A Complete Guide to ...

Geometry

Utilising the objectives as written in

MATHEMATICS in the New Zealand CURRICULUM

for

Level 3

This resource contains:

- ☑ Table of contents
- ☑ Teaching notes
- ☑ In class activity sheets involving
  - ▫ worked examples
  - ▫ basic skills
  - ▫ word problems
  - ▫ problem solving
  - ▫ group work
- ☑ Homework / Assessment activity sheets
- ☑ Answers

These resources are supplied as PHOTOCOPY MASTERS

Author: A. W. Stark

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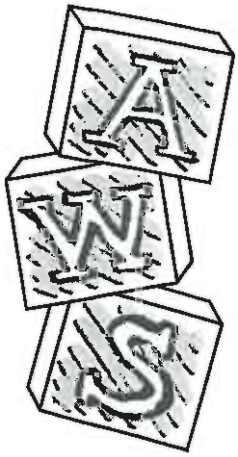

Note from the author:

This resource ...

*A Complete Guide to Geometry

is one of a series of **FIVE** resources written utilising the objectives as stated in

Mathematics in the New Zealand Curriculum for Level 3.

With my experiences as a specialist mathematics teacher, I enjoyed mathematics as a subject, but I am aware that not all teachers feel the same way about mathematics. It can be a difficult subject to teach, especially if you are unsure of the content or curriculum and if resources are limited.

This series of resources has been written with you in mind. I am sure you will find this resource easy to use and of benefit to you and your class.

Resources in this series:

A Complete Guide to Number

written utilising the objectives as stated in

Mathematics in the New Zealand Curriculum for Level 3.

Resource Code: **L3MN**

A Complete Guide to Measurement

written utilising the objectives as stated in

Mathematics in the New Zealand Curriculum for Level 3.

Resource Code: **L3MM**

*A Complete Guide to Geometry

written utilising the objectives as stated in

Mathematics in the New Zealand Curriculum for Level 3.

Resource Code: **L3MG**

A Complete Guide to Algebra

written utilising the objectives as stated in

Mathematics in the New Zealand Curriculum for Level 3.

Resource Code: **L3MA**

A Complete Guide to Statistics

written utilising the objectives as stated in

Mathematics in the New Zealand Curriculum for Level 3.

Resource Code: **L3MS**

For more information about these and other resources, please contact ...

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Acknowledgement:

I would like to thank the staff and pupils of **Mairehau Primary School, Christchurch** for their assistance in making these resources possible.

This resource has been divided into EIGHT sections as listed below.

Although there are no page numbers, the sections follow in sequential order as listed.

Note: **'In-class' Worksheets Masters** are lesson by lesson reuseable worksheets that can be photocopied or copied on to an OHP.

Homework / Assessment Worksheets Masters can be used as homework to reinforce work covered in class or they can be used for pupil assessment.

Section	
1	List of Geometry Objectives: Table of 'In-class' Worksheets / Objectives covered
2	Table of Contents: 'In-class' Worksheets
3	'In-class' Worksheets Masters
4	Teaching Notes / Answers for 'In-class' Worksheets
5	Table of Contents: Homework / Assessment Worksheets
6	Homework / Assessment Worksheets Masters
7	Answers for Homework / Assessment Worksheets
8	Worksheet tracking sheets for teachers to record pupil names / worksheets covered

'In-class' Geometry Worksheets

Table of Worksheet Number / Objectives Covered

See the opposite page for details of each objective.

	Geometry Objectives								Mathematical Processes Objectives									
Worksheet Number	G 1	G 2	G 3	G 4	G 5	G 6	G 7	G 8	MP 1	MP 2	MP 3	MP 6	MP 8	MP 9	MP 14	MP 15	MP 16	MP 18
1	Revision													✖		✖		
2	✖												✖	✖		✖		
3	✖												✖			✖		
4	✖													✖		✖		
5	✖		✖										✖			✖		
6		✖										✖		✖		✖		
7			✖									✖				✖		
8				✖								✖		✖		✖		
9					✖							✖		✖		✖	✖	
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16								✖						✖				

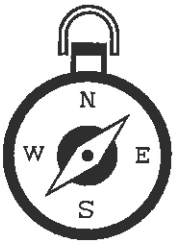
Table of Contents for the 'In-class' Worksheet Masters for Geometry, Level 3

Geometry words involving directions:

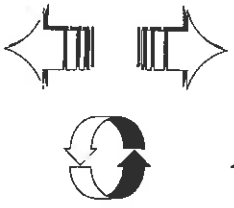
Being able to follow directions or instructions is an important skill, not only just in mathematics. Many words can be used to describe a 'direction'.

Example:

Do you understand the meaning of these words that have something to do with 'directions'?



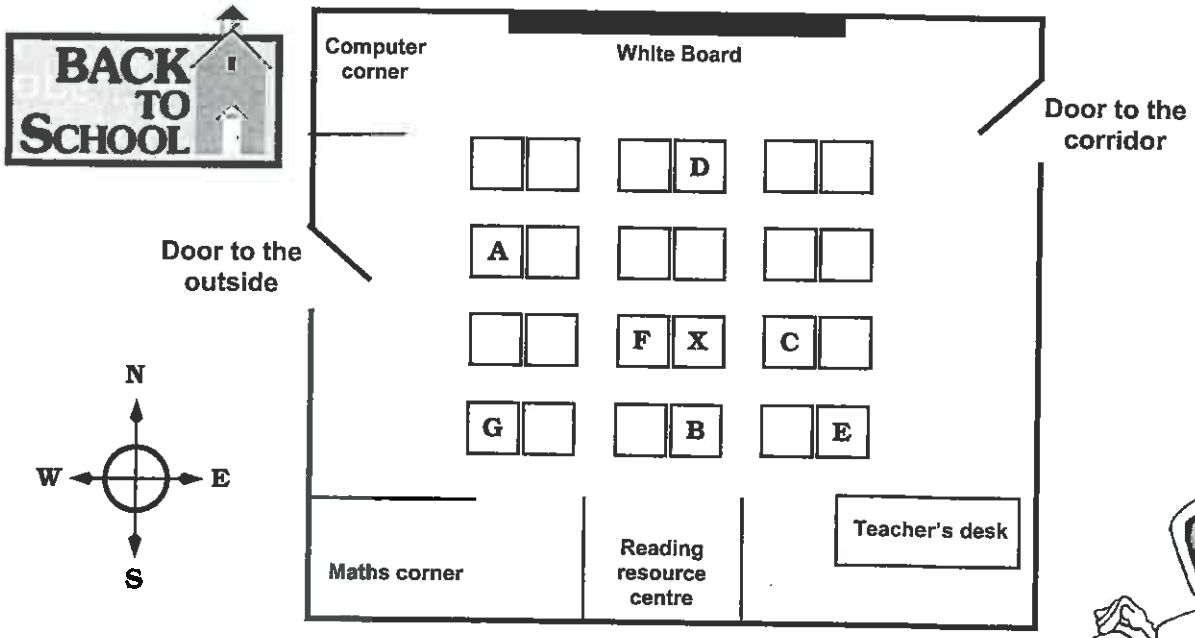
- left & right
- clockwise & anticlockwise
- north & south, east & west
- $\frac{1}{4}$ turn, $\frac{1}{2}$ turn & $\frac{3}{4}$ turn

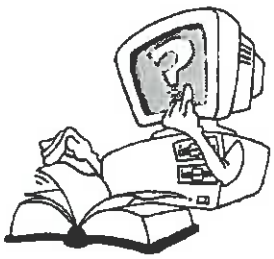


Discuss each one of these words above concerning 'directions', giving examples to show that you understand the meaning of each word.

Task 1

Below is a diagram of Shane's classroom. The desk he sits at is marked with an **X**.





