have them measure them with their own protractor.

Question 3

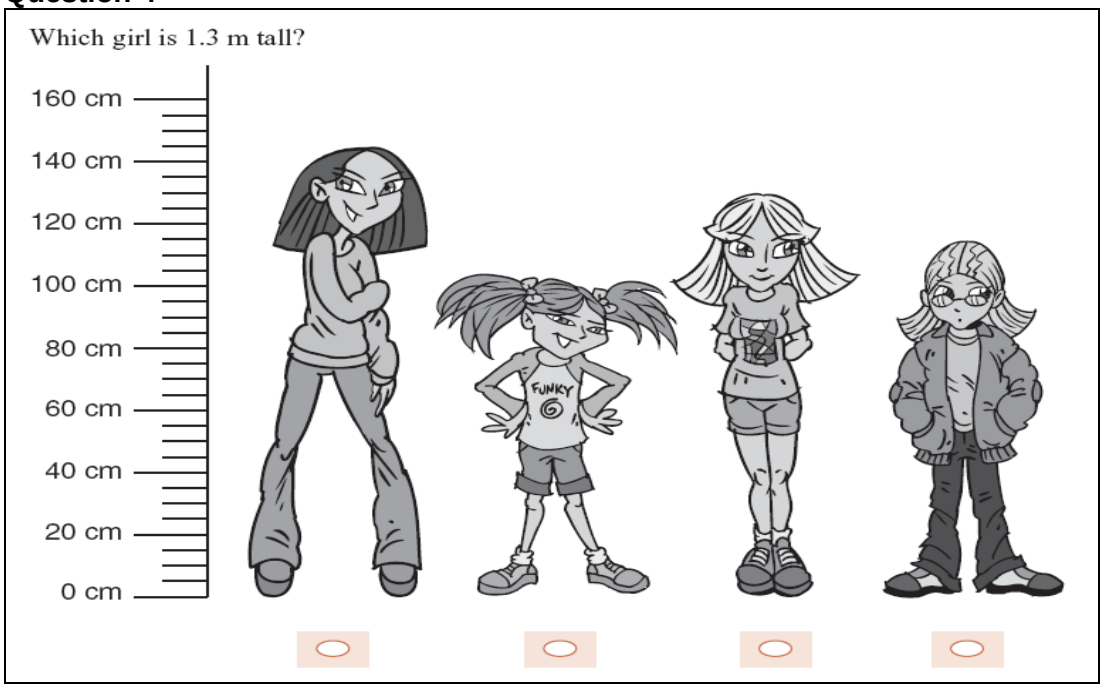


Skill: Students read different scales using millilitres.
Answer key: D

Additional questions

1. How did you work out your answer?
2. Order the containers from the least filled to the most filled.
3. Which container can hold the most fluid? How do you know?
4. Collect a range of jugs/containers with graduations marked for measuring capacity. Study the graduations and work out the scale used. Which are the easiest/most difficult to read and use? Why?

Question 4



Skill: Students read a scale in centimetres and convert to metres.
Answer key: C

Additional questions

1. What does each of the calibrations on the ruler indicate?
2. What did you have to do to work out the answer to the question in the example?
3. Work out the height for each of the girls in centimetres and then put them in order from tallest to shortest.
4. Convert each measurement to metres. How did you work them out?
5. Measure your own height in centimetres. Which girl(s) are you taller/shorter than?

Curriculum reference

Department of Education and Training Western Australia 2005, *First Steps in Mathematics: Measurement* (book one):

- Chapter 4: Direct Measure
  - Key Understanding 4: Calibrated scales can be used as a substitute for repeating units when measuring length, capacity, mass, angle and time. p.124

Student worksheet

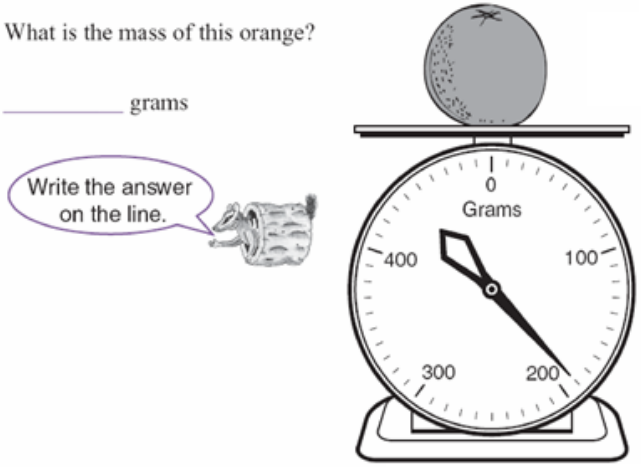
Focus

Reading measure from calibrated scales

Question 1

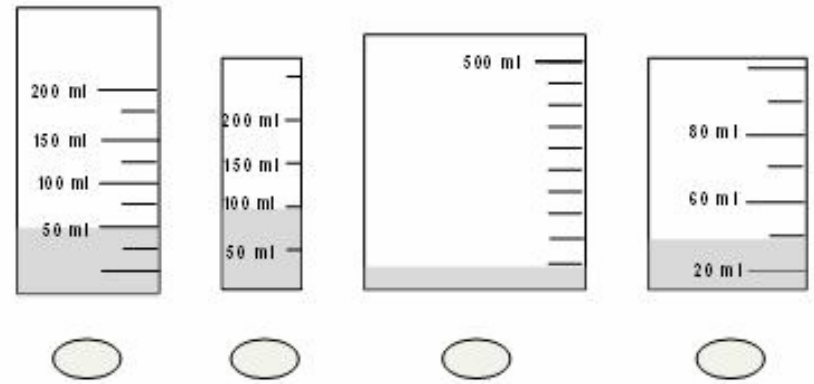
What is the mass of this orange?

_____ grams

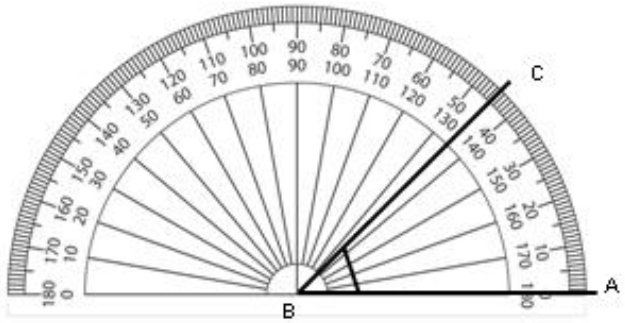


Question 3

Which container has the least amount of liquid?



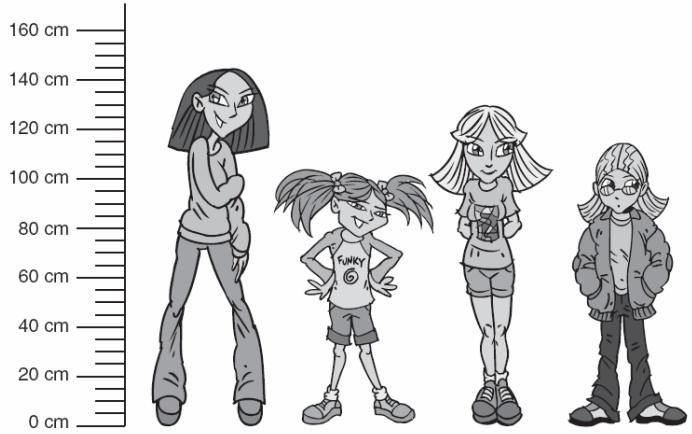
Question 2



What is the angle size of ABC?

Question 4

Which girl is 1.3 m tall?



Revised October 2016

Using elapsed time, calendars and timetables

Background information/teaching focus

Students need many opportunities to explore situations involving measuring elapsed time. It is a difficult concept that many students find difficult to understand. Many students may still believe that the person who arrives latest is also the one that took the longest time to get there.

They should read the time on clocks (digital and analogue), calendars, schedules and timetables to measure elapsed time. Relating elapsed time to the students' experiences with TV guides can also assist student understanding.

Students should be able to order familiar events in their lives and use regularly occurring things as cues to the time of the day or year. They need to develop the skills to be able to read key times on both digital and analogue clocks, calendars, timetables and schedules and need opportunities to explore a variety of calendar, timeline and timetable formats.

Recording of time, particularly seasons is cultural. Students can investigate the different ways cultural groups' record and designate periods of time to seasons of the year. For example:

- Australian Aboriginal seasons vary between different groups.
- Early Egyptian calendars had New Year in July.
- Some Asian countries use the Gregorian calendar for daily activities however use the ancient Chinese calendar for significant celebrations. (eg Chinese New Year)

Students need to recall the months of the year automatically but need to be given the opportunity to see how the months fit in a calendar year. The link must be made explicit how the days of the week continue the same sequence even when the month has changed.

Western Australian Curriculum

- Year 6 – Interpret and use timetables (ACMMG139).
- Year 8 – Solve problems involving duration, including using 12- and 24-hour time within a single time zone (ACMMG199).

For more information visit the Western Australian Curriculum.

Learning activities

For ideas for activities see *First Steps in Mathematics: Measurement* (book one):

- Days and months p. 159
- Ancient measures of time p. 159
- Comparing elapsed times p. 159
- Timetables p. 160

Question 1

Today is 30th May. Kerry's birthday is next Wednesday.

Which date is Kerry's birthday?

- 2nd May
- 30th May
- 6th June
- 7th June
- 30th June
- 6th July

MAY						
Sun	**Mon**	**Tue**	**Wed**	**Thu**	**Fri**	**Sat**
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

Skill: Students read and use a calendar.
Answer key: C

Additional questions

1. What is the date of the day before 1st May?
2. What is the date one week before 1st May?
3. What is the date two weeks after 31 May?
4. Kerry's brother had a party on the last Wednesday of April. What date was that?
5. Why are there blank spaces on the calendar?
6. What is the day of the week on the 1st June?

Question 2

Which two activities have a combined total of one hour?

- writing and assembly
- assembly and maths
- maths and recess
- assembly and recess

Timetable	
9:00am – 10:00am	writing
10:00am – 10:15am	assembly
10:15am – 10:45am	maths
10:45am – 11:15am	recess
11:15am – 11:45am	library
11:45am – 12:30pm	music
12:30pm – 1:30pm	lunch
1:30pm – 3:30pm	sport

Skill: Students calculate elapsed time.
Answer key: C

Additional questions

1. Which class lasts for 45 minutes?
2. A student was asked to take a message to the principal 20 minutes after the music lesson had started. At what time was this?
3. A student needed to leave the sport class 40 minutes early. At what time was this?

Question 3

What time will this clock show 10 minutes later?

- 23:55
- 23:64
- 12:04
- 00:04
- 01:04

Skill: Students use elapsed time in the context of 24-hour time.
Answer key: D

Additional questions

1. What time did the clock show one hour earlier?
2. What time did the clock show one hour later?
3. What time is 21:30 in 12 hour time?
4. It is 23:54 now. Alex went to bed two and a half hours earlier. At what time did Alex go to bed?

Question 4

How many hours and minutes between 3:26am and 3:17pm on the same day?

- 11 hours and 10 minutes
- 11 hours and 51 minutes
- 12 hours and 4 minutes
- 12 hours and 39 minutes

Skill: Students calculate elapsed time in the context of 12-hour time.
Answer key: B

Additional questions

1. How did you work it out?
2. What would the time be 50 minutes before 3:26am?
3. What would the time be 13 hours after 3:17pm?
4. What would be the time at exactly halfway between 3am and 3pm?

Curriculum references

Department of Education and Training Western Australia 2005, *First Steps in Mathematics: Measurement* (book one):

- Chapter 4: Direct Measure
  - Key understanding 4: Calibrated scales can be used as a substitute for repeating units when measuring length, capacity, mass, angle and time. p.124
  - Key understanding 6: We can judge and measure time using both natural cyclical changes and special techniques and tools which people have developed. p.150

Student worksheet

Focus

Using elapsed time, calendars and timetables

Question 1

Today is 30th May. Kerry's birthday is next Wednesday.

Which date is Kerry's birthday?

- 2nd May
- 30th May
- 6th June
- 7th June
- 30th June
- 6th July

MAY						
Sun	**Mon**	**Tue**	**Wed**	**Thu**	**Fri**	**Sat**
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

Question 2

Which two activities have a combined total of one hour?

- writing and assembly
- assembly and maths
- maths and recess
- assembly and recess

Timetable	
9:00am – 10:00am	writing
10:00am – 10:15am	assembly
10:15am – 10:45am	maths
10:45am – 11:15am	recess
11:15am – 11:45am	library
11:45am – 12:30pm	music
12:30pm – 1:30pm	lunch
1:30pm – 3:30pm	sport

Question 3

What time will this clock show 10 minutes later?

- 23:55
- 23:64
- 12:04
- 00:04
- 01:04

Question 4

How many hours and minutes between 3:26am and 3:17pm on the same day?

- 11 hours and 10 minutes
- 11 hours and 51 minutes
- 12 hours and 4 minutes
- 12 hours and 39 minutes

Using a protractor and recognising common angles

Background information/teaching focus

We can make judgements about order and size without actually measuring. Being able to make judgements about order or size without measuring is helpful when actual measurement is difficult.

We can improve our estimates by getting to know the size of common units and by practising judging the size of things. Practice helps us to become both better at estimating quantities and more confident in our judgement, so that we are prepared to trust it. Helpful practice involves:

- making an estimate
- getting feedback on how close the estimate was (often by measuring immediately)
- consciously using the feedback to improve the next estimate and repeating the cycle.

Calibrated scales can be used as a substitute for repeating units when measuring length, capacity, mass, angle and time.

Students need to develop an understanding as to why it is important to line up the zero mark on a protractor with the start of the angle that is to be measured. A student who 'forgets' to line up the beginning of the angle to be measured with the zero mark on the protractor may not understand the connection between measuring by repeating units and using a protractor. Students need to understand that the starting point shows the beginning of the first unit, which means no units used and so it is labelled 0 (zero). The end of the first unit indicates one unit used and so it is marked 1; the end of each unit marks the number of units long the object is. Making their own calibrated scale will assist students to understand how these scales are made and used.

For further related information see *First Steps in Mathematics: Measurement* (book one):

- Chapter 4: Direct measure
  - Key understanding 4: Calibrated scales can be used as a substitute for repeating units when measuring length, capacity, mass, angle and time. p.124

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Western Australian Curriculum

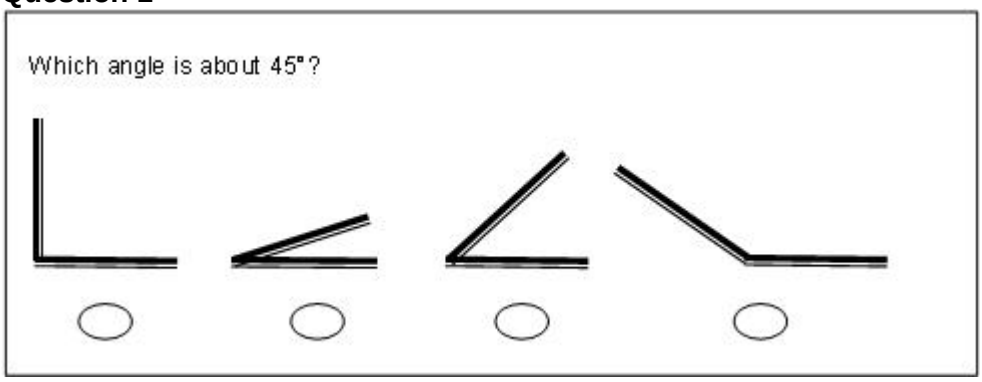
- Year 5 – Estimate, measure and compare angles using degrees. Construct angles using a protractor (ACMMG112).

Learning activities

For ideas for activities see *First Steps in Mathematics: Measurement* (book one):

- Ordering angles p. 102
- Angles p. 131

Question 1

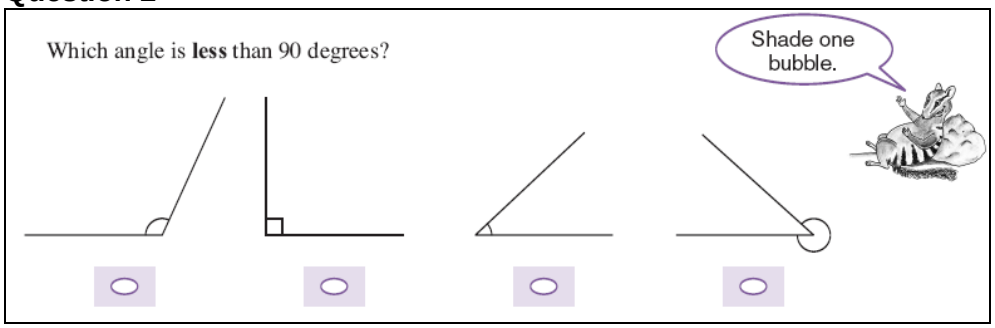


Skill: Students recognise an angle of 45º.
Answer key: C

Additional questions

1. Estimate the angle to which each of the cards are opened.
2. Fold a piece of paper or straw so it is opened to approximately 60º. Can you find something that matches this angle? (Repeat for other angle sizes.)
3. Draw a diagram to show a card opened to approximately 135º. How did you know?
4. Now check your estimate with a protractor.

Question 2

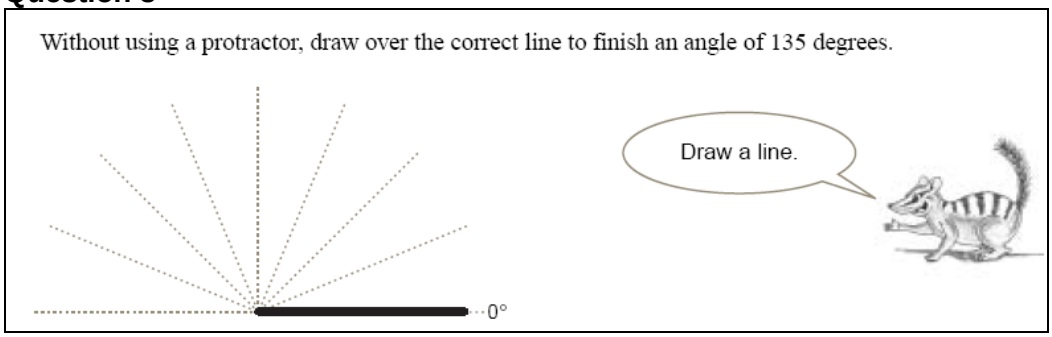


Skill: Students recognise an acute angle.
Answer key: C

Additional questions

1. Angles can be classified as reflex, acute, obtuse or right angles. Classify each of the angles shown above.
2. Estimate, where necessary, the size of each of the angles.
3. Now measure the angles using a protractor to check your estimates.