Use the diagram above to answer these questions.

Shane is facing the whiteboard which is in the direction of north.

1. Which desk is directly south of Shane's desk?
2. If he does a $\frac{1}{4}$ turn anticlockwise, give the letter of the desk he would be looking at.
3. If Shane walks up to the whiteboard, does he turn east or west to face the door to the corridor?
4. Shane has been playing outside and comes back into the classroom, through the door to the outside. Using 'direction' words, describe how he would get to the maths corner. Give **two** answers.

Task 2

Draw a simple diagram of your classroom showing the position of your desk. As you sit at your desk ...

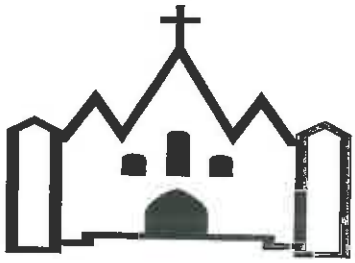
1. ... on your left is ... and on your right is ... (*give the name of a person or object*).
2. ... you do a $\frac{1}{2}$ turn clockwise, you are facing ... (*give the name of a person or object*).
3. ... you do a $\frac{1}{4}$ turn anticlockwise, you are facing ... (*give the name of a person or object*).
4. ... you do a $\frac{1}{4}$ turn clockwise, you are facing ... (*give the name of a person or object*).

Please **DO NOT** write on the sheets

Parallel and Perpendicular:

If your teacher asked your class to form three parallel lines of six pupils, would you know what she / he meant?

If the teacher said, *"Draw two lines that are perpendicular to each other"*, what would you draw?



Question:

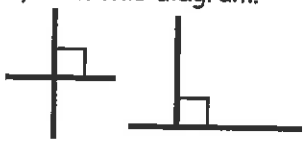
In the diagram opposite, there are examples of **parallel** and **perpendicular** lines.

Can you find them?

Parallel lines are the same distance apart. We draw **arrows** on lines that are parallel.

Perpendicular lines cross each other at **right angles,** or meet each other forming a **right angle.** The symbol for a right angle is a small square drawn where the lines cross or meet, as in this diagram.

An **angle** is a measure of turn. A **right angle** is quarter of a complete turn.



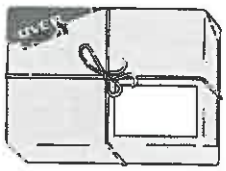
Task 3

Write two headings in your book, '**things that are parallel**' and '**things that are perpendicular**'.

Look at each diagram and **write** 'things' you see that could go under each of the headings above.

1. 

2. 

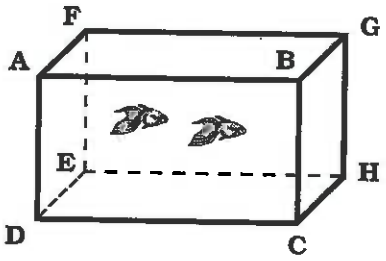
3. 

4. 

5. Look around your classroom, then add **five** more items to each of the lists.
Example: the sides of the door are parallel.

Faces, Edges and Vertices:

Consider this 3D diagram.



A **face** is a flat surface. On this diagram, ABCD is one of the faces on this diagram.

How many other faces are there on this diagram?

An **edge** is a line where two faces meet. On this diagram, line AD is one edge.

How many other edges are there on this diagram?

A **vertex** is a corner where the edges meet. The plural form of vertex is **vertices**. On this diagram, A, B, C and D are vertices. How many other vertices are there on this diagram?

Task 4

How many **faces**, **edges** and **vertices** do these 3D diagrams have, including the ones you cannot see?

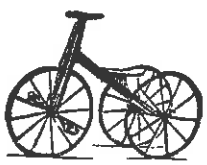
1. 

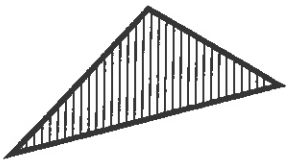
2. 

3. 

4. 

Naming 2-dimensional (2D) shapes:





What does a **tricycle** and a **triangle** have in common?

Answer: The tricycle has **three** wheels and the triangle has **three** sides and **three** angles.

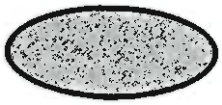
The number of sides a 2D shape has, can often be worked out by the name the 2D shape has been given.

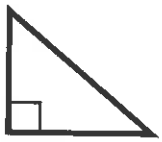
Polygons are 2D shapes with three or more straight sides.

Task 5

Name each of the 2D shapes drawn below, using the names in the box.

1. 

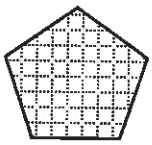
2. 

3. 

4. 

5. 

6. 

7. 

8. 

9. 

10. 

11. 

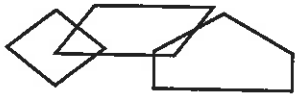
12. 

hexagon, triangle, ellipse (oval), decagon, heptagon, circle, octagon, rectangle, parallelogram, nonagon, pentagon, square

13. Look around your classroom and make a list of 10 objects that are made based on any of the 2D shapes above. *Example: 'my desktop is a rectangle'.*
14. **Draw** a picture using some of these 2D shapes above. *Example:* A picture of a house.

Describing and drawing 2-dimensional (2D) shapes:

Geometry words, such as parallel, perpendicular, right-angled and vertex (corner) can be used to describe 2D shapes.



Example:

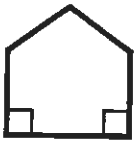
This shape has no parallel sides, but it does have one right-angle between two sides that are perpendicular. It has three sides and three vertices. What is it called? Can you draw the shape?

Answer: a right-angled triangle 

Task 6

Describe using geometry words, each of these 2D shapes drawn below.

1. 

2. 

3. 

4. 

5. **Write** a description for three different 2D shapes. Exchange your descriptions with a classmate and see if you can **name** and then **draw** the 2D shapes that each of you have described.

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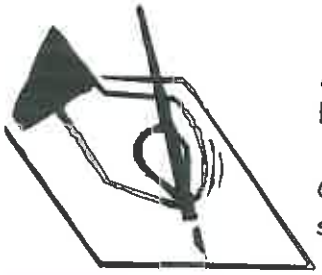
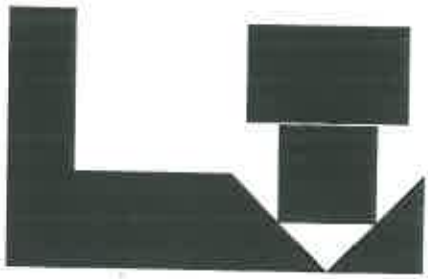
Drawing diagrams involving 2D shapes:

Diana likes drawing, using all of these 2D shapes below ...



Example: One of her diagrams is drawn here.

Can you work out how she placed the 2D shapes to create it?



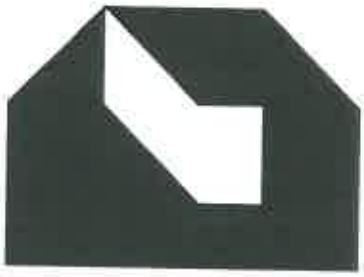
Task 7

Study each diagram below and see if you can **recreate** it, using all of the 2D shapes above. Then **draw** each diagram, showing how the 2D shapes were used to create them.

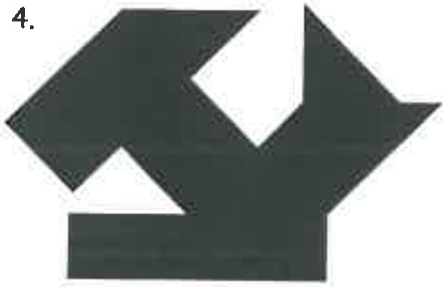
1.