Question 3

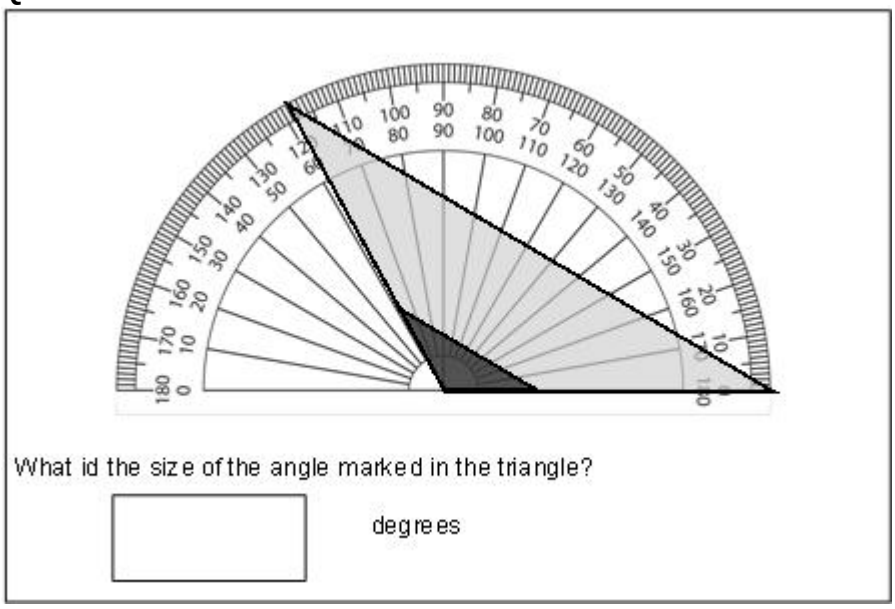


Skill: Students draw an angle of 135º.

Additional questions

1. Draw a line to show an approximate angle of 20º. Justify your decision.
2. Draw a line to show an approximate angle of 100º. Justify your decision.
3. What is the angle of a straight line? How do you know?

Question 4



Skill: Students use a protractor.

Answer key: 119°

Additional questions

1. Use a protractor to assist you to draw a 70º angle.
2. Use a protractor to assist you to construct a right angled triangle that also has a 40º angle.
3. Use a protractor and a ruler to construct two different right-angled triangles that have a 50º angle and a 6 cm side.

Curriculum references

Department of Education and Training Western Australia 2005*, First Steps in Mathematics: Measurement* (book one):

- Chapter 4: Direct measure
  - Key understanding 4: Calibrated scales can be used as a substitute for repeating units when measuring length, capacity, mass, angle and time. p.124

Department of Education and Training Western Australia 2005*, First Steps in Mathematics: Measurement* (book two):

- Chapter 4: Estimate
  - Key understanding 2: We can improve our estimates by getting to know the size of common units and by practising judging the size of things. p.80

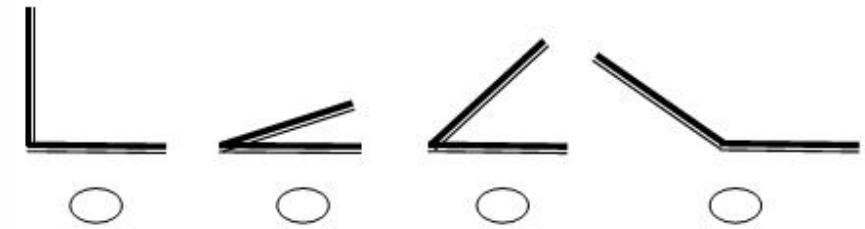
Student worksheet

Focus

Using a protractor and recognising common angles

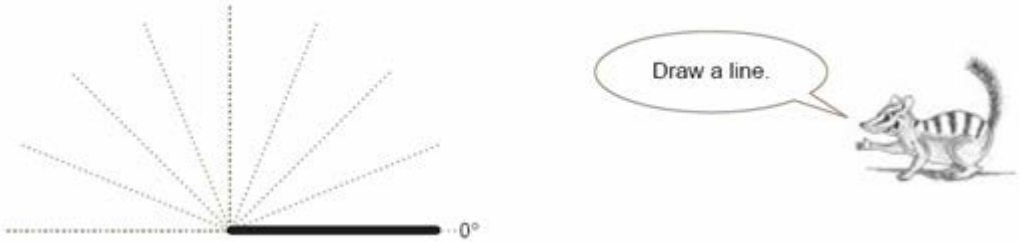
Question 1

Which angle is about 45°?



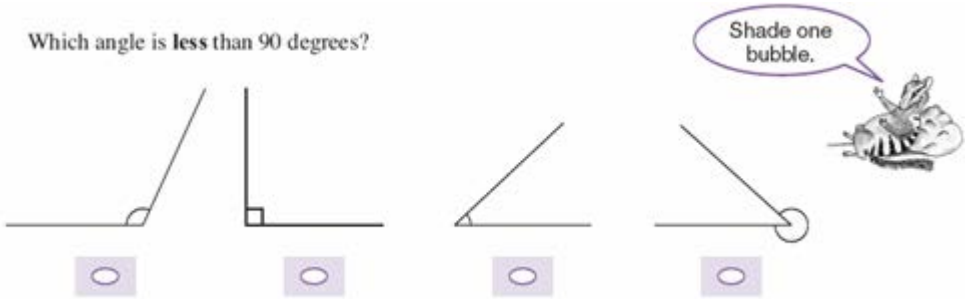
Question 3

Without using a protractor, draw over the correct line to finish an angle of 135 degrees.

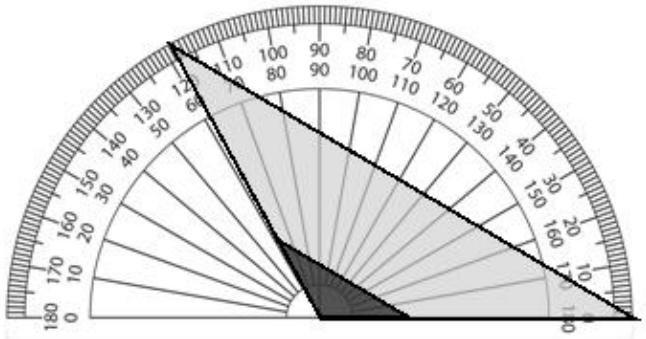


Question 2

Which angle is **less** than 90 degrees?



Question 4



What id the size of the angle marked in the triangle?

degrees

Revised November 2016

Describing geometric properties of familiar 2D shapes

Background information/teaching focus

Shape is a property or attribute of things and there are infinitely variable shapes just as there are infinitely variable colours. As for colour, we have developed standard classification of shapes and given classes and names of their own. This naming helps students to distinguish shapes and remember them. The classes themselves become concepts ('triangle') with properties of their own. Thus a 'triangle' is the bearer of a set of properties.

Students should understand that figures that they recognise as being, for example, rectangles all have certain properties in common. They should then move on to realise that it is the properties that define the class of the figure. Students will benefit from activities focusing on relationships between properties. Only when students understand that properties are related to each other do they understand that knowing just a few properties of a figure or object enables them to work out other properties. This is the most useful aspect of geometry.

For further related information see *First Steps in Mathematics: Space:*

- Chapter 6: Reason geometrically
  - Key Understanding 4: People have developed useful ways to classify shapes. Knowing that a shape is one of the standard types can tell us a lot about it. p.196

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Western Australian Curriculum

- Year 4 - Compare and describe two dimensional shapes that result from combining and splitting common shapes, with and without the use of digital technologies (ACMMG088).

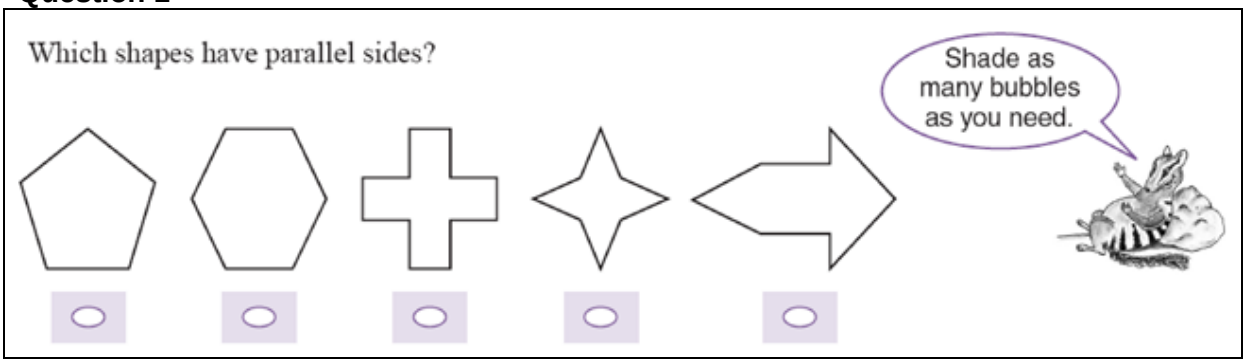
For more information visit the Western Australian Curriculum.

Learning activities

For further ideas for activities see *First Steps in Mathematics: Space:*

- Quadrilaterals p. 203
- Geoboard p. 203
- Shape clues p. 204
- Every square a rectangle p. 205
- Quadrilaterals p. 205
- Relationships p. 205

Question 1

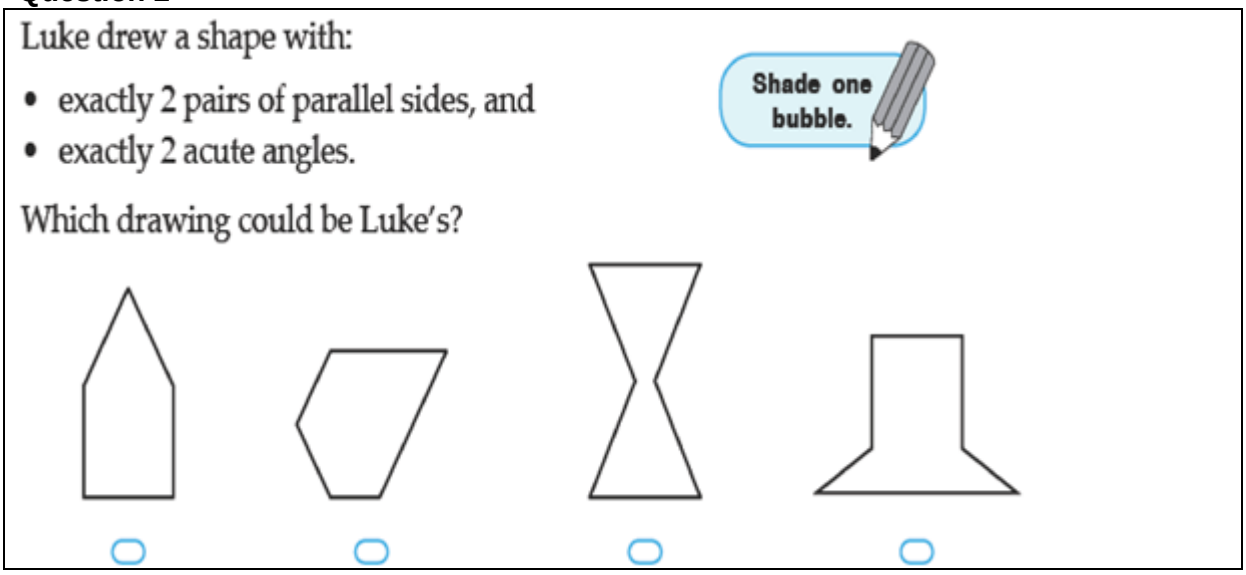


Skill: Students identify parallel sides in familiar 2D shapes.
Answer key: Shapes B, C, D and E have parallel sides.

Additional questions

1. What does parallel mean?
2. Name the shape with no parallel sides.
3. Which of these shapes are regular shapes?
4. Draw a different shape with three pairs of parallel sides.

Question 2

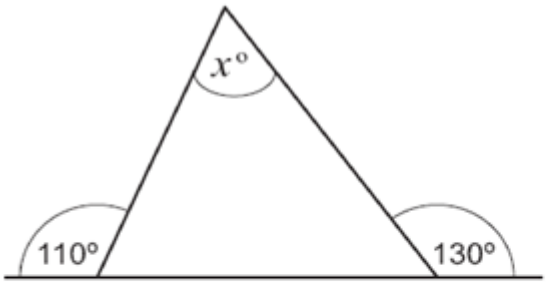


Skill: Students identify parallel sides and acute angles in familiar 2D shapes.
Answer key: D

Additional questions

1. What is the name of the shapes above?
2. Draw a different shape that has exactly two pairs of parallel sides and exactly two acute angles.
3. Write a description of the third shape.
4. Draw your own shape and write a description. Swap with a partner and draw the shape they have described.

Question 3



Not to scale

Shade one bubble.

What is the value of x in this diagram?

50	55	60	70
⬭	⬭	⬭	⬭

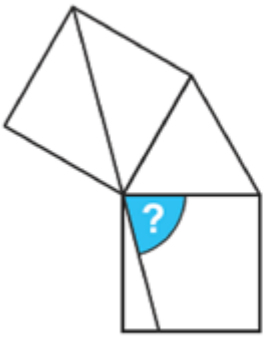
Skill: Students use properties of the angles in a triangle.
Answer key: C

Additional questions

1. How many degrees in a triangle?
2. If the 130° angle is decreased to 125°, what is the value of *x*?
3. If the 110° angle is increased to 120 °, what is the value of *x*?
4. What are the other missing angle sizes of the triangle? How do you know?

Question 4

Two squares are drawn on the sides of an equilateral triangle as shown.
A straight line is then drawn through the point where the 3 shapes touch.



What is the size of the shaded angle? ____ °

Skill: Students use properties of the angles in geometric shapes.
Answer key: 75°

Additional questions

1. How did you work it out? Is there another way you could work it out?
2. How many degrees are there in a straight line? How does this help work out the answer to this problem?
3. What is the size of the small angle next to this one? How do you know?

Curriculum references

Department of Education and Training Western Australia 2005, *First Steps in Mathematics: Space*:

- Chapter 6: Reason geometrically
  - Key understanding 3: There are special words, phrases and symbols that help us to think about and describe the shape and structure of things. p.182
  - Key understanding 4: People have developed useful ways to classify shapes. Knowing that a shape is one of the standard types can tell us a lot about it. p.196

Student worksheet

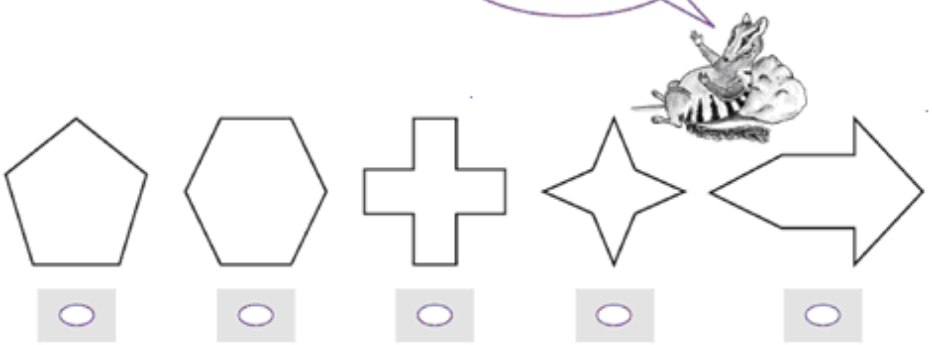
Focus

Describing geometric properties of familiar 2D shapes

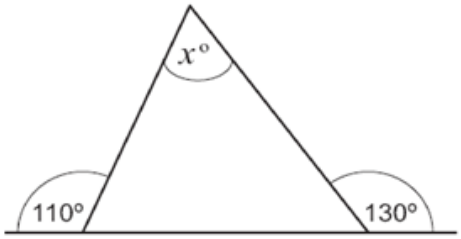
Question 1

Which shapes have parallel sides?

Shade as many bubbles as you need.



Question 3



Not to scale

Shade one bubble.

What is the value of x in this diagram?

50 55 60 70

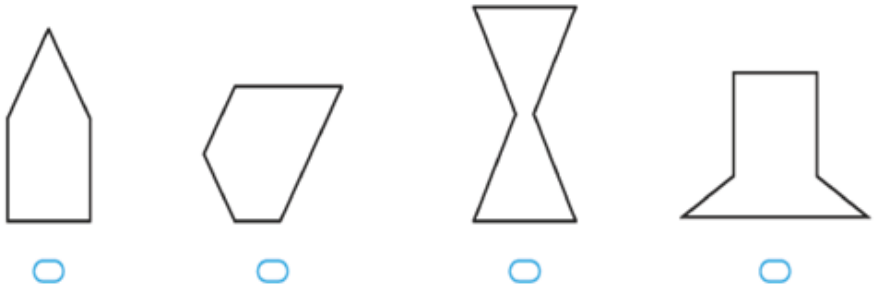
Question 2

Luke drew a shape with:

- exactly 2 pairs of parallel sides, and
- exactly 2 acute angles.

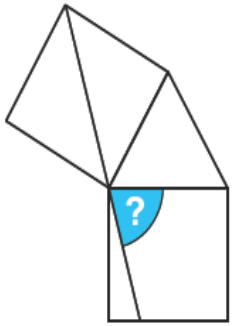
Shade one bubble.

Which drawing could be Luke's?



Question 4

Two squares are drawn on the sides of an equilateral triangle as shown.
A straight line is then drawn through the point where the 3 shapes touch.