2.

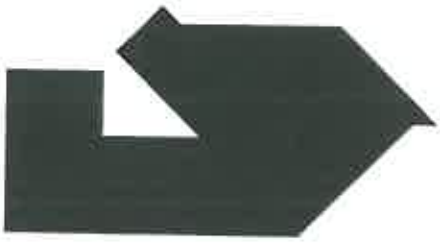
3.



4.



5.



6.

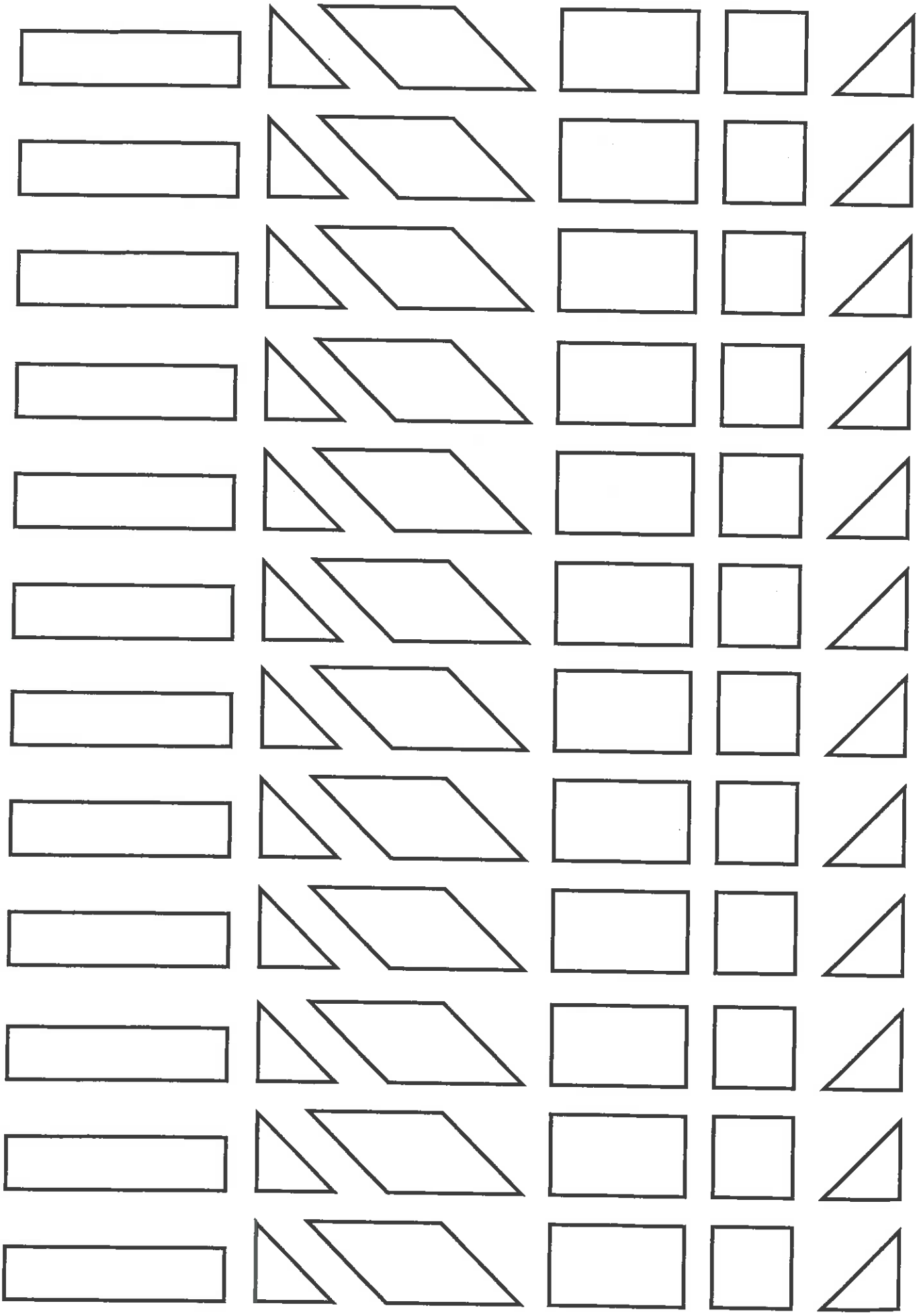
7. Use all shapes to create a square.

Task 8

Using all of the cardboard cut-out 2D shapes, **create** 5 new diagrams of your own. Trace around your diagram, then remove your shapes.

Exchange your diagrams with a classmate to see if they can work out how you placed the 2D shapes to create your diagram. You work out their diagrams.

Photocopy master for the shapes required for Geometry Worksheet 4, Task 7 / 8:
Pupils to cut out shapes. Could glue on cardboard first.



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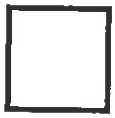
Naming 3-dimensional (3D) shapes:

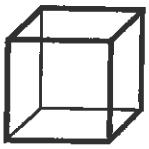
The 3D shapes are based on the 2D shapes.

Example:

A 3D **cube** is based on a 2D **square.**

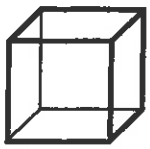


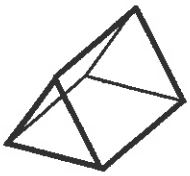
From the 2D square, we can create a 3D cube.

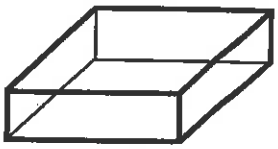


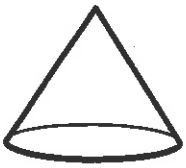
Task 9

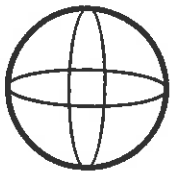
Name each of the 3D shapes drawn below, using the names in the box.

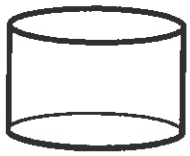
1. 

2. 

3. 

4. 

5. 

6. 

cylinder
cube
cone
cuboid (rectangular box)
sphere
triangular prism

7. Drawing 3D shapes can be difficult. **Draw** each of the shapes above.

Name which 3D shape is illustrated by these food items.

8. 

9. 

10. 

11. 

Describing 3-dimensional (3D) shapes:

You are on the telephone to a friend. Using geometry words, such as face, edge, vertex, parallel, perpendicular and right-angled, describe a 3D container. Can you guess the name of the 3D shape?

Example:

This shape has three faces, one is curved. It has two edges, but no sharp vertices. The top and bottom of this container are both circles and are perpendicular to its sides. What shape is this container?

Answer: A cylinder.

Task 10

1. This 3D shape has 6 **faces**, all the same **size**. It has 12 edges and eight vertices. The top and bottom **faces**, and opposite faces are parallel to each other. The top and bottom faces are perpendicular to the sides. What 3D shape am I describing?
2. Draw the 3D shape that is described in question 1 above.
3. Using the language of geometry as above, **describe** this 3D container.

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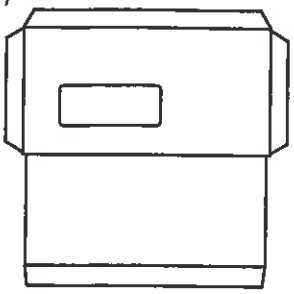
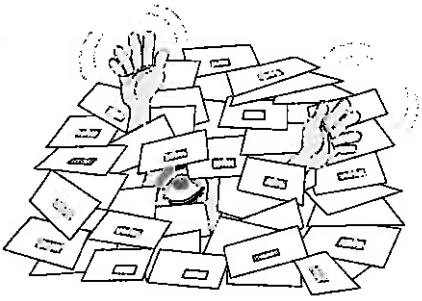
Understanding and using 'Nets':

A self-sealing envelope, with a window, has been unfolded and laid out flat.
Example:



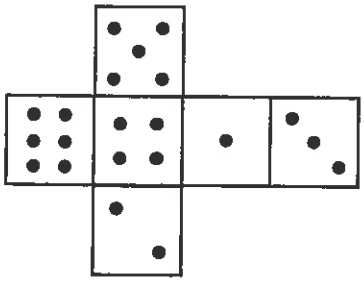
This diagram of the unfolded envelope is called a **net**. The small strips on the sides are the flaps needed to hold the envelope together.