What is the size of the shaded angle? ____ °

Revised October 2016

Classifying and describing geometric properties of triangles

Background information/teaching focus

In order for students to learn to reason about shape and structure and hence to solve spatial problems, they need to learn to notice shape, think of it as something significant and have appropriate vocabulary and notations for describing it.

Shape is a property or attribute of things and there are infinitely variable shapes possible. Standard classification of shapes has therefore been developed and shapes have been given classes and names of their own. This naming helps students to distinguish shapes and remember them. The classes themselves become concepts with properties of their own. Thus a triangle is the bearer of sets of properties.

Students should understand that figures that they recognise as being, for example, triangles all have certain properties in common. They should then move on to realise that it is the properties that define the class of the figure. Students will benefit from activities focusing on relationships between properties. Only when students understand that properties are related to each other do they understand that knowing just a few properties of a figure or object enables them to work out other properties. This is the most useful aspect of geometry.

For further related information see *First Steps in Mathematics: Space:*

- Chapter 6: Reason geometrically
  - Key understanding 3: There are special words, phrases and symbols that help us to think about and describe the shape and structure of things. p.182
  - Key understanding 4: People have developed useful ways to classify shapes. Knowing that a shape is one of the standard types can tell us a lot about it. .196

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Western Australian Curriculum

- Year 7 – Demonstrate that the angle sum of a triangle is 180° and use this to find the angle sum of a quadrilateral (ACMMG166).
- Year 7 – Classify triangles according to their side and angle properties and describe quadrilaterals (ACMMG165).

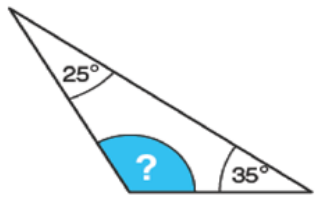
For more information visit the Western Australian Curriculum.

Learning activities

For further ideas for activities see *First Steps in Mathematics: Space:*

- Geoboard p. 203
- Shape clues p. 204
- Relationships p. 205
- Sorting triangles p. 205

Question 1



What is the size of the shaded angle?

115° 120° 130° 145°

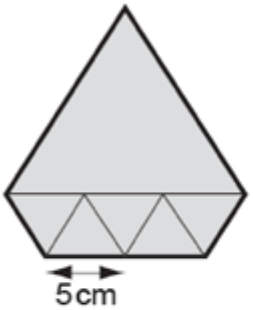
Skill: Students use properties of a triangle.
Answer key: B

Additional questions

1. How did you work it out?
2. What type of triangle is this? How do you know?
3. Would this work for an equilateral triangle? What about a right angle triangle?
4. Draw a triangle for your partner and measure two of its angles. Swap and work out the third angle. Check by using a protractor.

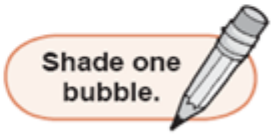
Question 2

This shape is made from five small equilateral triangles and one large equilateral triangle.



Each side of all the small triangles is 5 cm long.

What is the perimeter of the shape?



15 cm 45 cm 50 cm 85 cm

Skill: Students use properties of the equilateral triangle.
Answer key: C

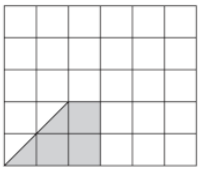
Additional questions

1. How did you work it out?
2. What is the perimeter of the large equilateral triangle?
3. How does the perimeter of one of the smaller equilateral triangles compare to the perimeter of the larger equilateral triangle?
4. If you added two more small triangles to the diagram to make a larger equilateral triangle, what would be the perimeter of the new triangle?

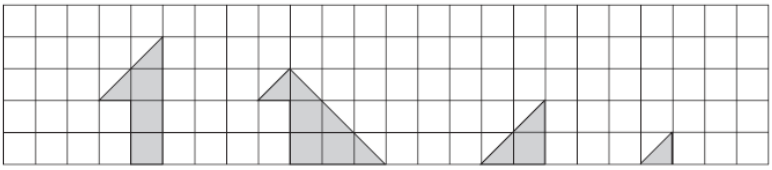
Question 3

Tara drew this shape on square grid paper.

Shade one bubble.



Which one of the shapes below, when joined (with no overlap) with Tara's shape, will **not** make a right-angled triangle?



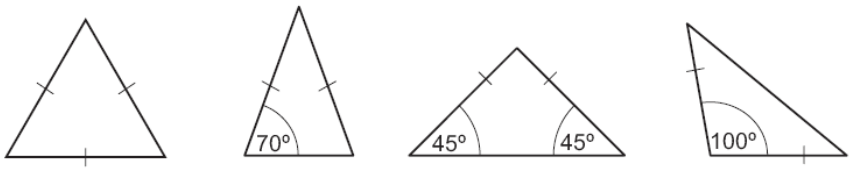
Skill: Students visualise right-angled triangles.
Answer key: C

Additional questions

1. What shape did Tara draw?
2. Enlarge Tara's shape on grid paper.
3. Draw the four resulting shapes on grid paper and indicate the right angles.

Question 4

Which one of these is a right-angled isosceles triangle?



Not to scale

Skill: Students identify a triangle with specified geometric properties.
Answer key: C

Additional questions

1. What name best describes the first shape?
2. In each triangle, indicate the equal angles.
3. Find the size of the angles in each of the above triangles.
4. Can you think of a way to prove that the sum of the angles in every triangle is 180°?

Curriculum references

Department of Education and Training Western Australia 2005, *First Steps in Mathematics: Space:*

- Chapter 6: Reason geometrically
  - Key understanding 3: There are special words, phrases and symbols that help us to think about and describe the shape and structure of things. p.182
  - Key understanding 4: People have developed useful ways to classify shapes. Knowing that a shape is one of the standard types can tell us a lot about it. p.196

Student worksheet

Focus

Classifying and describing geometric properties of triangles.

Question 1

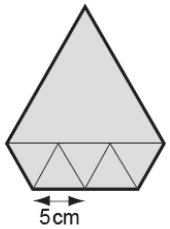
What is the size of the shaded angle?

115° 120° 130° 145°

Question 2

This shape is made from five small equilateral triangles and one large equilateral triangle.

Shade one bubble.



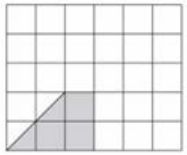
Each side of all the small triangles is 5 cm long.

What is the perimeter of the shape?

15 cm 45 cm 50 cm 85 cm

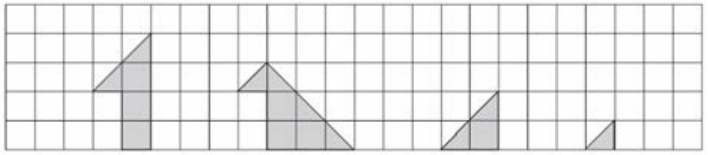
Question 3

Tara drew this shape on square grid paper.



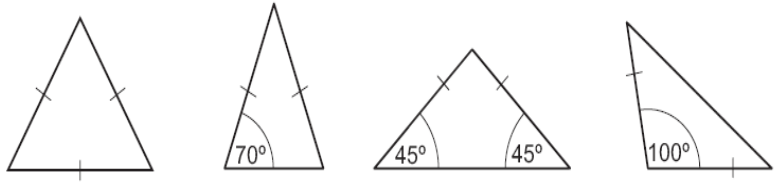
Shade one bubble.

Which one of the shapes below, when joined (with no overlap) with Tara's shape, will **not** make a right-angled triangle?



Question 4

Which one of these is a right-angled isosceles triangle?



Not to scale

Revised October 2016

Recognising the top or a side view of an object

Background information/teaching focus

There are a number of standard ways of representing space that are in widespread use internationally and students need to learn the conventions for interpreting and producing them. Students should understand that we often interpret diagrams by reading beyond them to what is not in the diagram but must have been there.

The ability to produce representations of 3D objects drawn from a fixed viewpoint develops slowly and students will need considerable experience in interpreting 2D representations of 3D objects and spaces, varying from photographs and semi-realistic sketches to various geometric diagrams. They also need experience in looking at 3D objects from different viewpoints so that when it is not possible to look at an object from a different view point, the student can visualise its features.

For further related information see *First Steps in Mathematics: Space:*

- Chapter 4: Represent shape:
  - Key understanding 3: To understand drawings of objects we need to combine what we can actually see with what we think is there. Special drawing techniques emphasise different aspects of an object. p.84

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Western Australian Curriculum

- Year 7 – Draw different views of prisms and solids formed from combinations of prisms (ACMMG161).

For more information visit the Western Australian Curriculum.

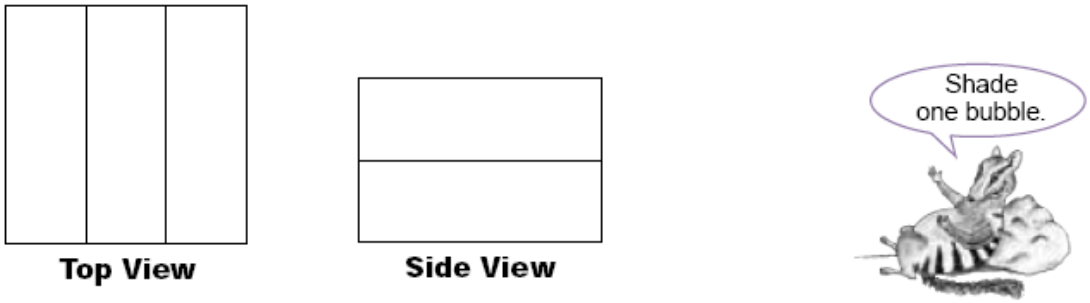
Learning activities

For further ideas for activities see *First Steps in Mathematics: Space:*

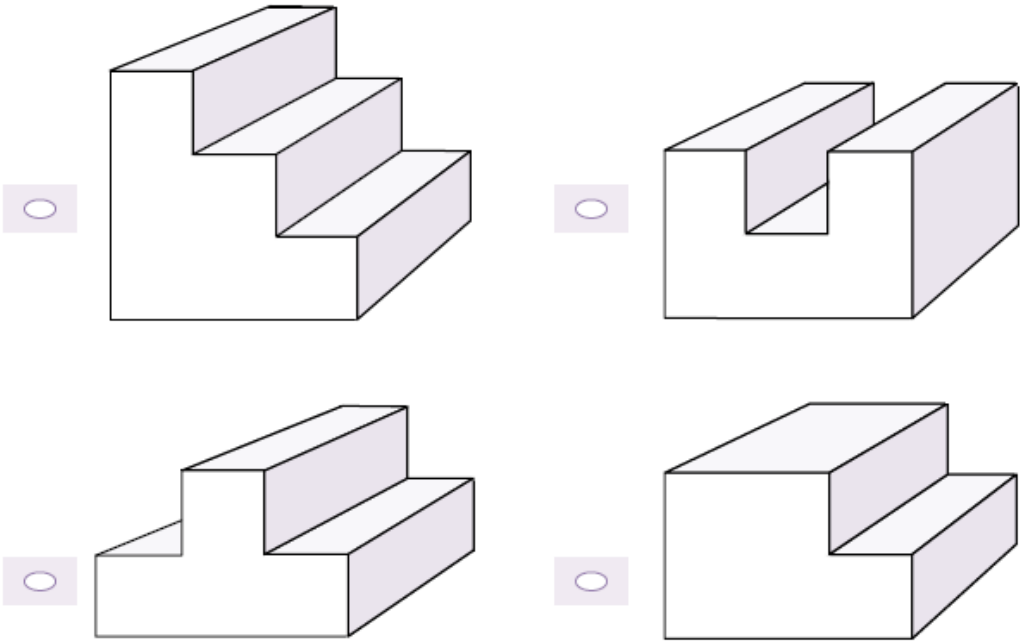
- Viewpoint p. 89
- Drawing the top p. 89
- Four-cube houses p. 91
- Drawing a cube p. 92
- Viewpoints p. 92
- Carton and cup p. 93

Question 1

Here are two views of an object.



Which one of these could be the object?



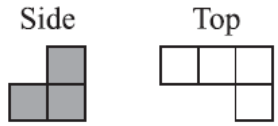
Skill: Students visualise the top and side view of an object made of blocks.
Answer key: C

Additional questions

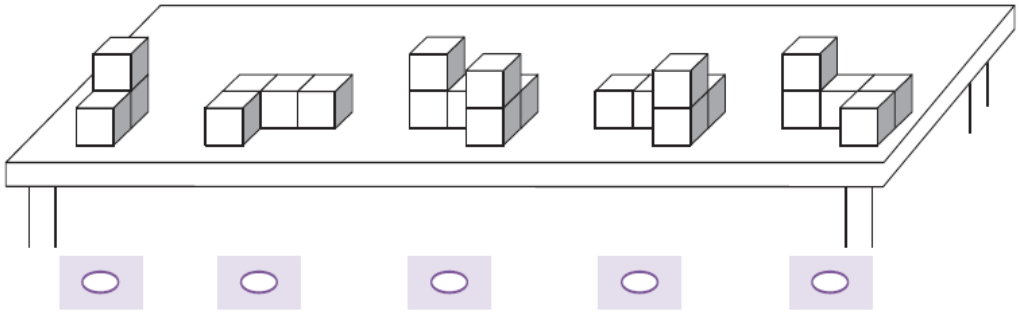
1. Make these objects with blocks. Use these models, if necessary, to draw the front, side and top view of these shapes.

Question 2

Here is the shaded side view and top view of a stack of blocks.



Which could be the stack of blocks?



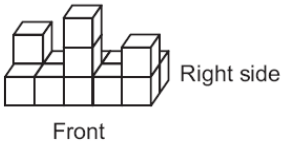
Skill: Students select an object made of unit cubes, given its top and side views.
Answer key: E

Additional questions

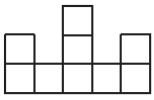
1. Construct each of the models with blocks. Draw these models on isometric grid paper.
2. Use square grid paper to draw the side and the top view of each model.
3. D is very similar to E. Why can't D be the answer? What change would be needed for D to be correct?

Question 3

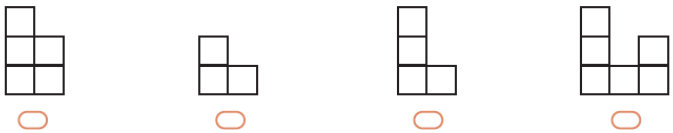
This object was made using identical cubes.



This is a drawing of the view from the front.



Which drawing shows the view from the right side?

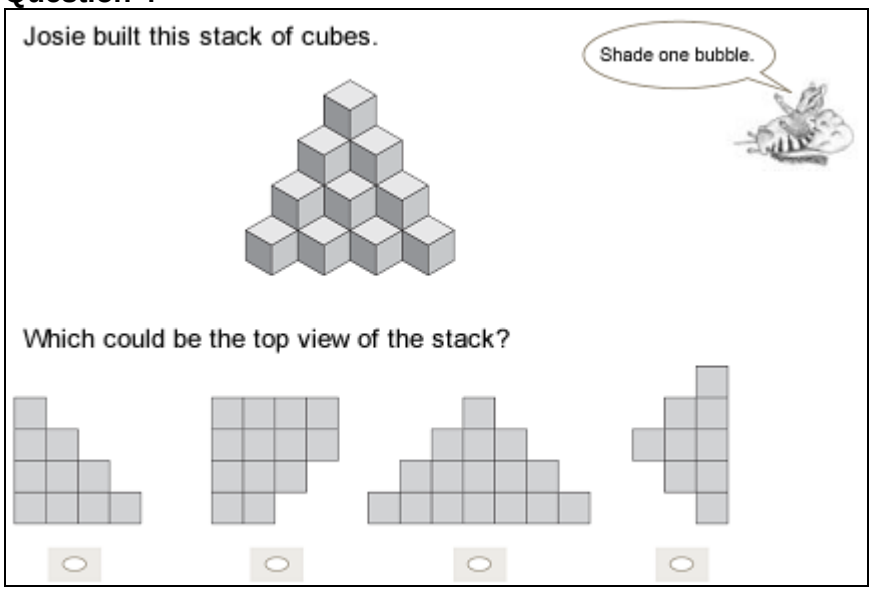


Skill: Given an oblique drawing and the top view of an object, students visualise the right-side view.
Answer key: A

Additional questions

1. Make this model with blocks and look at the side view.
2. Use grid paper to draw the top view of this model.
3. Helen wants *C* to be the correct answer. She needs to remove only one cube. Which one?
4. Make two models which would make *D* the correct answer.

Question 4



Skill: Given an isometric drawing of an object made of cubes, students visualise its top view.
Answer key: A

Additional questions

1. What is the least number of blocks needed to make this model?
2. On the isometric drawing above, draw in extra cubes, so that, *B* is the correct answer.
3. Make this model using blocks and use grid paper to draw the views from the side and front.

Curriculum reference

Department of Education and Training Western Australia 2005, *First Steps in Mathematics: Space:*

- Chapter 4: Represent shape
  - Key understanding 3: To understand drawings of objects we need to combine what we can actually see with what we think is there. Special drawing techniques emphasise different aspects of an object. p.84

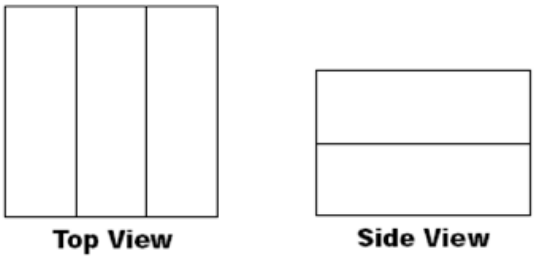
Student worksheet

Focus

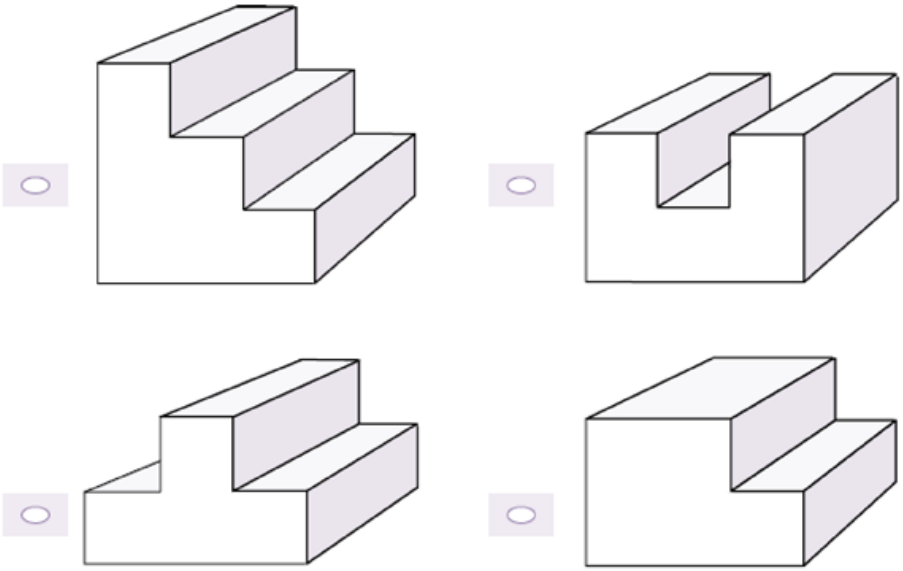
Recognising the top or a side view of an object

Question 1

Here are two views of an object.

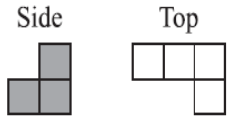


Which one of these could be the object?

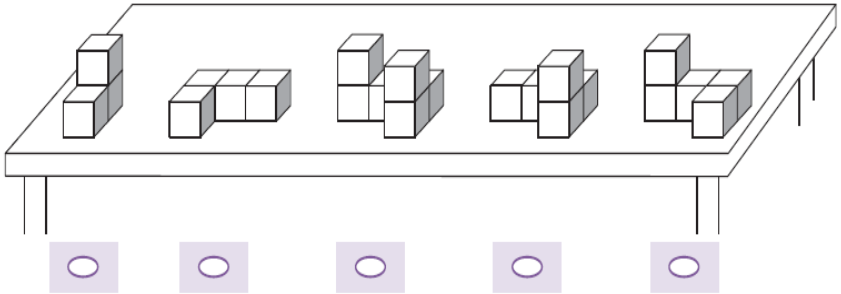


Question 2

Here is the shaded side view and top view of a stack of blocks.



Which could be the stack of blocks?



Revised October 2016

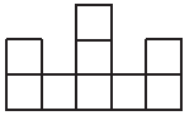
Question 3

This object was made using identical cubes.

Right side

Front

This is a drawing of the view from the front.

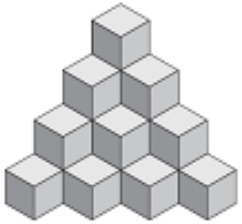


Front view

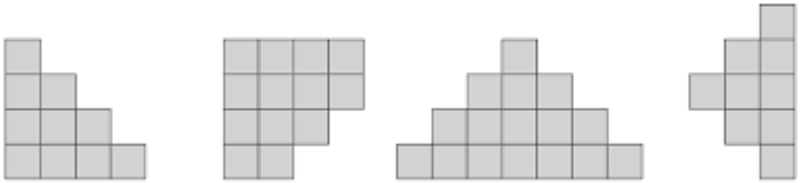
Which drawing shows the view from the right side?

Question 4

Josie built this stack of cubes.



Which could be the top view of the stack?



Visualising and recognsing prisms and pyramids given skeletons and nets

Background information/teaching focus

A net is a special technique used for producing objects. It is composed of figures arranged in a particular flat configuration. The arrangement of these figures does not exactly match the arrangement on the object to be made, as some sides may be some distance from each other. This arrangement is such that when it is folded all the parts will come together in the right relationship. Through experience that focuses upon the component parts of a figure and how they fit together, students learn that the net of any given object will need:

- figures of the right shape and size
- the right number of figures and
- figures located in the correct position relative to each other.

Students should be able to match provided nets to actual objects and to make their own nets for 3D objects. Activities that involve students in investigating which 2D shapes go together to make a particular prism or pyramid and how these shapes are connected to each other will help them to see the parts that make up the whole object.

For further related information see *First Steps in Mathematics: Space*:

- Chapter 4: Represent shape
  - Key Understanding 2: The net of an object has to have the same component parts as the object and the parts have to be in the right relationship to each other. p.72

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- Year 3 – Make models of three-dimensional objects and describe key features (ACMMG063).
- Year 5 – Connect three-dimensional objects with their nets and other two-dimensional representations (ACMMG111).
- Year 6 – Construct simple prisms and pyramids (ACMMG140).

For more information visit the Western Australian Curriculum.

Learning experiences and activities

- Collect everyday packages, such as cereal, toothpaste and chocolate boxes, and plastic wrap cylinders. Ask students to cut along selected edges and fold out flat to show the net. Identify and discuss the 2D shapes that make up the 3D object.
- Students use a wooden 3D shape and paint each face a different colour. After each face is painted use it to make one print on a sheet of paper. After all faces are printed discuss the face shapes and the number of each shape to assist students to make connections between the 2D representations of the 3D solid.

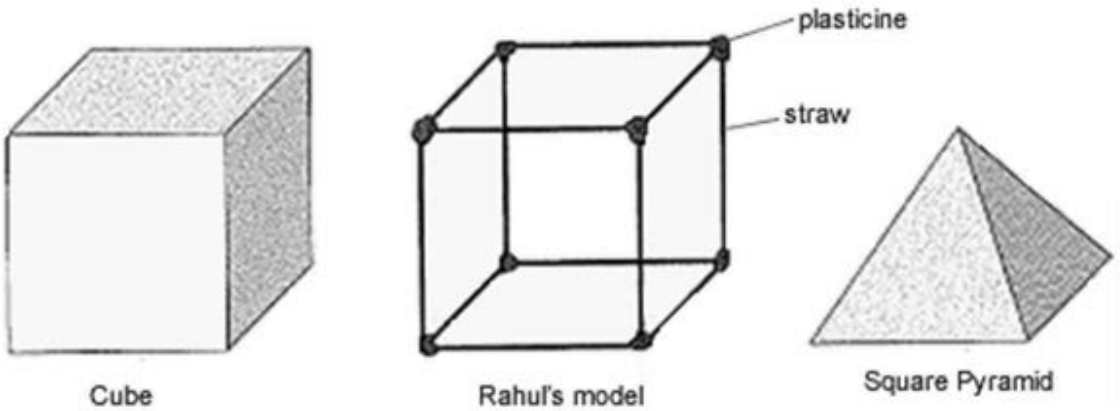
- Students need to recognise, name, build, draw, compare and sort two–dimensional shapes and three dimensional objects. Patterns blocks and 3D geometric solids are a valuable resource for students to manipulate and explore.
- In pairs, students take turns building and describing the selection and placement of 3D objects to their partner from behind a barrier. The partner recreates the construction by following the directions.
- Students explore the characteristics of prisms and pyramids. Make posters describing the characteristics of the shapes.

For further ideas for activities see *First Steps in Mathematics: Space:*

- Opening 3D objects p. 74
- Matching Nets p. 74
- Tracing p. 76
- Matching 2D with 3D p. 76

Question 1

Rahul made a model of the cube. He used twelve straws and plasticine.



How many straws would Rahul need to make a model of the square pyramid?

Shade one bubble.

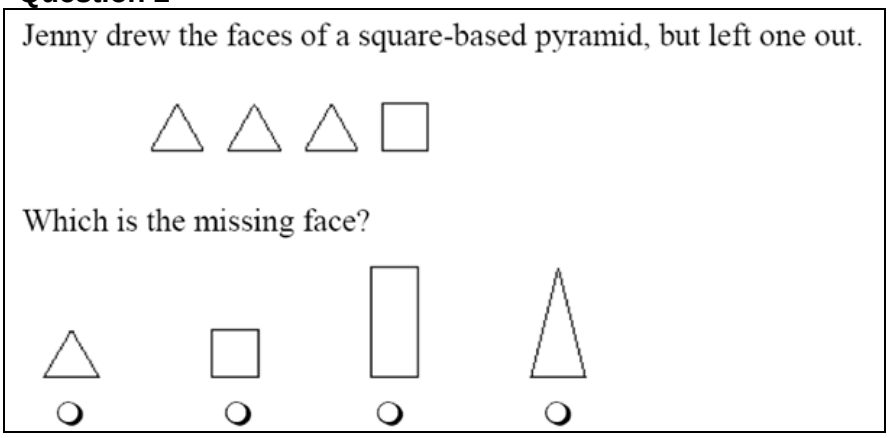
○ 6 ○ 8 ○ 10 ○ 12

Skill: Students visualise a skeleton of a square-based pyramid.
Answer key: B

Additional questions

1. How many faces does a cube have? What shape are they?
2. How many edges does a cube have?
3. Create a square pyramid using straws and plasticine.
4. How many faces does a square pyramid have? What shape are they?
5. How many edges does a square pyramid have?
6. Name an object that has eight vertices and twelve edges.

Question 2

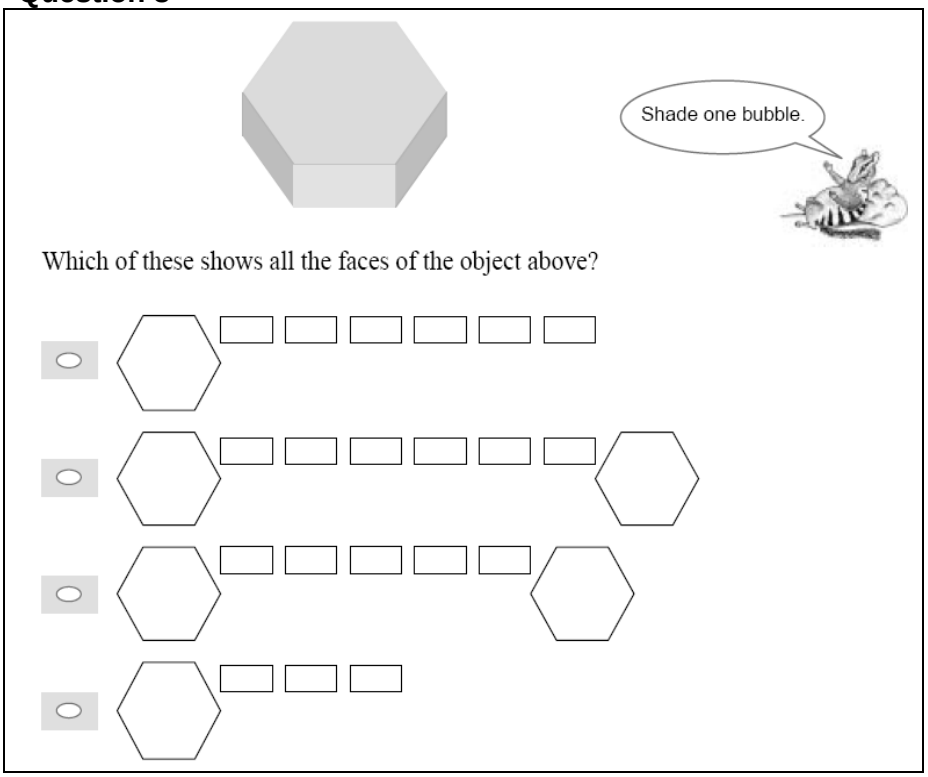


Skill: Students visualise the faces of a square-based pyramid.
Answer key: A

Additional questions

1. Ann said that she selected the last shape. Why is Ann is wrong?
2. Cut up some different shapes such as triangles, squares and rectangles. What object can you make with the shapes?
3. How many faces does your object have?
4. What would the net of your object look like?

Question 3

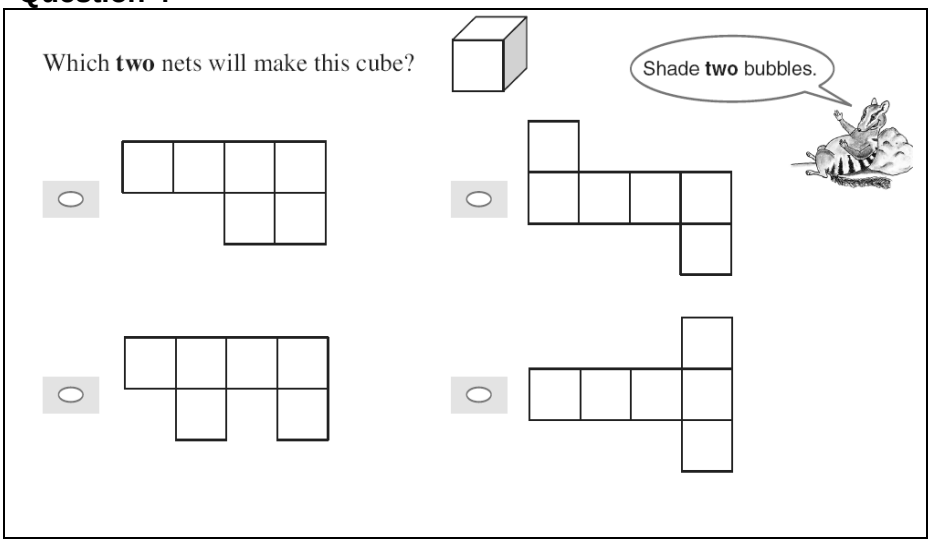


Skill: Students visualise the faces of a hexagonal prism.
Answer key: B

Additional questions

1. What shapes are missing from the incorrect choices?
2. How many edges does this object have?
3. Make the shape using straws or construction materials.
4. If the sides were squares would it still be a hexagonal prism?

Question 4



Skill: Students recognise a net of a cube.
Answer key: The two nets on the right.

Additional questions

1. Look at a cube. How many squares will the net of the cube have?
2. Ask students to cut out a copy of each net and fold them into cubes. Which nets did not work?
3. Draw a net for a cube that is different from the ones shown above.
4. How did you know your net would make a cube?
5. On a net of a cube, tick two faces that will be opposite to each other when the net is folded.

Curriculum references

Department of Education and Training Western Australia 2005, *First Steps in Mathematics: Space*:

- Chapter 4: Represent shape
  - Key understanding 1: When we copy and make figures and objects, we need to think about how the whole thing looks and about how the parts relate to each other and to the whole. p.58
  - Key understanding 2: The net of an object has to have the same component parts as the object and the parts have to be in the right relationship to each other. p.72

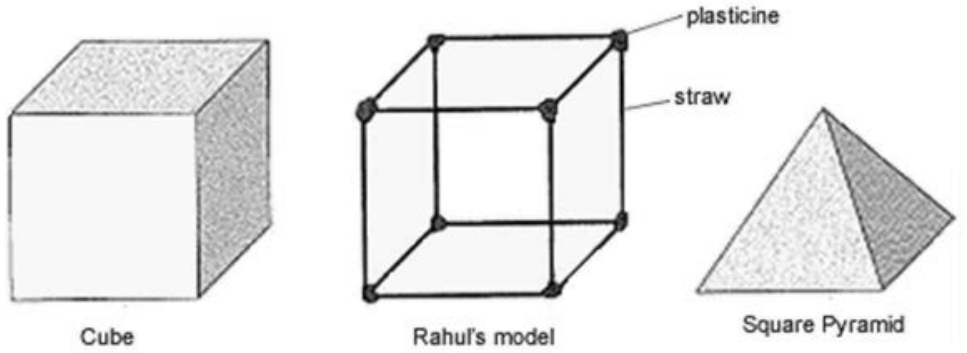
Student worksheet

Focus

Identifying 2D shapes within 3D objects

Question 1

Rahul made a model of the cube. He used twelve straws and plasticine.



How many straws would Rahul need to make a model of the square pyramid?

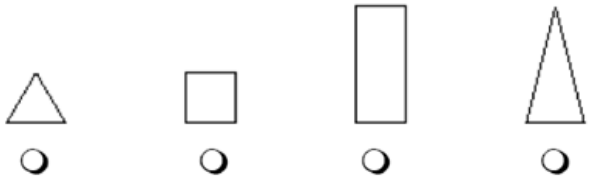
Shade one bubble.

○ 6 ○ 8 ○ 10 ○ 12

Question 2

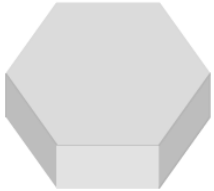
Jenny drew the faces of a square-based pyramid, but left one out.

Which is the missing face?



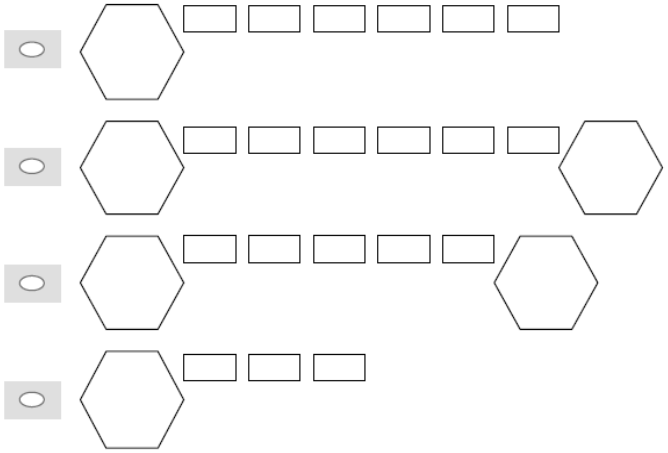
Revised October 2016

Question 3



Shade one bubble.

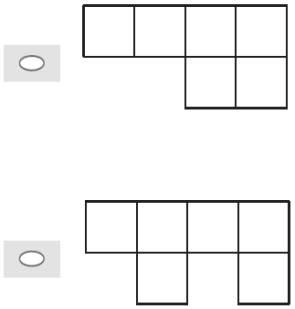
Which of these shows all the faces of the object above?

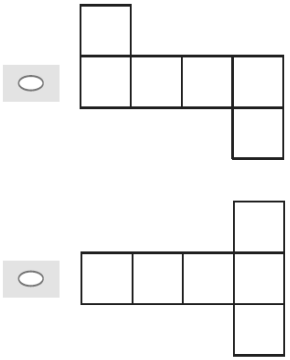


Question 4

Which **two** nets will make this cube?