There are many other sized envelopes. All will have their own net diagram.



Task 11

Karen is going to make a six sided die (dice). She drew the following net, without showing the flaps needed to hold it together. Note that opposite sides of the die must add up to 7.



1. **Draw two** other **nets** for this die .
2. What 3D shape is created by this net?
3. **Make** your own die out of cardboard, using one of your nets.

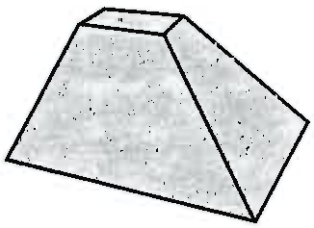
A new brand of chocolate comes in an odd shaped container, the net for which is drawn opposite.

4. If the net is folded to form the container, what 3D shape will be created?

Draw the **nets** for these shapes. There may be more than one correct answer.

5.

6.



7.

Steve has made a 'get-well' card that folds down the middle, as shown by this diagram. Your job is to **design** the envelope.

8. **Draw a net** for this envelope. Remember the envelope does not have to be a rectangle.

9. **Design** and **make** your own card and envelope.
10. **Design** and **make** a container with a lid for an object of your choice.

Please **DO NOT** write on the sheets

Creating 3D models:

The local drama club is putting on a new show.
One important job is to design the set, showing the main features.

Example: Are there buildings, trees, walls etc. ?

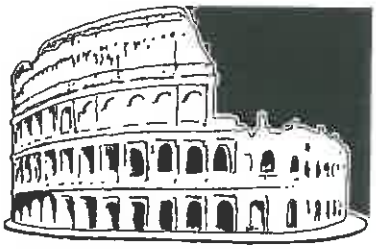
The model of the set is usually a scale model and is used by the director to work out where the actors go during the show.

Task 12

Your class is going to put on a play and you are asked to build a model of the stage and set.
Working in groups of two or three ...

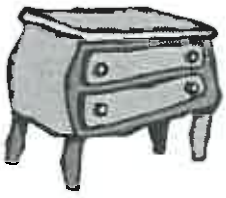
1. **Decide** what your play is going to be about as this will determine what the stage and set will look like.
   Example: In a room or out in the country.

2. **Build** a model of the stage out of a cardboard box, although the stage does not have to be a rectangular shape.
   Example: use a shoe box or make your own shaped stage using some cardboard.

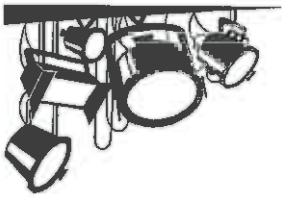


3. **Draw** a rough diagram of your stage, showing where you would put at least five main features of the set.
   Example: a tree, a desk, a chair.

4. **Build** the **five** features that you decided on in question 3 above.
   Example: a tree



5. **Write** a brief description of the shape of your stage, using some geometry words.



6. **Write** a brief description of the five main features of your set, using some geometry words.

Please **DO NOT** write on the sheets

Drawing 3D shapes on isometric paper:

Special 'dotted' paper, called isometric paper, can be helpful when drawing 3D shapes.

Example:

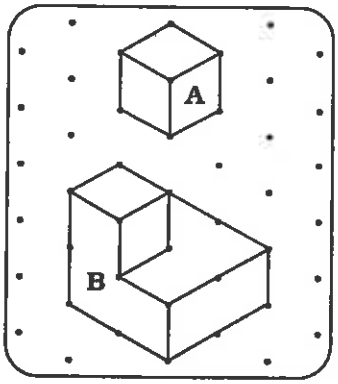
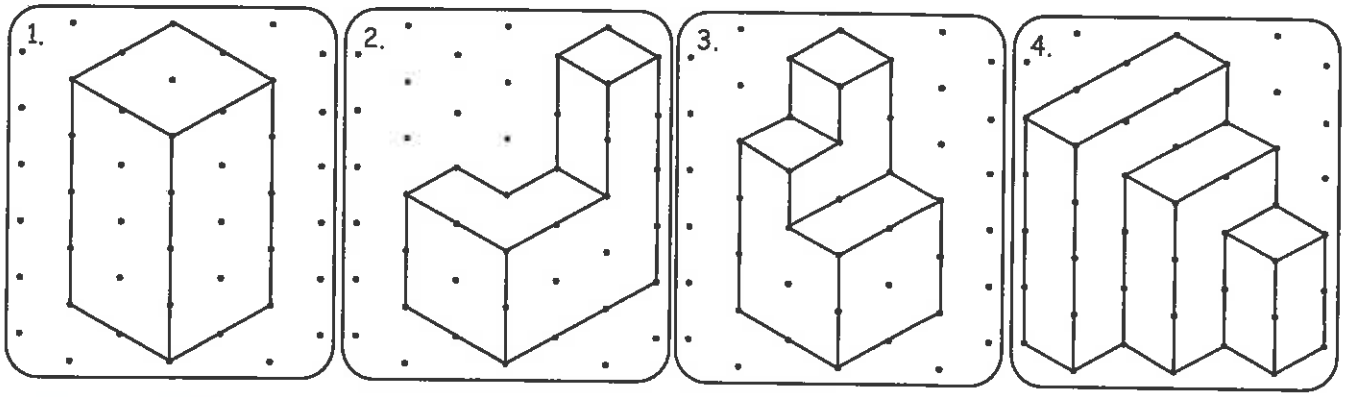


Diagram **A** on this isometric paper is of a small cube.

Diagram **B** is of a cuboid with a small cube on one corner.

Task 13

Copy these diagrams onto the **isometric paper A** provided.



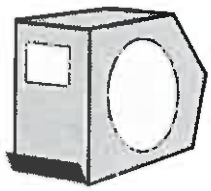
Task 14

Look at the objects below and then draw each of them on **isometric paper A** or **B**.

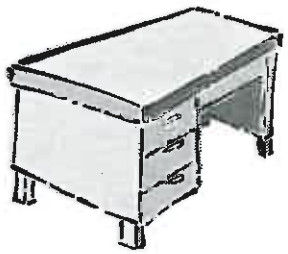
1.

2.

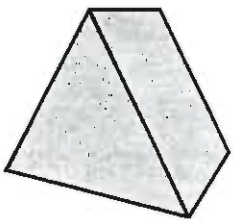
3.



4.

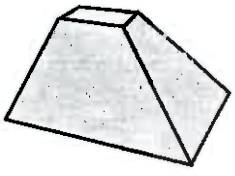


5.



6.

7.



8.

9. Look around your classroom and **draw 4 more 3D objects** on **isometric paper A** or **B**.

G4

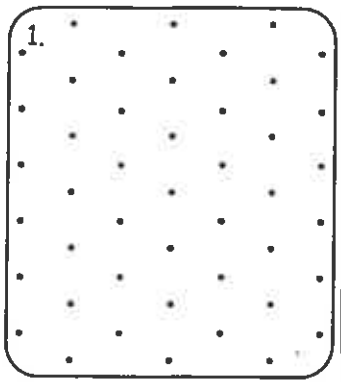
Geometry Geometry

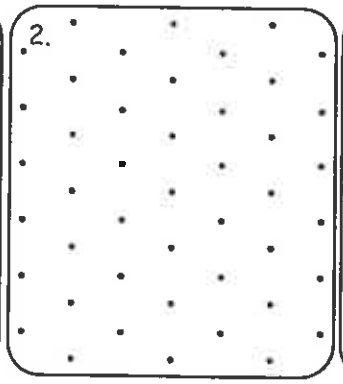
Isometric Paper A

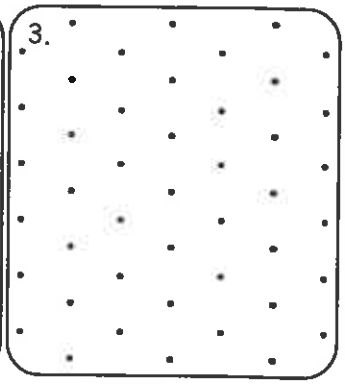
Worksheet 3

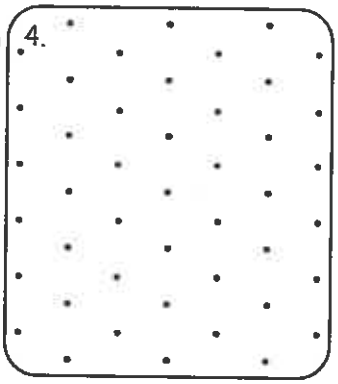
Name: Class:

Task 13

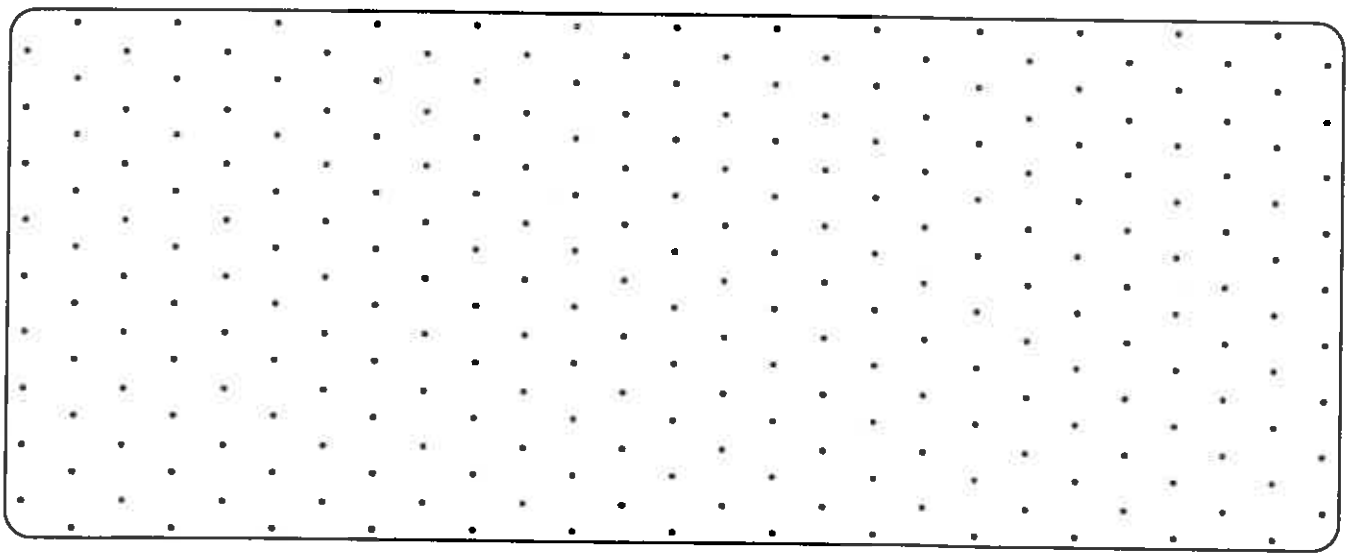
1. 

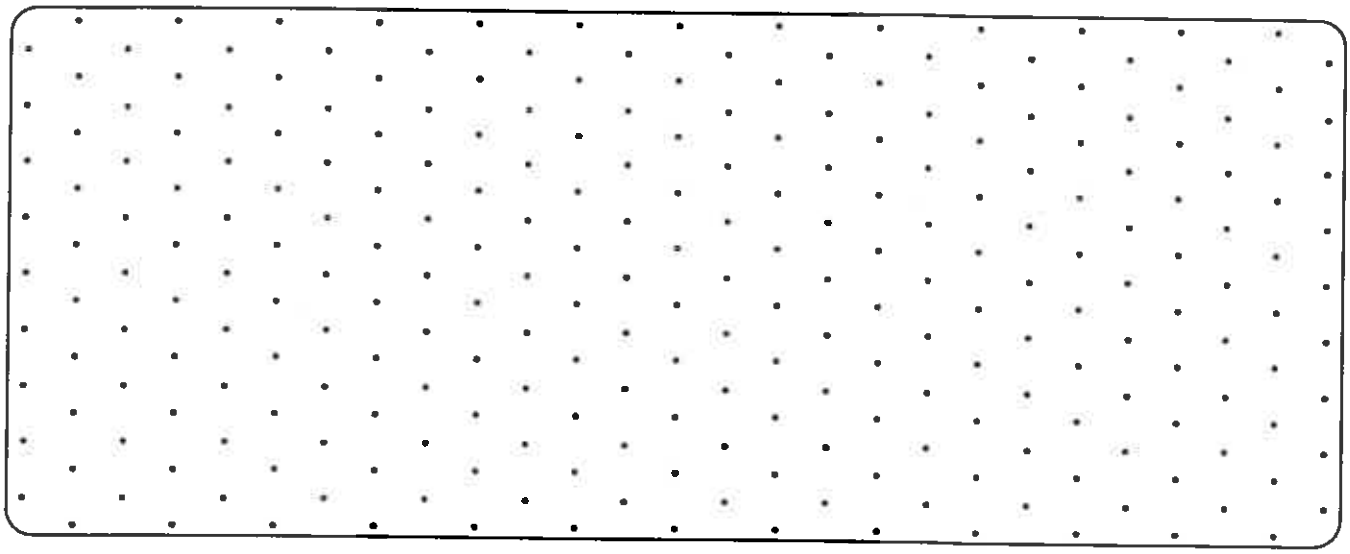
2. 

3. 

4. 

Task 14





G4

Geometry Geometry

Isometric Paper B

Worksheet 8

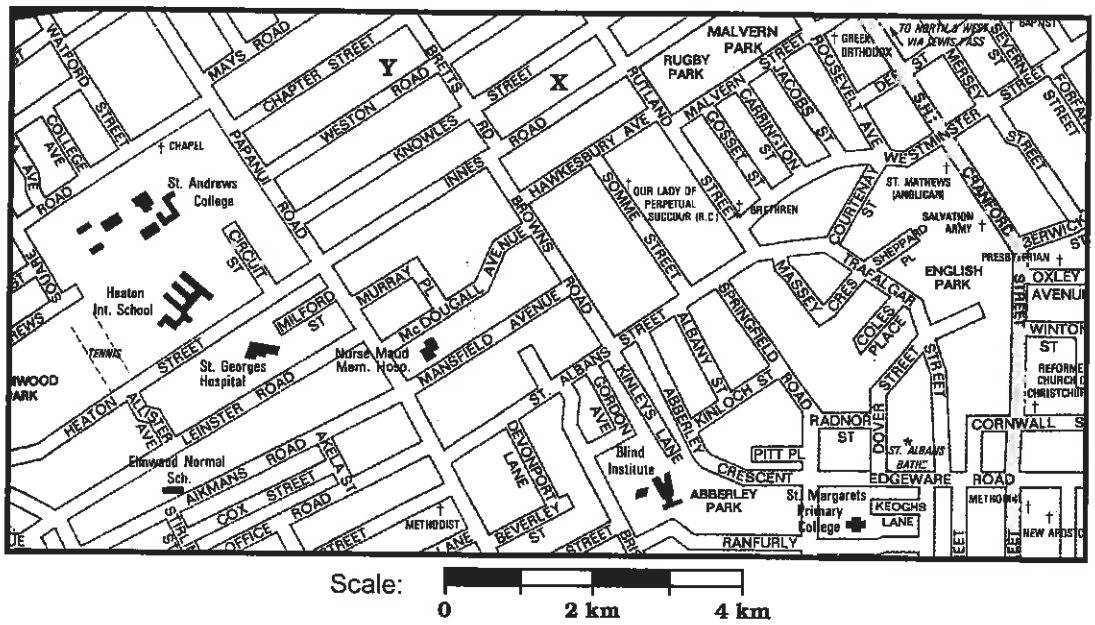
Name: Class:

Task 14

Understanding scale maps:

Being able to read a map and follow directions is an important skill.