Shade **two** bubbles.

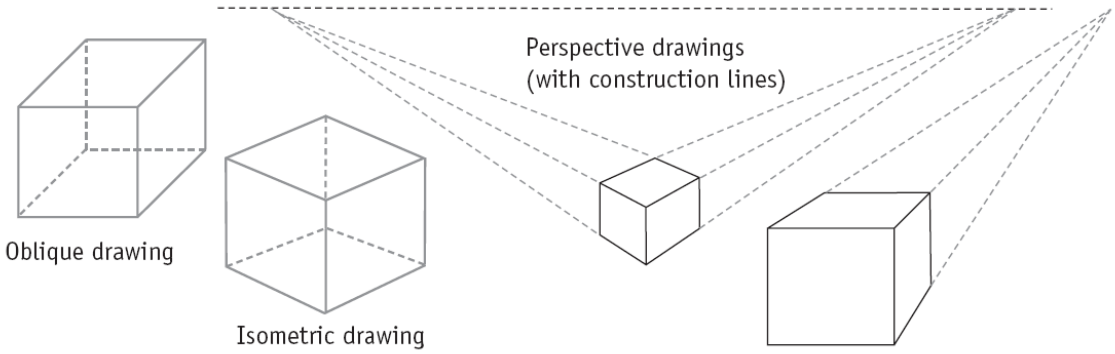




Visualising 3D objects given isometric drawings

Background information/teaching focus

When we draw any object we have the choice of drawing it 'flat' (2D) or as a 'solid' (3D) and our choice is determined by the purpose of the drawing. Perspective, oblique and isometric drawings are three common forms of representation which, to varying degrees, 'look like' 3D objects to us. Isometric drawings have an edge positioned towards the front of the drawing. The three faces are drawn with the length of all edges to scale and parallelism maintained. However, the shapes of these faces and the angles are not the same as on the object. For example, parallelograms are used to represent square and rectangle faces.



For further related information see *First Steps in Mathematics: Space:*

- Chapter 4: Represent shape
  - Background notes p.97

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Western Australian Curriculum

- Year 7 – Draw different views of prisms and solids formed from combinations of prisms (ACMMG161).

For more information visit the Western Australian Curriculum.

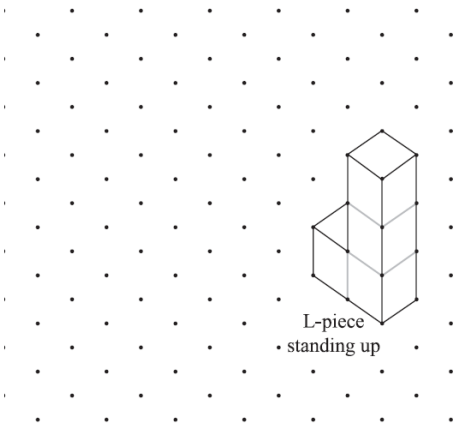
Learning activities

For further ideas for activities see *First Steps in Mathematics: Space:*

- Isometric drawings p. 90
- Soma cube p. 91
- Building complex structures p. 93
- Elevation plans p. 96

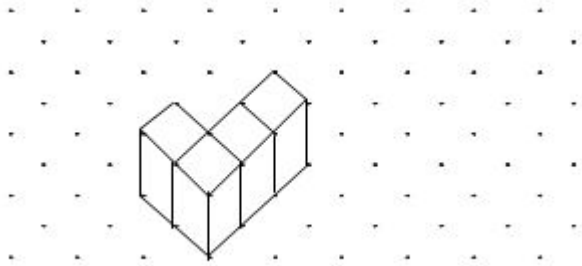
Question 1

On the grid provided, draw the L-piece in a ‘lying down’ position.



Skill: Given an isometric drawing of a 3D object, students draw the object in a different position.

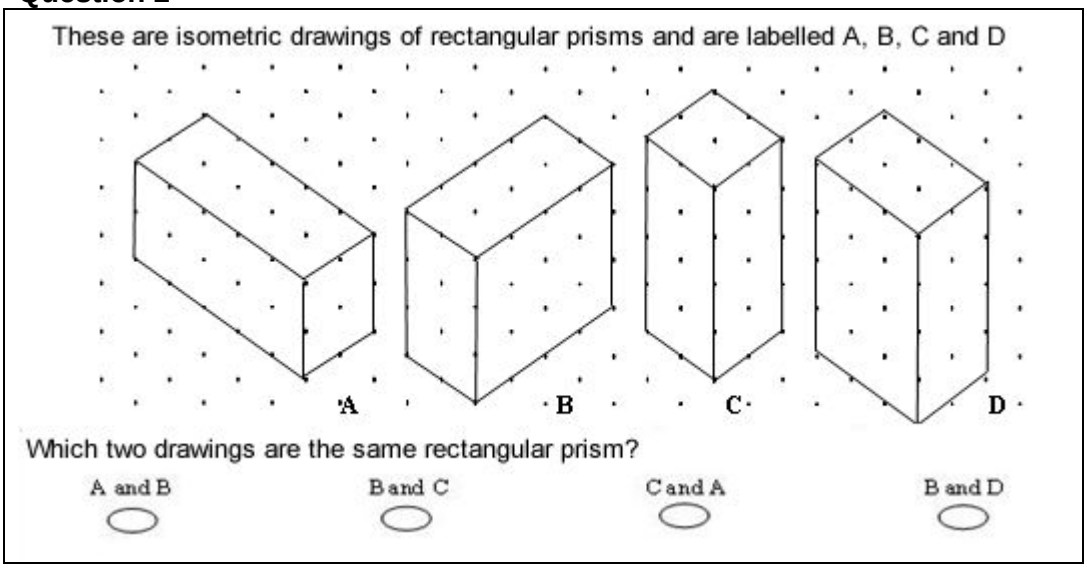
Answer key:



Additional questions

1. What would the shape in the new position look like from the top? How is this different from the view from the top of the original position?
2. Use four to six blocks and make an arrangement. Draw it isometrically. Change the position of the blocks to make a new arrangement.
3. Draw your new arrangement from the top, side and back views.

Question 2

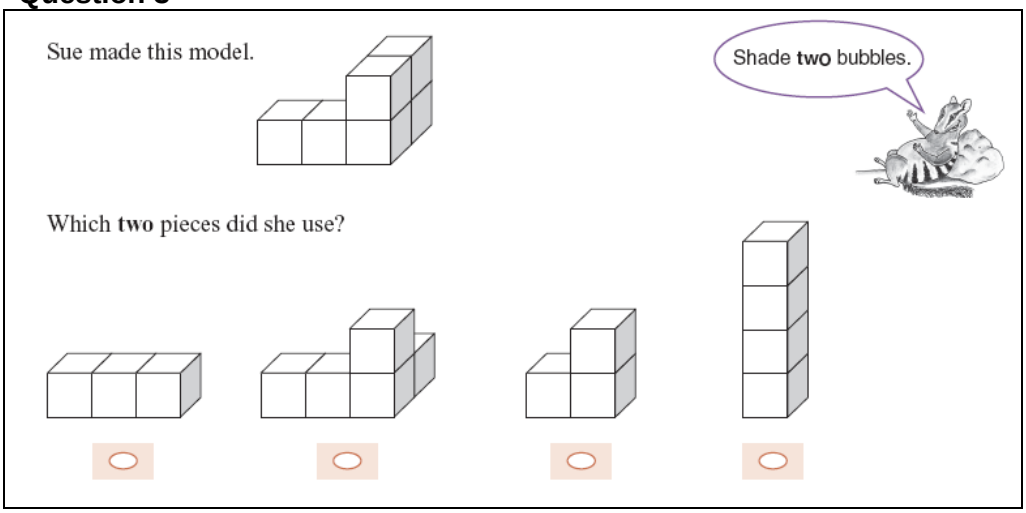


Skill: Recognising different views of the same 3D object from isometric drawings
Answer key: D

Additional questions

1. Which of the rectangular prisms is made with the most number of cubes?
2. Which of the rectangular prisms has a surface area of 40 square units?
3. Sam removed the top layer of Prism C and said, “Prism A is now the same as Prism C.” Is Sam correct? Explain your thinking.

Question 3



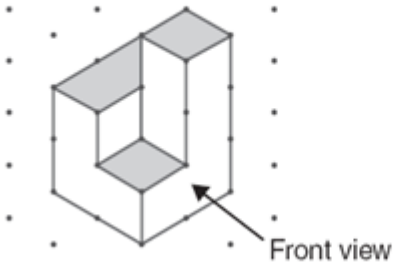
Skill: Students visualise the two pieces needed to make a model.
Answer key: A and C

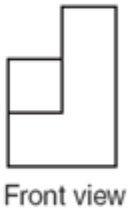
Additional questions

1. Explain how you worked out your answer.
2. How do you know that pieces B and C are not the pieces Sue used? Draw what the shape might look like if you combined these two pieces? (Note: There may be more than one answer depending on how the students combine the pieces.)
3. Have the students create each of the shapes from interlocking cubes using a different colour for each shape. Allow the students to manipulate the pieces to solve the problem. Ask: What did you have to do to the pieces to make them fit?
   Ask the students to use the pieces to make different models and have other students draw them.

Question 4

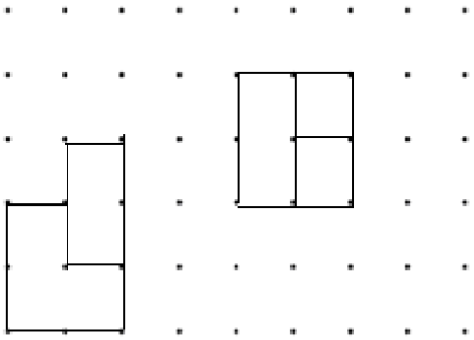
This 3D solid is made from 8 cubes glued together.
The front view is drawn.





On the grid below draw the left-side view and the top view of the object.

Skill: Students draw orthogonal views of a 3D object given its isometric drawing.
Answer key:



Additional questions

1. How many edges does this solid have?
2. If the volume of the solid is 8 cm^3, what is its surface area?
3. In what way is the right – side view different to the left – side view?

Curriculum reference

Department of Education and Training Western Australia 2005, *First Steps in Mathematics: Space*:

- Chapter 4: Represent shape
  - Key understanding 3: To understand drawings of objects we need to combine what we can actually see with what we think is there. Special drawing techniques emphasise different aspects of an object. p.84

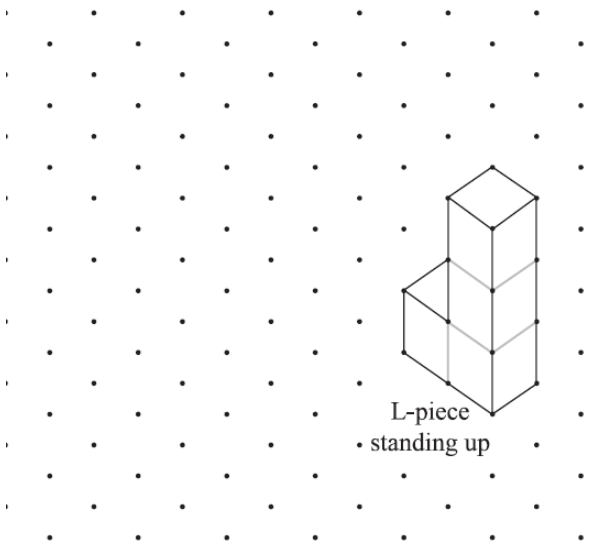
Student worksheet

Focus

Visualising 3D objects given isometric drawings

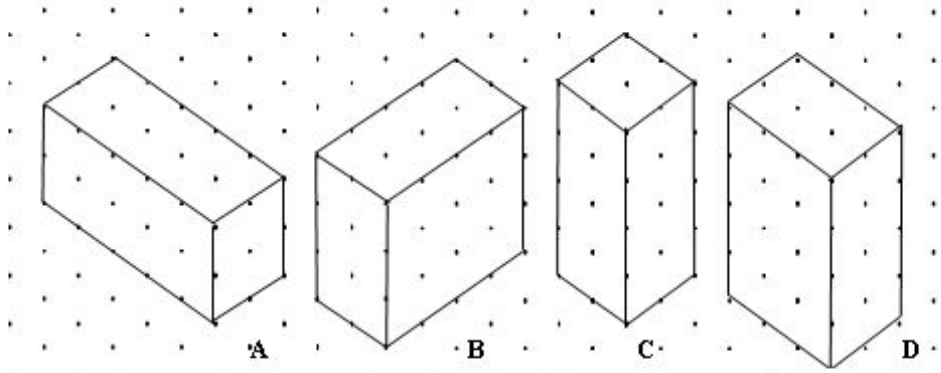
Question 1

On the grid provided, draw the L-piece in a 'lying down' position.



Question 2

These are isometric drawings of rectangular prisms and are labelled A, B, C and D

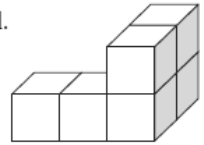


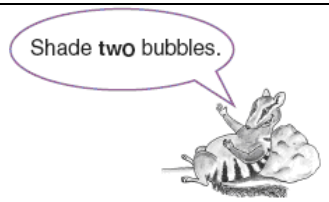
Which two drawings are the same rectangular prism?

A and B ◯ B and C ◯ C and A ◯ B and D ◯

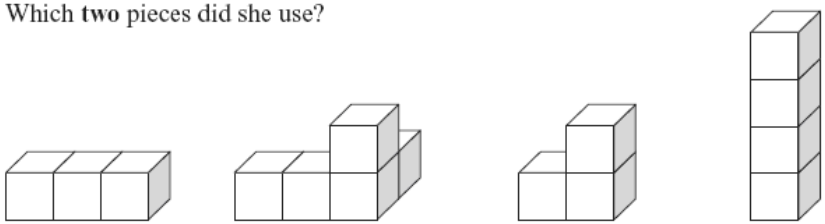
Question 3

Sue made this model.



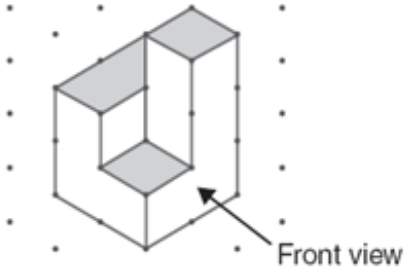


Which **two** pieces did she use?



Question 4

This 3D solid is made from 8 cubes glued together.
The front view is drawn.



On the grid below draw the left-side view and the top view of the object.

Identifying 3D objects with given properties

Background information/teaching focus

In order for students to learn to reason about shape and structure and hence to solve spatial problems they need to learn to 'notice' shape and think of it as something significant, and have appropriate vocabulary and notations for describing it. Noticing and describing spatial features interact with each other. Students need opportunities to analyse and describe the component parts that form a 3D object (shapes, size, and placement) and consider how the components fit and hold together.

Teachers need to build on these experiences by introducing the vocabulary and names of the 3D objects and their features. Students will gradually learn and use the mathematical names of classes of standard shapes as they manipulate and talk about the shapes, objects and their properties. Many of the names of 3D objects relate to 2D figures and discussion can help children see the connections and similarities.

For further related information see *First Steps in Mathematics: Space*:

- Chapter 6: Reason geometrically
  - Key understanding 3: There are special words, phrases and symbols that help us to think about and describe the shape and structure of things.
  - Key understanding 4: People have developed useful ways to classify shapes. Knowing that a shape is one of the standard types can tell us a lot about it.

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Western Australian Curriculum

- Year 6 – Construct simple prisms and pyramids (ACMMG140).

For more information visit the Western Australian Curriculum.

Learning activities

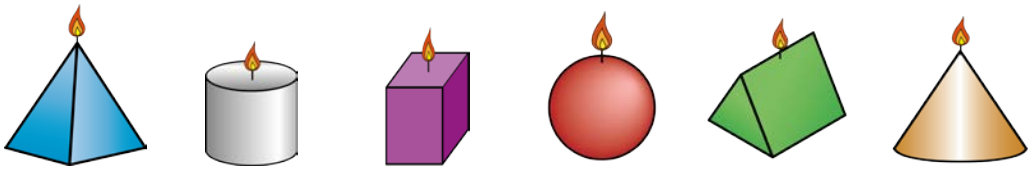
For further ideas for activities see *First Steps in Mathematics: Space:*

- Polyhedrons p. 66
- Trapezoids and triangles p. 167
- Guess my shape 1 p. 191
- Charts of words p. 191

Question 1

Which candle looks most like a sphere?

Shade one bubble.



Skill: Students recognise a sphere.
Answer key: D

Additional questions

1. Name the other objects that you can see.
2. Describe the geometric features of the triangular prism and the square prism.

Question 2

The net of a shape is made up of two circles the same size and a rectangle.

The shape of the net is a

- cone
- cylinder
- rectangular prism
- cube

Skill: Students recognise the net and the 2D shapes of a cylinder.
Answer key: B

Additional questions

1. Nelly drew a net of a triangular pyramid. What shapes did she draw?
2. How many vertices does a triangular pyramid have?
3. Name and draw a pyramid that has two more vertices than a triangular pyramid.

Question 3

Which 3D object has 5 faces and 9 edges?

- ⬭ rectangular prism
- ⬭ square-based pyramid
- ⬭ triangular pyramid
- ⬭ triangular prism

Skill: Students visualise familiar 3D objects.
Answer key: D

Additional questions

1. How many faces and edges does each of the listed objects have?
2. Which of the listed 3D objects has the most vertices?
3. Which of the listed 3D objects could have six square faces?

Question 4

Jeff has a 3D object.

Shade one bubble.

Which 3D object does he have?

cube	triangular prism	hexagonal prism	pentagonal pyramid
⬭	⬭	⬭	⬭

Skill: Students identify 3D objects with given properties.
Answer key: D

Additional question

1. Make a table of the names and quantities of the 2D shapes that would be found in the net of each of the listed objects?

Curriculum references

Department of Education and Training Western Australia 2005, *First Steps in Mathematics: Space*:

- Chapter 6: Reason geometrically
  - Key understanding 3: There are special words, phrases and symbols that help us to think about and describe the shape and structure of things. p.182
  - Key understanding 4: People have developed useful ways to classify shapes. Knowing that a shape is one of the standard types can tell us a lot about it. p.196

Student worksheet

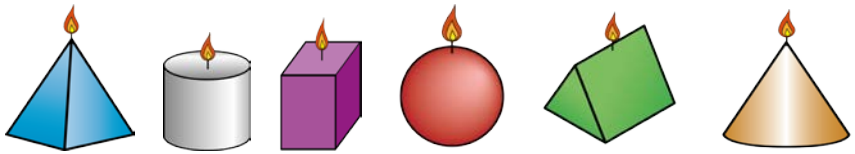
Focus

Identifying 3D objects with given properties

Question 1

Which candle looks most like a sphere?

Shade one bubble.



Question 3

The net of a shape is made up of two circles the same size and a rectangle.

The shape of the net is a

- cone
- cylinder
- rectangular prism
- cube

Question 3

The net of a shape is made up of two circles the same size and shape.
The shape of the net is a

- rectangular prism
- square-based pyramid
- triangular pyramid
- triangular prism

Question 4

Jeff has a 3D object.

Shade one bubble.

Which 3D object does he have?

cube	triangular prism	hexagonal prism	pentagonal pyramid

Revised October 2016

Identifying lines of symmetry in 2D shapes

Background information/teaching focus

There is a form of symmetry associated with each of the transformations. They are: translational (or slide) symmetry; reflectional (or mirror) symmetry; and rotational (or turn) symmetry. Each of the transformations maintains shape and size, and it is this property that makes symmetry possible.

All symmetrical things have congruent or identical units that can be matched in some way. We say that a figure or object is symmetrical if a transformation exists that moves its individual points or parts into a different position but leaves the whole thing looking the same. Improving students' capacity to visualise is important, both for its direct benefit and because of its helpfulness in learning further geometrical and other mathematical ideas.

For further related information see *First Steps in Mathematics: Space:*

- Chapter 5: Represent transformation
  - Key Understanding 4: Symmetrical things have component parts which can be matched by rotating, reflecting or translating. p.140

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Western Australian Curriculum

- Year 7 – Describe translations, reflections in an axis, and rotations of multiples of 90° on the Cartesian plane using coordinates. Identify line and rotational symmetries (ACMMG181).

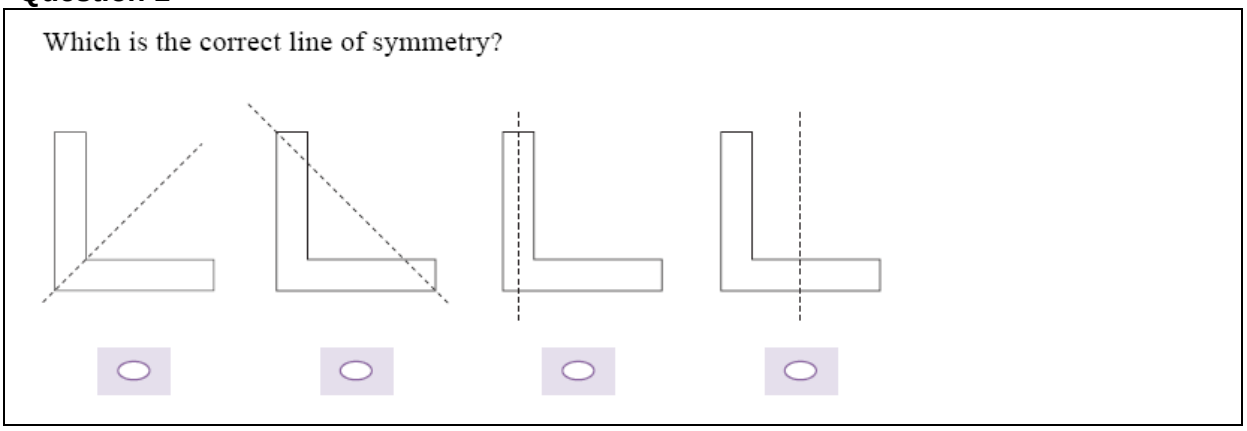
For more information visit the Western Australian Curriculum.

Learning activities

For further ideas for activities see *First Steps in Mathematics: Space:*

- Logos and crests p. 146
- Regular polygons p. 146
- Card designs p.147
- Rotational designs p. 147

Question 1

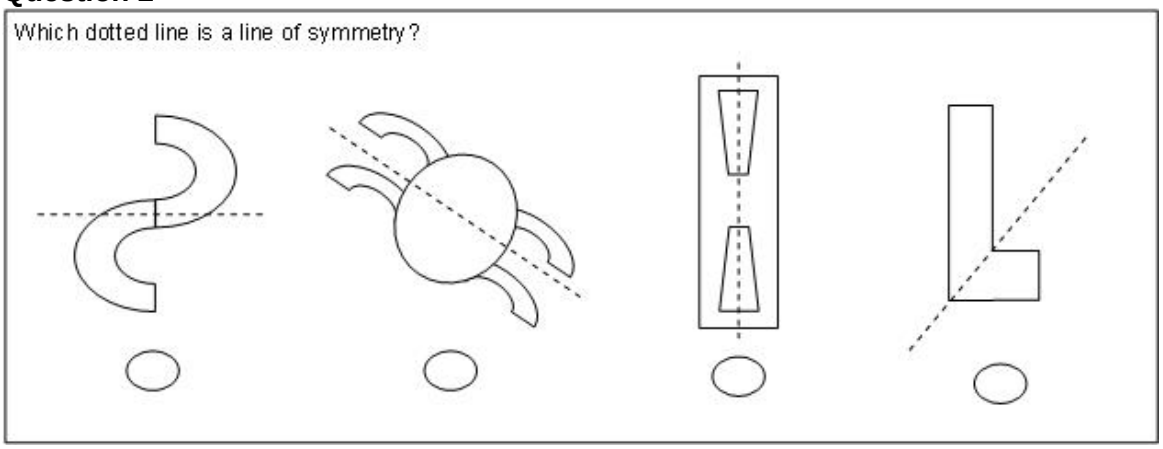


Skill: Students recognise a line of symmetry.
Answer key: A

Additional questions

1. Get students to use a mirror to check their answers.
2. For each of the incorrect responses, draw the reflection that would occur from the line shown.
3. Use copies of alphabet letters and mirrors for students to identify letters that are symmetrical.

Question 2



Skill: Students recognise a line of symmetry.
Answer key: C

Additional questions

1. Draw the line of symmetry on the second shape.
2. How could you change shape D so the line is showing symmetry?
3. Why is A incorrect?

Question 3

Karen reflected this shape.

It made a circle.

Which shape should she reflect to make a triangle?

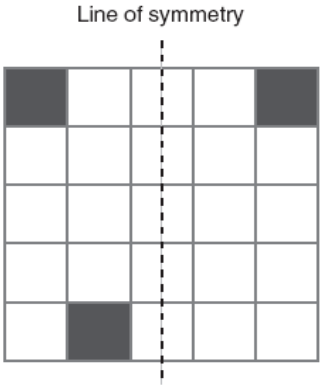
Skill: Students visualise reflection.
Answer key: B 

Additional questions

1. Name the shapes that the other three reflections would make.
2. Draw your own shape that, when reflected, would make a regular hexagon.
3. Draw your own shape that, when reflected, would make an irregular pentagon.

Question 4

Shade **two** squares on the grid to make the pattern symmetrical.



Skill: Students construct a symmetrical shape.

Additional questions

1. On another 5 x 5 grid, shade some squares to show a design that has two lines of symmetry.
2. Draw a triangle that has one line of symmetry.
3. Draw three different quadrilaterals – one quadrilateral that has no lines of symmetry, one quadrilateral that has one line of symmetry and one quadrilateral that has two lines of symmetry only.

Curriculum reference

Department of Education and Training Western Australia 2005, *First Steps in Mathematics: Space*:

- Chapter 5: Represent transformation
  - Key understanding 4: Symmetrical things have component parts which can be matched by rotating, reflecting or translating. p.140

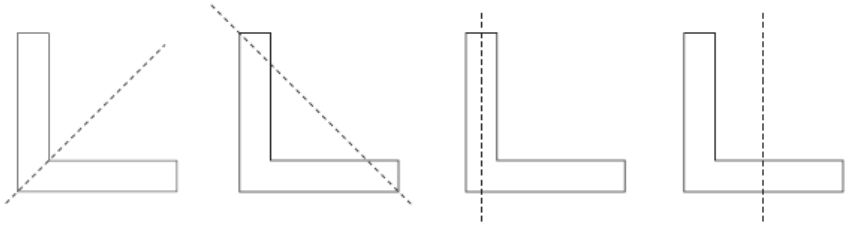
Student worksheet

Focus

Identifying lines of symmetry in 2D shapes

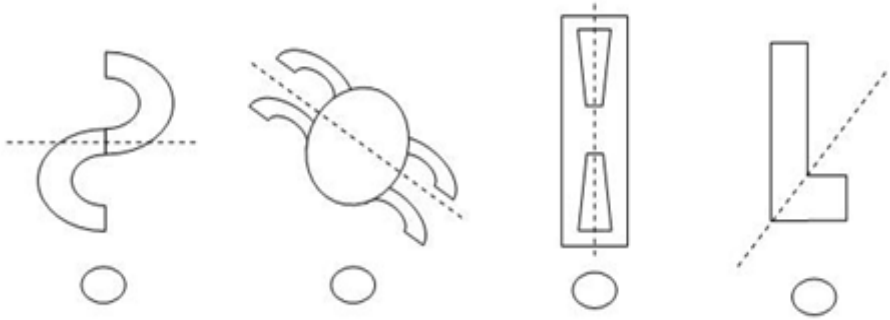
Question 1

Which is the correct line of symmetry?



Question 2

Which dotted line is a line of symmetry?



Question 3

Karen reflected this shape.

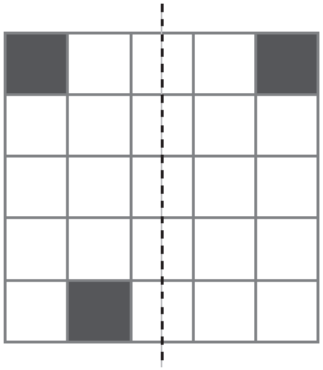
It made a circle.

Which shape should she reflect to make a triangle?

Question 4

Shade **two** squares on the grid to make the pattern symmetrical.

Line of symmetry



Revised October 2016

Using compass points, including NE, NW, SE, SW, and turns in angles in degrees

Background information/teaching focus

Students should develop the basic concepts underlying the mathematical representation of arrangement and location by exploring and describing the layout and position of things in their environment and paths and movements within it. Their work with maps should begin with those most familiar within their home communities and gradually expand to include those that are less familiar and more conventionally mathematical. They should use sketches of their locality or road maps to describe the position of local features, understand and use bearings to define direction and specify location by using simple coordinate grids and distances and directions. They should learn to relate direction and angle of turning to compass directions and use a magnetic compass to determine simple directions.

For further related information see *First Steps in Mathematics: Space:*

- Chapter 3: Represent location
  - Key understanding 2: Some maps or diagrams show the order of things and what comes between what. Others also represent distances and directions between things. p.26

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Western Australian Curriculum

- Year 5 – Use a grid reference system to describe locations. Describe routes using landmarks and directional language (ACMMG113).

For more information visit the Western Australian Curriculum.

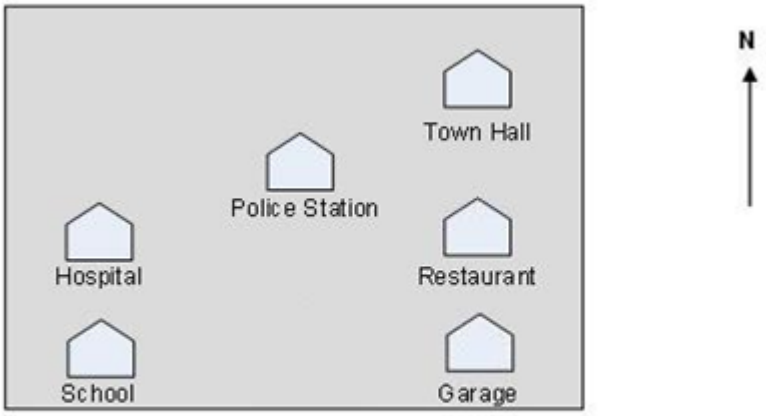
Learning activities

For further ideas for activities see *First Steps in Mathematics: Space:*

- Sorting maps p. 34
- Local maps p. 35
- Fun run p. 35
- Orienteering p. 35

Question 1

This map shows the position of some buildings in the town of Newton.



Which building is East of the Hospital and South of the Restaurant?

Police Station ○ Garage ○ School ○ Town hall ○

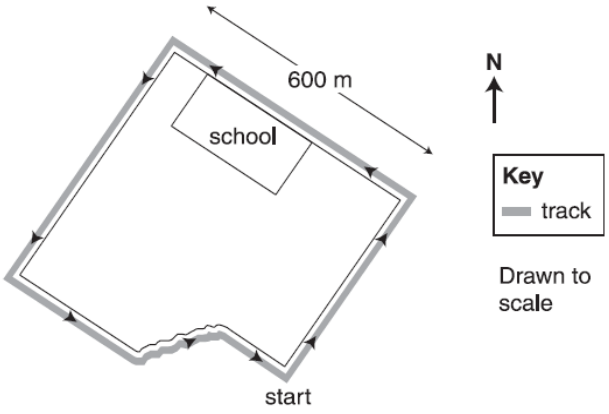
Skill: Students use compass points for directions.
Answer key: B

Additional questions

1. Using compass points, describe the location of the school in relation to the police station.
2. Describe the location of the town hall in relation to the restaurant and the school.
3. Describe the location of the garage in relation to the town hall and the hospital.

Question 2

Emma walked once around the track in the direction shown.



In which direction was she walking when she passed the school?

- ⬭ NE
- ⬭ NW
- ⬭ SW
- ⬭ N

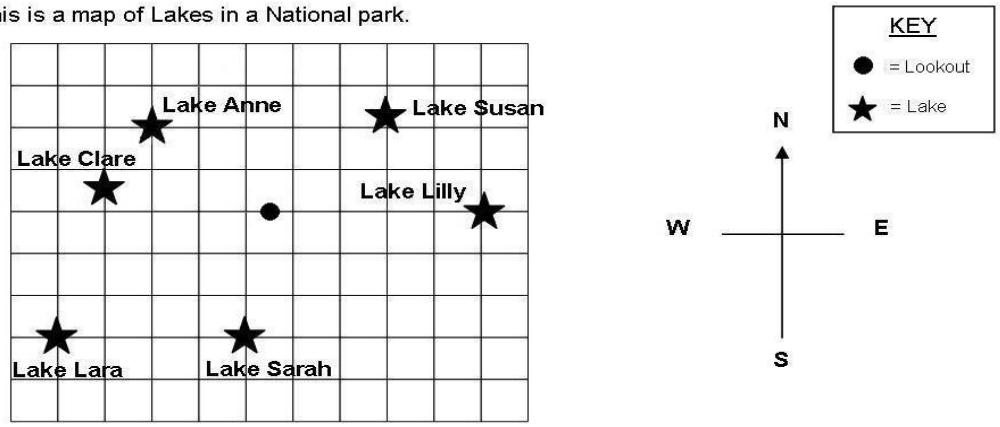
Skill: Students identify key directions.
Answer key: B

Additional questions

1. What direction was Emma facing when she turned the corner after passing the school?
2. As Emma walked around the track she was walking in six different directions.
3. List the directions in which she was walking, in order, from the start point.
4. Approximately how far did Emma walk? How did you work it out?

Question 3

This is a map of Lakes in a National park.



Gemma is at the Lookout facing South. She turns approximately 225° in a clockwise direction.

Which Lake is Gemma facing now?

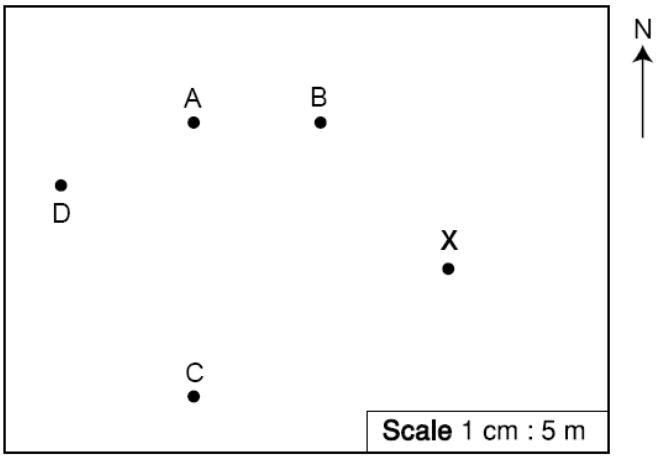
Lake Susan ◯ Lake Clare ◯ Lake Lara ◯ Lake Sarah ◯

Skill: Students apply knowledge of direction and rotation in a clockwise direction.
Answer key: A

Additional questions

1. Gemma is at Lake Susan facing the lookout. She turns 90º anticlockwise. Which lake is she now facing?
2. From question 1 above, in what direction was Gemma looking when she was looking at Lake Lilly?
3. Gemma is at the lookout looking north-west. Which lake is she facing now?
4. Approximately how many degrees should she turn to face Lake Lilly?/Lake Susan?

Question 4



Omar was at point **X** and facing North.
He turned 90º anti-clockwise and walked 10 m.
He then turned 45º clockwise and walked 15 m.

Which point was he then nearest to?

○ A ○ B ○ C ○ D

Skill: Students apply knowledge of key rotations and scale.
Answer key: A

Additional questions

1. Omar was at point **C** facing point **X**. Using compass points, in what direction should he walk to get to point **X**?
2. Omar walked 10 m east of point **D**. He turned 45º clockwise and walked 30 m. He then turned 135º anti-clockwise and walked 30 m. What point is west of his final position?
3. Write the directions for Omar's path in question 2 above, using compass points instead of angles and direction of rotations.