Example: Mary lives in Weston Road (**Y**) and her friend Michelle lives in Innes Road (**X**).
Which streets can she go down, if she walks from her house to Michelle's house?



Answer: From her house, Mary turns left into Weston Road. At the first intersection, she turns right into Bretts Road. Walking down Bretts Road, she turns left into Innes Road and walks to Michelle's house.

Question: Approximately how far is Mary's house from Papanui Road (to the nearest km)?

Answer: Measuring the distance from Papanui Road to the **Y** (Mary's house) on Weston Road, is about 2cm. The scale above shows 1cm = 1 km, therefore Mary's house is 2km from Papanui Road.

Task 15

Use the **map** above to answer these questions.

1. Find St Andrew's College on the map. Where would you end up if you ...
   - ... leave St Andrew's College using Circuit Street,
   - ... turn left into Heaton Street, then right into Papanui Road,
   - ... walk along Papanui Road then turn left at the fourth street on the left,
   - ... turn left again at the fourth street on the left, continue walking and stop at a park.

   Name the park that you stopped at and **name** the sport that you think is played there.
2. If you walked the length of Papanui Road, as shown on this map, how far would you have walked? (answer to the nearest kilometre)

Task 16

1. **Draw** your own street **map** with about 10 streets.
2. **Mark** on your map 8 main features.
3. **Write** instructions on how to get between some of your main features.
4. **Exchange** your map with a classmate's. See if you can follow their instructions and name the main features you visit, as you move around their map.

Please **DO NOT** write on the sheets

Creating pathways (locus):

Have you ever watched a fly or a bee as it flies through the air? The path that it creates is called a **locus**.

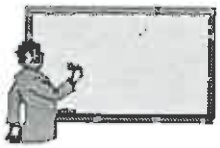
Example: What could a locus look like for a bee going through the air?

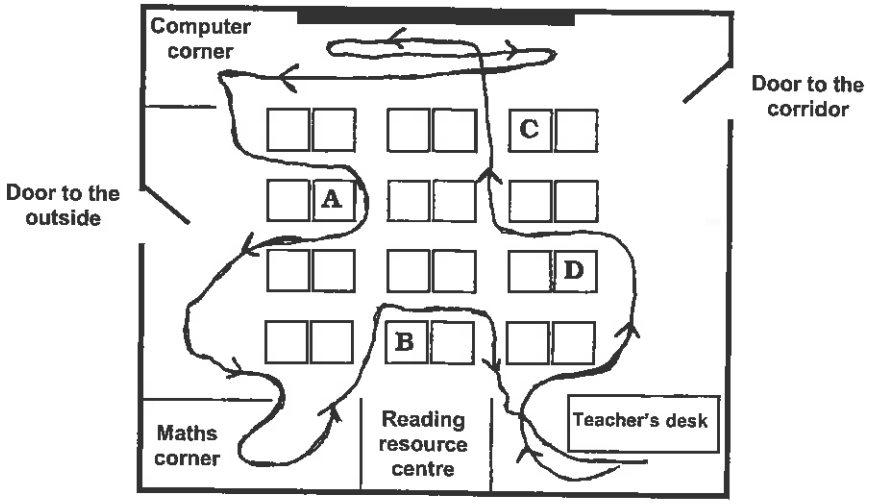
As a soccer player runs around during a game, what could a possible path or locus be for the soccer player?

Answer: The locus for the bee could look like a scribble on the page, whereas a soccer player's locus may appear as a zig-zag. There is no correct answer for these examples.

Task 17

Chris drew a **diagram** of his classroom. He watched his teacher, Mr Moore, for 10 minutes and **drew the path** that he took as he walked around the classroom. Below is the diagram showing the path.





1. Suggest names for the four pupils sitting at the desks A, B, C and D.
2. In which order did the teacher visit each pupil?
3. Write a description of the teacher's path as she moved around the classroom.

4. Draw the locus (path) that a bouncing tennis ball would create.

5. Draw the locus that a swing would create.

6. Draw the locus that a yoyo would create.

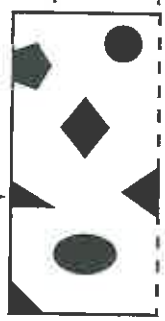
Task 18

1. **Draw** a **diagram** of your classroom or your school playing fields.
2. Choose one person, a pupil or a teacher, and then for the next **10 minutes,** draw the path on your diagram to show where this person goes.
3. **Write** a brief description of their path.

Exploring reflection:

David folded a square of paper in half and using a pair of scissors, he cut out some shapes.

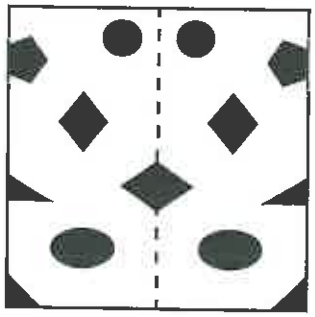
Example:



He then unfolded the paper square to look at the pattern he had created.

What can you say about his pattern?

Answer:
There is a mirror line down the middle, where the paper was folded.



A shape or design which has a **mirror line** is said to have **reflective symmetry**. A mirror line can also be called a **line of symmetry**. Reflective symmetry is also called **line symmetry**. A shape or design can have more than one line of symmetry or no lines of symmetry.

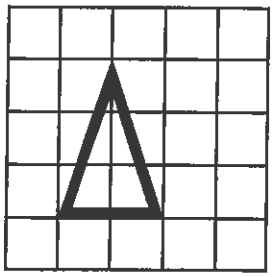
Task 19

By folding paper and using scissors, create paper designs as above, that have the following number of **lines of symmetry** or mirror lines. The pieces of paper, from which you create your designs, can be any shape.

1. 0 lines of symmetry
2. 1 line of symmetry
3. 2 lines of symmetry
4. 4 lines of symmetry
5. On your paper designs, mark all lines of symmetry.

Copy each diagram below, then **draw** in the lines of symmetry, if they have any.

6.



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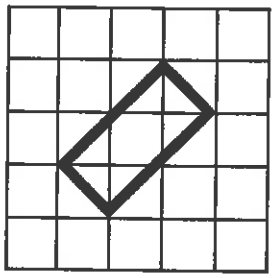

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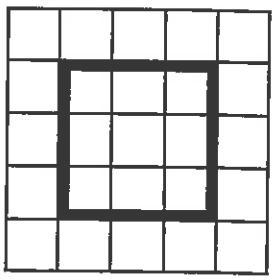

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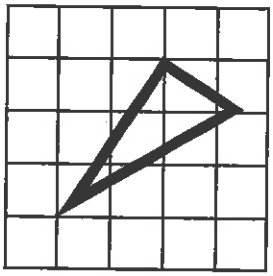
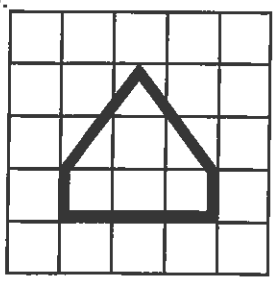


10.