Curriculum references

Department of Education and Training Western Australia 2005, *First Steps in Mathematics: Space*:

- Chapter 3: Represent location
  - Key understanding 1: We describe where things are in relation to other things. There are special words, phrases and symbols that help us with this. p .12
  - Key understanding 2: Some maps or diagrams show the order of things and what comes between what. Others also represent distances and directions between things. p.26

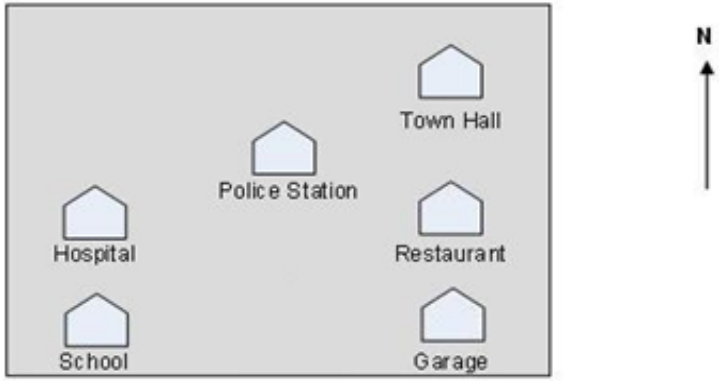
Student worksheet

Focus

Using compass points, including NE, NW, SE, SW, and turns in angles in degrees

Question 1

This map shows the position of some buildings in the town of Newton.

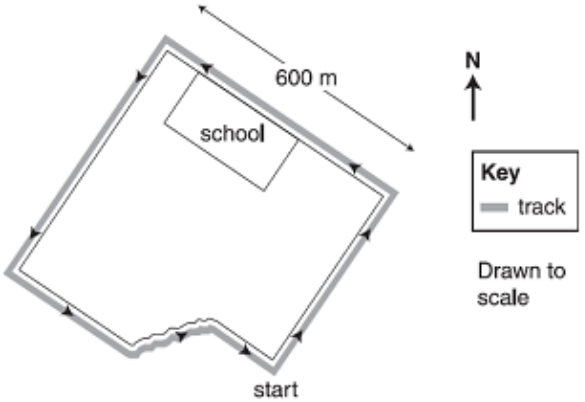


Which building is East of the Hospital and South of the Restaurant?

Police Station ○ Garage ○ School ○ Town hall ○

Question 2

Emma walked once around the track in the direction shown.

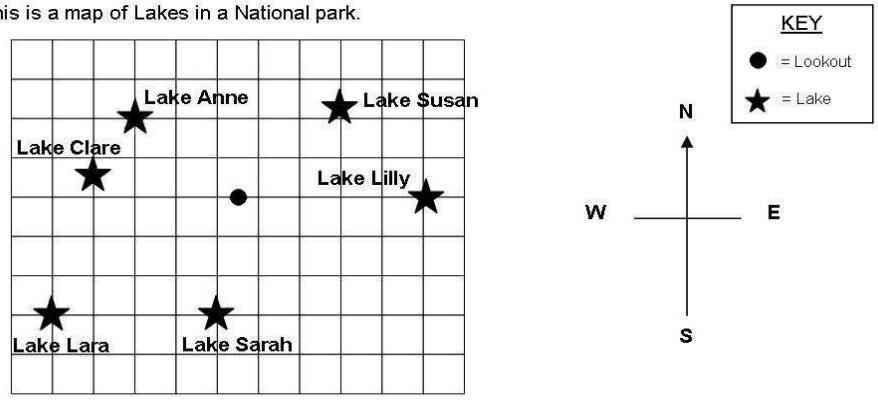


In which direction was she walking when she passed the school?

- ○ NE
- ○ NW
- ○ SW
- ○ N

Question 3

This is a map of Lakes in a National park.

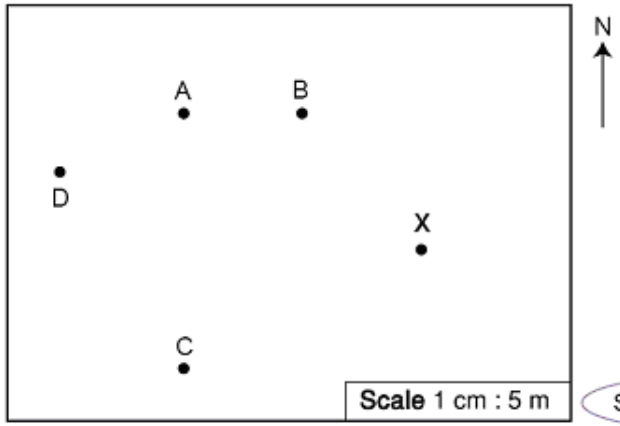


Gemma is at the Lookout facing South. She turns approximately 225° in a clockwise direction.

Which Lake is Gemma facing now?

- Lake Susan
- Lake Clare
- Lake Lara
- Lake Sarah

Question 4



Shade one bubble.

Omar was at point **X** and facing North.
He turned 90° anti-clockwise and walked 10 m.
He then turned 45° clockwise and walked 15 m.

Which point was he then nearest to?

- A
- B
- C
- D

Revised October 2016

Following directions on maps and plans with reference to key features, distance and orientation

Background information/teaching focus

Some maps or diagrams show the order of things and what comes between what, others also represent distances and directions between things. Students need to be taught and exposed to the wide variety of map types. The common feature of all maps is that they represent the order of objects within the environment that is they should be enable you to tell whether you can get you from one place to another, whether you have to go through another place on the way, which places come first or second, and what routes are possible.

Some maps do not indicate direction or distance. Examples include the network diagrams of rail and subway systems and air routes. These schematic network diagrams do not enable you to tell how far it is from one place or another or in what 'true' direction you are going.

Students need to develop the basic concepts underlying the mathematical representation of arrangement and location by exploring and describing the layout and position of things in their environment and paths and movements within it. While it is important for students to develop the ability to produce accurate scale maps, making this the sole focus of mapping activities may lead students to the conclusion that maps and diagrams are always drawn to scale, when this is clearly not the case.

Students need to use the language associated with directions and movement (clockwise, forward) and develop their use of technical spatial terms, symbols and methods of representation (angle, NWW, grids and coordinates). Many students initially think of direction in relation to their own bodies and therefore find directions like 'turn left', 'turn right' easier than the fixed external references such as ' turn east' or 'head towards the coast'. Grids and coordinates provide the major mathematical contribution to representing location and direction, the essential idea being that we can use numbers (usually pairs of numbers) to describe where something is.

For further related information see *First Steps in Mathematics: Space*:

- Chapter 3: Represent location
  - Key understanding 1: We describe where things are in relation to other things. There are special words, phrases and symbols that help us with this. p.12
  - Key understanding 2: Some maps or diagrams show the order of things and what comes between what. Others also represent distances and directions between things. p.26
  - Did you know? p.53

Rigby Harcourt Education, Australia

Western Australian Curriculum

- Year 5 – Use a grid reference system to describe locations. Describe routes using landmarks and directional language (ACMMG113).

For more information visit the Western Australian Curriculum.

Learning experiences and activities
It is important to take into account cultural differences, experiences and location finding strengths of all students and to build upon them. For further information see *First Steps in Mathematics: Space:* Did you know?

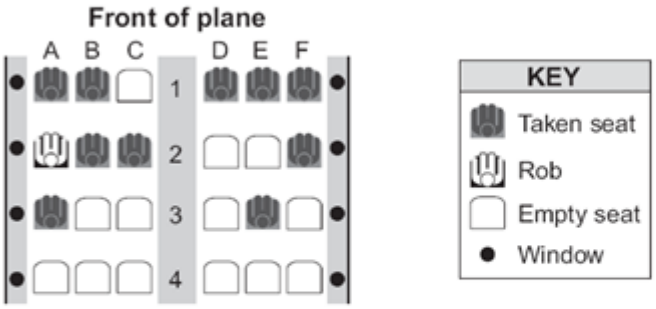
For further ideas for activities see *First Steps in Mathematics: Space:*

- Where in the world? p.21
- Holiday map p. 21
- Mud map p. 21
- Car rally navigator p. 21

Question 1

Here is a seating plan for part of an aeroplane.
Rob is sitting in window seat number 2A.

Shade one bubble.



Peta wants to sit in a window seat as close as possible to the front of the plane.

Which empty seat should Peta choose?

1C 2E 3F 4A

Skill: Students interpret a set of instructions in a familiar context.
Answer key: C

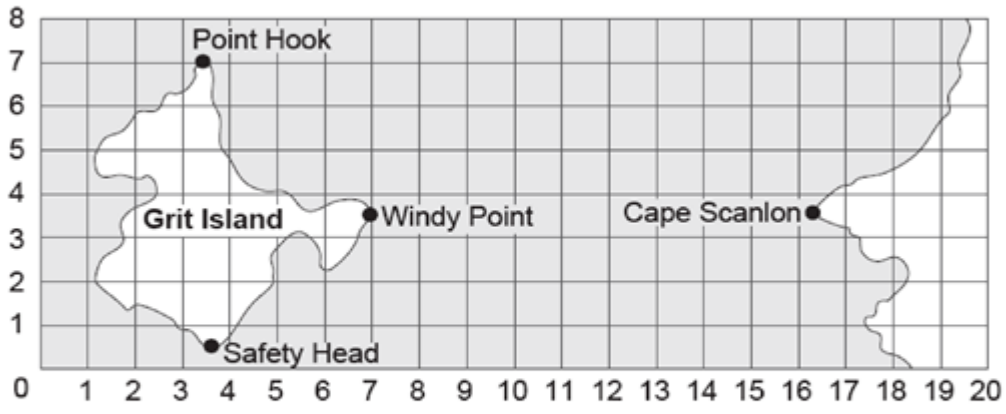
Additional questions

1. What are the grid coordinates of the empty seat on the first row?
2. Jane has a window seat on the same row where Rob is sitting.
   What seat does Jane have?
3. Someone decides to sit three seats to the right and one seat back from Rob's seat.
   What are the grid coordinates of this seat?

Question 2

Here is a map of Grit Island.

The shortest distance from Point Hook to Safety Head is 1300 m.



The shortest distance from Windy Point to Cape Scanlon is closest to

950 m ○ 1700 m ○ 1900 m ○ 2250 m ○

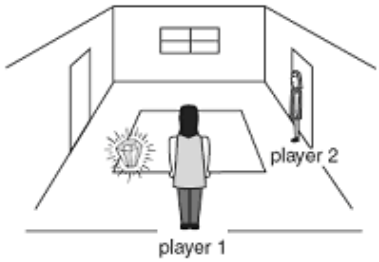
Skill: Students read and apply knowledge of a scale.
Answer key: C

Additional questions

1. What are the coordinates of Safety Head?
2. If the distance between Point Hook and Safety Head was 650 metres, what would be the distance between Windy Point and Cape Scanlon?
3. The distance from Point Hook to Safety Head is 1300 metres.
   What could the scale of the map be?
4. Use the map above to estimate the distance between Windy Point and Safety Head.

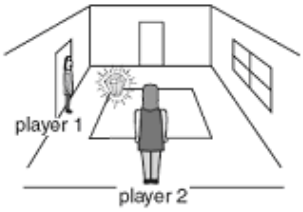
Question 3

In a computer game, two players have just entered a room.
This is the view from behind player 1.

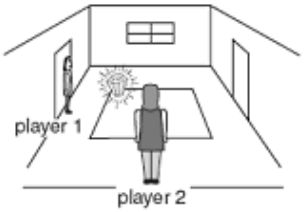


Which of the following shows the view from behind player 2?

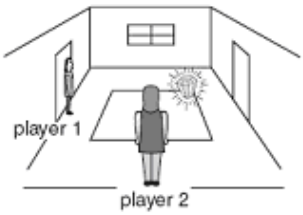
A



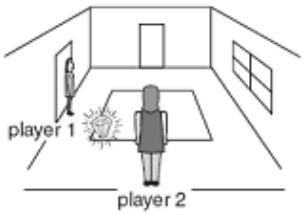
B



C



D



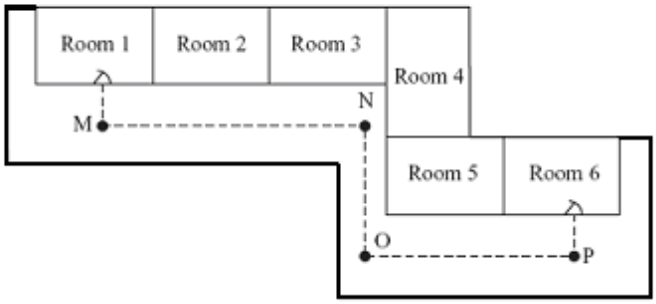
Skill: Students visualise positions of objects on a plan.
Answer key: A

Additional questions

1. Alex said that option *D* is not correct. How could he know?
2. For each of the options, list the features that make it correct or incorrect.
3. Imagine Player 3 standing opposite Player 1 and in front of the window. Make a drawing of the view from behind Player 3.

Question 4

This is a plan of a block of classrooms at a school.



A student walks out of Room 1 and follows the dotted path into Room 6 as shown.
The students turns at each of the four points M, N, O and P.
L means 'turn left' and R means 'turn right'.

Which instruction should the student follow?
A) L, R, L, L
B) L, R, L, R
C) R, R, L, R
D) R, L, R, R

The scale of the map is 1 cm represents 4 m.
What is the **actual** length of the path **from** point M to point P in metres?

_____ **m**

Skill: Students visualise following a set of instructions on a plan.
Answer key: A; 32 m

Additional Questions

1. A student walks out of Room 6 and follows the dotted line into Room 1.
   Write the instructions that the student needs to follow.
2. If the scale of the map was 1 cm represents 5 m, what would the area of Room 4 be?
3. The dark line on the diagram shows the fence of the school. Use the scale of the map to estimate the actual length of the fence.

Curriculum references

Department of Education and Training Western Australia 2005, *First Steps in Mathematics: Space:*

- Chapter 3: Represent location
  - Key understanding 1: We describe where things are in relation to other things. There are special words, phrases and symbols that help us with this. p.12
  - Key understanding 2: Some maps or diagrams show the order of things and what comes between what. Others also represent distances and directions between things. p.26

Student worksheet

Focus

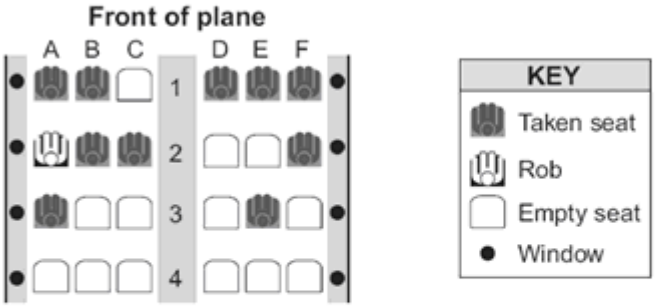
Following directions on maps and plans with reference to key features, distance and orientation

Question 1

Here is a seating plan for part of an aeroplane.

Rob is sitting in window seat number 2A.

Shade one bubble.



Peta wants to sit in a window seat as close as possible to the front of the plane.

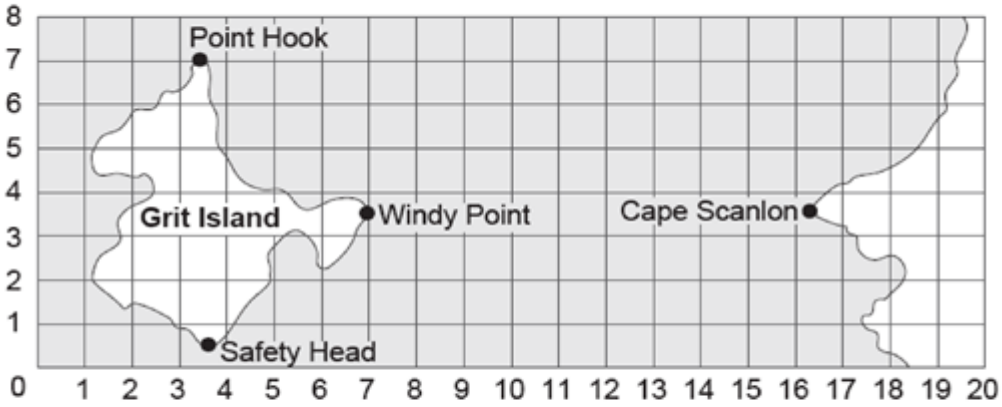
Which empty seat should Peta choose?

1C 2E 3F 4A

Question 2

Here is a map of Grit Island.

The shortest distance from Point Hook to Safety Head is 1300 m.



The shortest distance from Windy Point to Cape Scanlon is closest to

950 m 1700 m 1900 m 2250 m

Revised October 2016

Question 3

In a computer game, two players have just entered a room.
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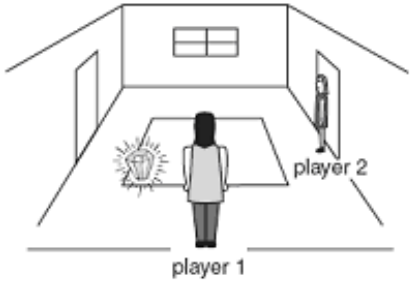
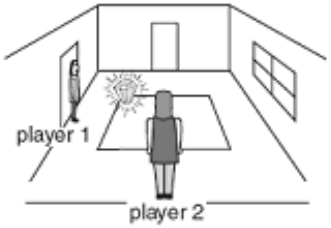
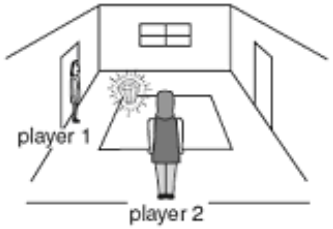


Which of the following shows the view from behind player 2?

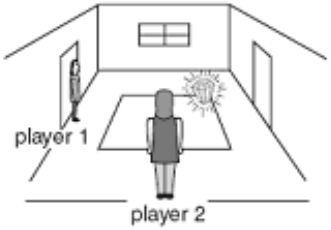
A



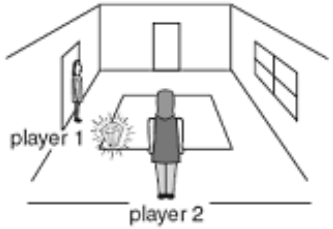
B



C



D



Question 4

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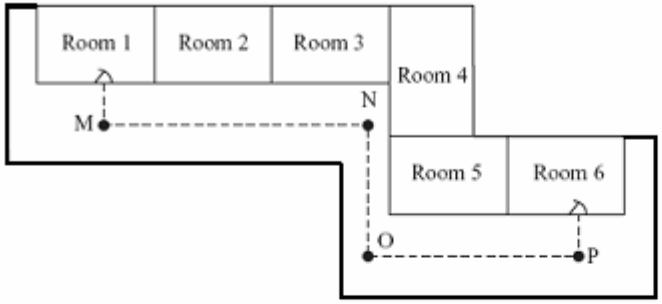

A student walks out of Room 1 and follows the dotted path into Room 6 as shown.
The students turns at each of the four points M, N, O and P.
L means 'turn left' and R means 'turn right'.

Which instruction should the student follow?

A) L, R, L, L
B) L, R, L, R
C) R, R, L, R
D) R, L, R, R

The scale of the map is 1 cm represents 4 m.
What is the **actual** length of the path **from** point M to point P in metres?

_____ **m**

Revised October 2016

Calculating distances using scale on a map or diagram

Background information/teaching focus

Scale maps use a scale to represent the distance and direction between objects. This scale may be measured precisely or estimated. The positions of objects on the map or plan replicate their position in real life. On plans, the objects themselves are also drawn to the same scale. Scale maps, however, are normally of much larger areas, so a smaller scale is needed to represent the distances between objects. For this reason, the objects themselves cannot be drawn to the same scale and may be represented using a different scale, or by symbols, eg the roads in street directories.

Scale maps:

- Key features within certain boundaries are represented (mainly with symbols).
- Distances between objects are drawn to scale.
- Positions of objects are a bird's eye view.

Plans:

- Key features within certain boundaries are drawn to scale.
- Distances between objects are drawn to scale.
- Positions of objects are a bird's eye view, showing orientation.

For further related information see *First Steps in Mathematics: Space:*

- Chapter 3: Represent Location
  - Background notes p.53

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Western Australian Curriculum

- Year 4 – Use simple scales, legends and directions to interpret information contained in basic maps (ACMMG090).
- Year 5 – Use a grid reference system to describe locations. Describe routes using landmarks and directional language (ACMMG113)

For more information visit the Western Australian Curriculum.

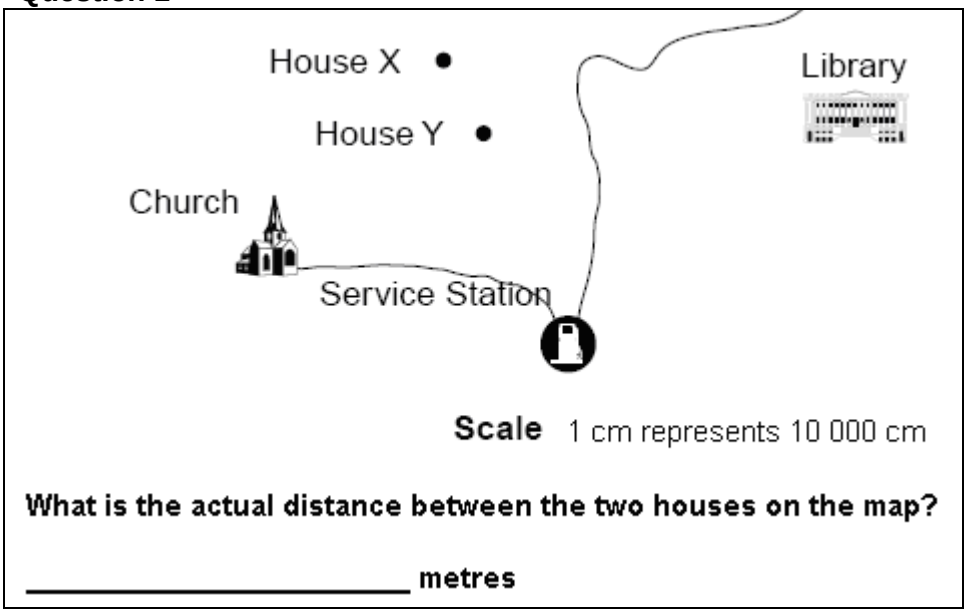
Learning experiences and activities

Students need to move from describing routes and distances in a narrative form, to representing and interpreting a bird's eye view, using scale and then onto grid coordinates, bearings and scale. The successful use of scale is also dependent upon students' understanding of multiplicative comparisons and computational skills.

For ideas for activities see *First Steps in Mathematics: Space*:

- Mud maps p. 34
- Fun run p. 35
- Scale p. 35
- Orienteering p. 35

Question 1

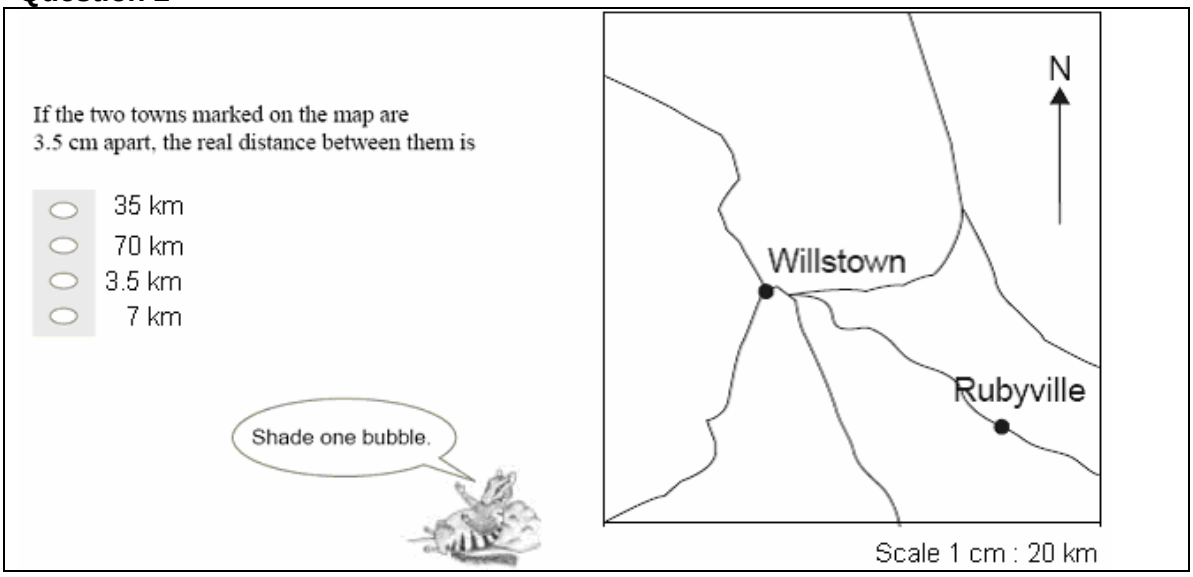


Skill: Students estimate actual distance using a simple numerical scale.
Answer key: 100 m

Additional questions

1. What distance does 1 cm distance on the map represent? How do you know?
2. Use the scale to find the distance between the Church and the Service Station.
3. Peter's place is in a north-east direction from the Service Station. The distance between his place and the Station is 200 metres. Put a cross on the map to show the position of Peter's place.

Question 2



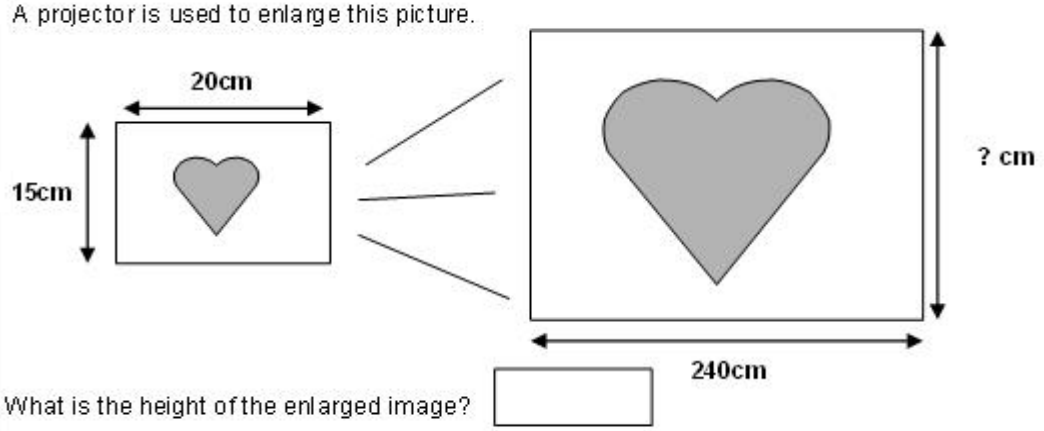
Skill: Students use a numerical scale with different units to calculate distance.
Answer key: B

Additional questions

1. How did you work out the real distance? How did the scale help you?
2. The distance between two places is 10 km. What will be the distance between them on the map above?
3. The distance between two places is 10 km. Jane is drawing a map using a scale 1 cm: 5 km. On her map, what would the distance between the two places be? How do you know?

Question 3

A projector is used to enlarge this picture.



What is the height of the enlarged image? ☐

Which of these scales make the same enlargement?

- ☐ 1 cm : 12 cm
- ☐ 2 cm : 24 cm
- ☐ 5 mm : 6 cm
- ☐ 5 cm : 65 cm
- ☐ 10 cm : 120 cm

Skill: Students identify and use a numerical scale in a familiar context.

Answer key: 180 cm

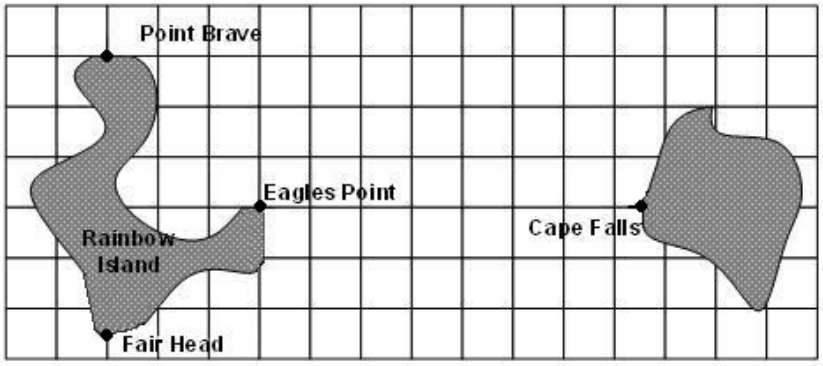
These scales will make the same enlargement:
1cm: 12 cm
2 cm: 24 cm
10 cm: 120 cm

Additional questions

1. On the diagram above, when enlarged, a distance of 20 cm corresponds to a distance of 240 cm. What is the scale? How do you know?
2. Which of these does **not** represent the scale in the diagram? How do you know?
   a) 1 cm represents 12 cm
   b) 10 cm represent 120 cm
   c) 15 cm represent 180 cm
   d) 30 cm represent 300 cm
3. Which of these represent the same scale as the diagram above? Check your prediction.
   a) 1 cm : 20 m
   b) 1 cm : 20 000 cm
   c) 1 mm : 20 000 mm
   d) 1 mm : 2000 mm

Question 4

Here is a map of Rainbow Island.
The shortest distance between Point Brave and Fair Head is 1100m.



The shortest distance between Eagles Point and Cape Falls is closest to

950m ○ 1250m ○ 1500m ○ 2500m ○

Skill: Students identify and use a numerical scale.
Answer key: C

Additional questions

1. What distance would one unit on the grid represent? How do you know?
2. A scale **1:10** means that **1 unit on a map represents 10 units** real distance. Cathy made a map of her house. She used a scale **1 cm represents 1 m**. Which one of these shows the same scale?
   a) 1 : 1
   b) 1 : 10
   c) 1 : 100
   d) 1 : 1000
   e) 1 : 10 000
3. Which of these shows a scale **1 cm represents 200 m**?
   a) 1 : 20
   b) 1 : 200
   c) 1 : 2000
   d) 1 : 20 000

Curriculum references

Department of Education and Training Western Australia 2005, *First Steps in Mathematics: Space*:

- Chapter 3: Represent location
  - Key understanding 1: We describe where things are in relation to other things. There are special words, phrases and symbols that help us with this. p.12
  - Key understanding 2: Some maps or diagrams show the order of things and what comes between what. Others also represent distances and directions between things. p.26

Department of Education and Training Western Australia 2005, *First Steps in Mathematics: Measurement* (book 2):

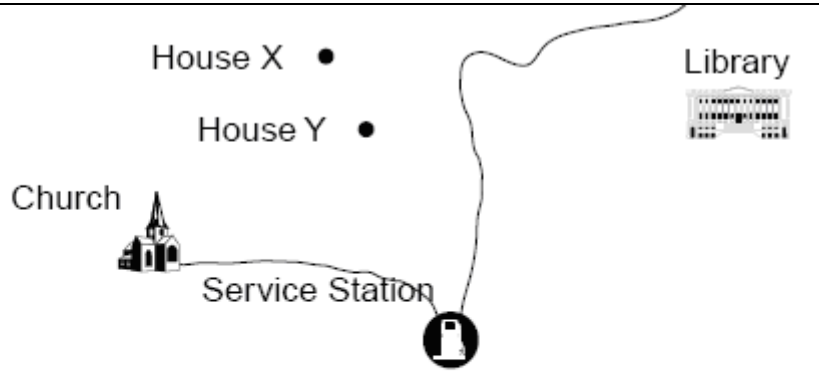
- Chapter 3: Indirect measure
  - Key understanding 3: Scale drawings and models have the same shape as the original object. This can be useful for comparing and calculating dimensions and for making judgements about position. p.44

Student worksheet

Focus

Calculating distances using scale on a map or diagram

Question 1



Scale 1 cm represents 10 000 cm

What is the actual distance between the two houses on the map?

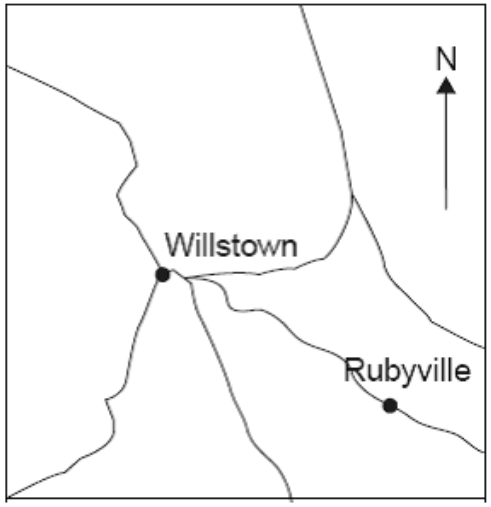
_____ **metres**

Question 2

If the two towns marked on the map are 3.5 cm apart, the real distance between them is

- ○ 35 km
- ○ 70 km
- ○ 3.5 km
- ○ 7 km

Shade one bubble.



Scale 1 cm : 20 km

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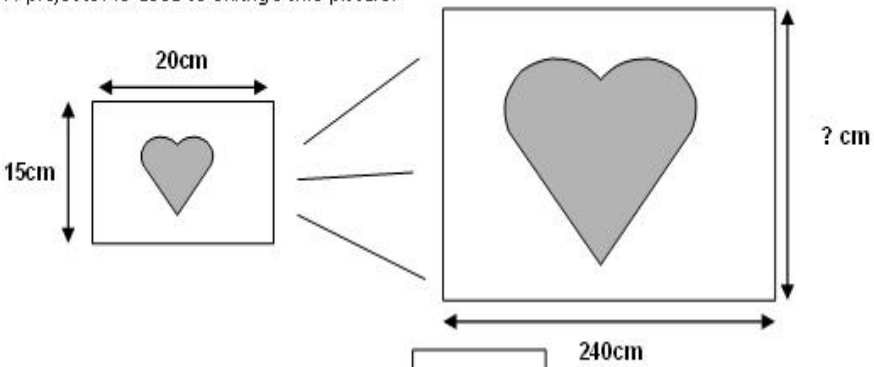
Question 3

A projector is used to enlarge this picture.



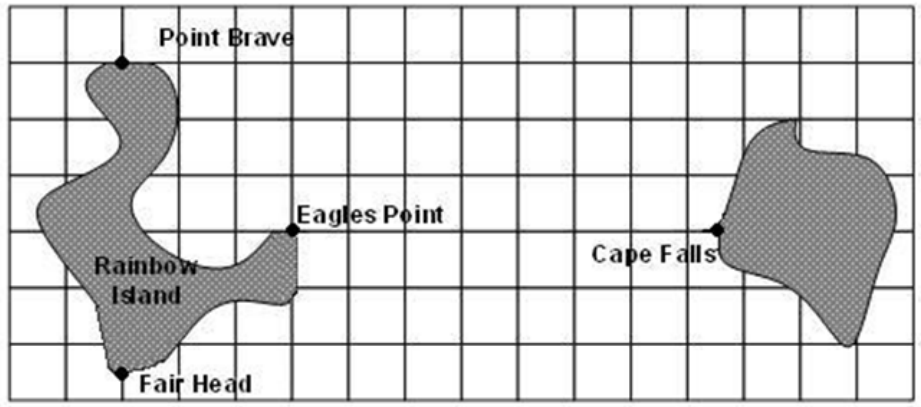
What is the height of the enlarged image? ☐

Which of these scales make the same enlargement?

- ☐ 1 cm : 12 cm
- ☐ 2 cm : 24 cm
- ☐ 5 mm : 6 cm
- ☐ 5 cm : 65 cm
- ☐ 10 cm : 120 cm

Question 4

Here is a map of Rainbow Island.
The shortest distance between Point Brave and Fair Head is 1100m.



The shortest distance between Eagles Point and Cape Falls is closest to

- ○ 950m
- ○ 1250m
- ○ 1500m
- ○ 2500m