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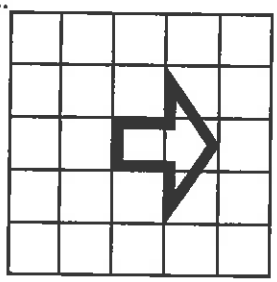

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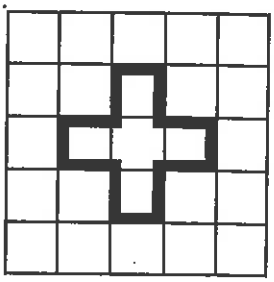
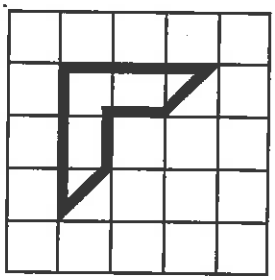
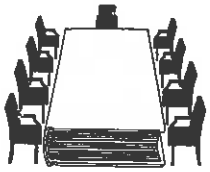


13.



14. Look around your classroom for **5 objects** that have **line symmetry**.
Draw these objects, showing where the lines of symmetry occur.
Record the number of lines of symmetry each item has.
Example: your desk may be a rectangular shape and it has 2 lines of symmetry.

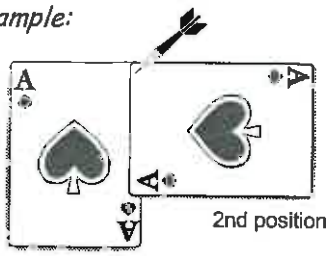


Please **DO NOT** write on the sheets

Exploring rotation:

Jenny placed a dart in the top right-hand corner of a card.

Example:



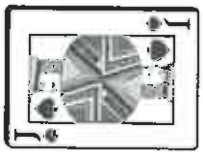
1st position 2nd position

Jenny moved the card from the 1st position to the 2nd position. Describe how this was done.

Answer: The card was rotated through a $\frac{1}{4}$ turn, anti-clockwise, using the dart as the centre of rotation.

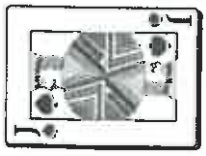
Original position

Jenny also rotated this card four times, as shown ... ⇨



¼ turn clockwise

½ turn clockwise



¾ turn clockwise

1 complete turn clockwise

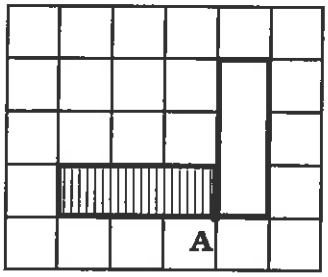
A shape has **rotational symmetry** if it fits onto itself more than once during a complete turn. Does the card that Jenny turned have rotational symmetry?

Answer: Yes, the card has rotational symmetry as it fits onto itself when it is in the $\frac{1}{2}$ turn position. The centre of rotation would be the centre of the card.

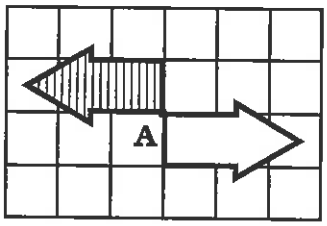
Task 20

Each striped shape has been rotated to a new position (clear shape). **Describe** how each rotation has been carried out. The centre of rotation is marked by the letter **A**.

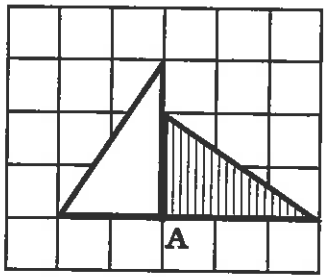
1.



2.



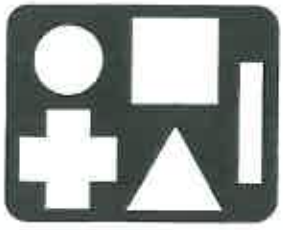
3.



4. **Draw** 5 simple shapes of your own. **Mark** a corner as above, then rotate your shapes $\frac{1}{2}$ turn clockwise. **Draw** the new position of your shapes.

A puzzle has the following **pieces**.

5. Which of the five shapes would be the easiest to fit into the puzzle? Explain your answer.

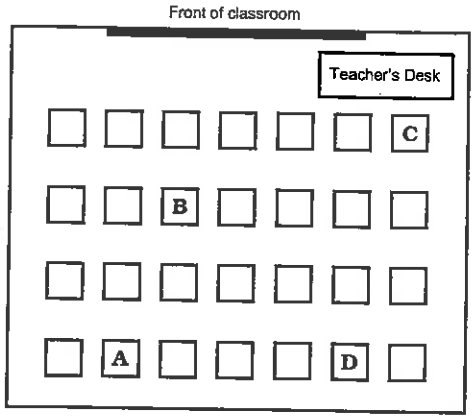


6. Which shape has three different ways in which it can be placed in the puzzle?
7. How many ways can the 'cross' be placed into the puzzle?
8. Which shape has two different ways in which it can be placed in the puzzle?

Exploring translation:

In Mr Williamson's class all the desks are in rows facing the front of the classroom.

Example:



Jacob was sitting in the seat labelled **A**. However, he was misbehaving and was asked to move to the desk labelled **C**.

Describe Jacob's move.

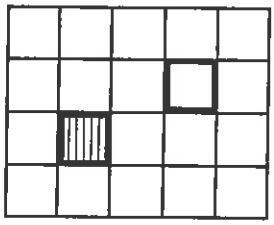
Answer: move 5 desks to the right, then 3 desks up.
(or 3 desks up, then 5 desks to the right).

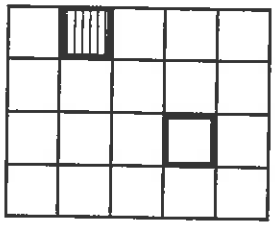
If an object moves up or down, and left or right without the object being reflected or rotated, the movement is called a **translation**.

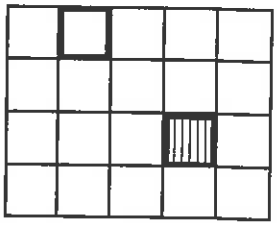
Describe Casey's move from desk B to desk D.

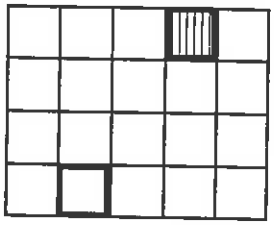
Task 21

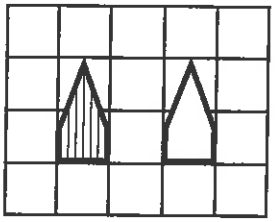
The striped shapes have been translated to a new position (clear shape). **Describe** each translation stating the left or right movement first, followed by the up or down movement.

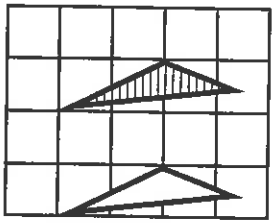
1. 

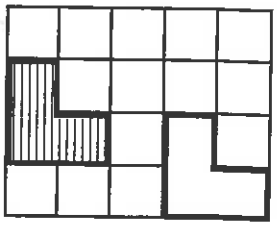
2. 

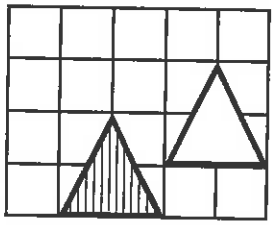
3. 

4. 

5. 

6. 

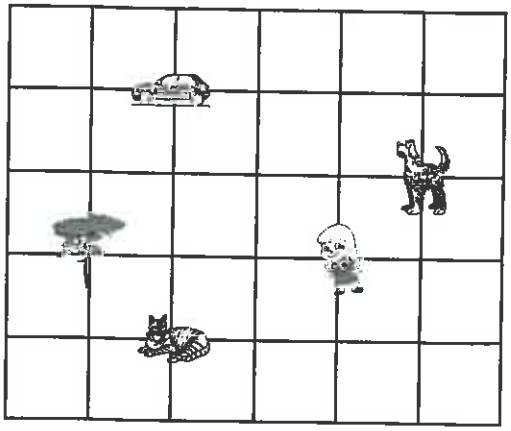
7. 

8. 

Kelly drew a simple map of her backyard.
The squares on this grid are 1 metre across.
Example: Kelly moves 3 metres west to get to the tree.

Describe how Kelly gets from ...

9. the tree to the car,
10. the car to the dog,
11. the dog to the cat,
12. the cat back to where she was standing.

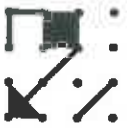


13. **Draw** a simple map of your classroom or school on some 'squared 'math paper.
Mark a route on the map, **describing** each translation as you go.
Remember to give your map a scale.
Example: 1 square = 5 metres across . Move 20 metres east, then 50 metres north

Please **DO NOT** write on the sheets

Describing patterns / designs:

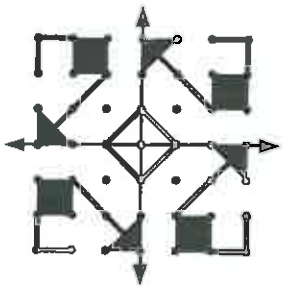
Miranda drew a design on special 'square dotted' paper created by her teacher.
Example:



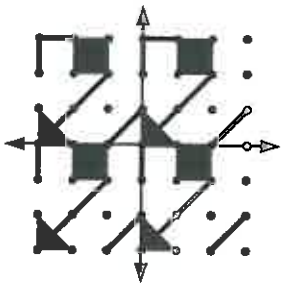
She then used four of her designs and by either **reflecting**, **rotating** or **translating** each design, she created a bigger pattern.

Three of her new patterns are drawn below.

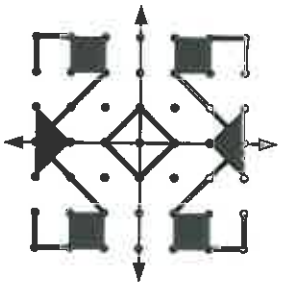
Design 1



Design 2



Design 3



Describe how each design has been created.

Answer: **Design 1** was created by rotating her design a $\frac{1}{4}$ turn clockwise or a $\frac{1}{4}$ turn anticlockwise 3 times, with the centre being where the arrowed lines cross.

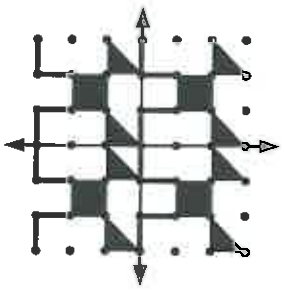
Design 2 was created by tranlating her design into four new positions.

Design 3 was created by reflecting her design, using the arrowed lines as lines of symmetry or mirror lines.

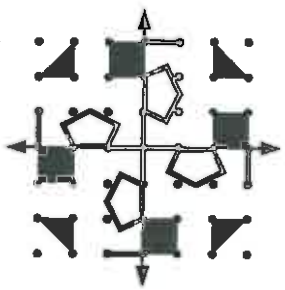
Task 22

Study each design that has been drawn in the top left corner of each diagram below. By talking about **reflection, rotation or translation, describe** how each of these designs has been created.

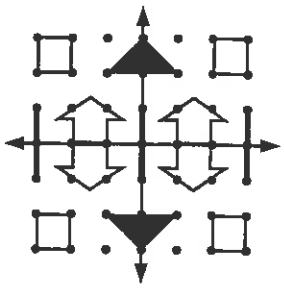
1.



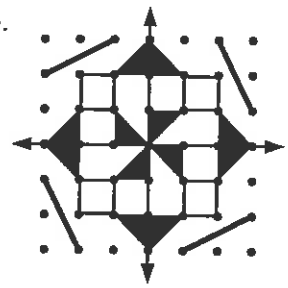
2.



3.

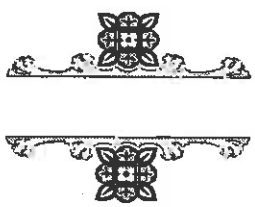


4.



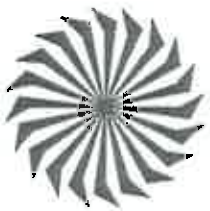
Below are some designs that have been created by reflecting, rotating or translating part of the design. **Describe** how each design has been created.

5.

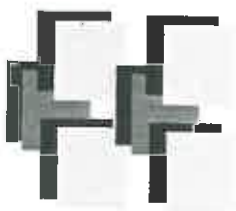


6.

7.



8.

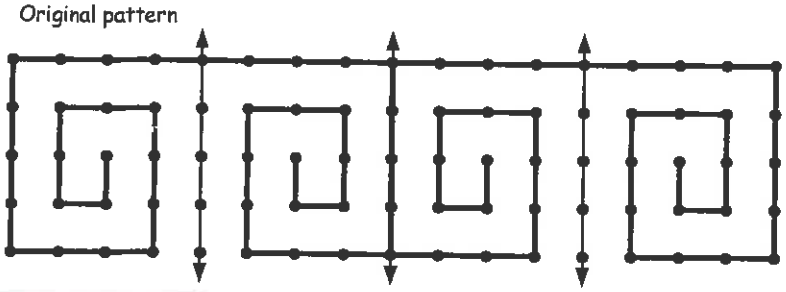


9. Look around your classroom or school for examples of objects that have created a pattern by using either reflection, rotation or translation.
Example: desks all facing the same way would be an example of objects that have been translated.

Creating patterns / designs:

Many wallpaper and floor tiles have designs that have been created by reflecting, rotating or translating a design. Mary likes creating her own designs.
John created his design by drawing patterns repeatedly on some specially created 'square dotted' paper.
Example: This pattern was copied three times, starting at the left.

Original pattern

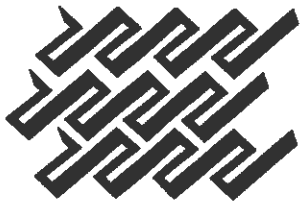


How did he created his design?

Answer: Repeated reflections, with the arrowed lines as lines of symmetry.

Task 23

1. Use the specially created **square 'dotted' paper A**, to complete the designs that involve **reflection**, **rotation** or **translation**.

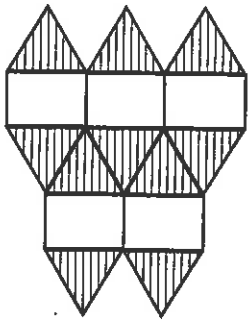


Use the specially created **square 'dotted' paper B**, to create you own designs. Your maths book could be used if you do not have the special paper.

2. Create **3** designs involving reflections.
3. Create **3** designs involving rotations.
4. Create **3** designs involving translations

Tessellations:

A design made up of repeating shapes, without gaps between the shapes, is called a **tessellation**.
The shapes in the design have been reflected and / or rotated and /or translated.
Example:



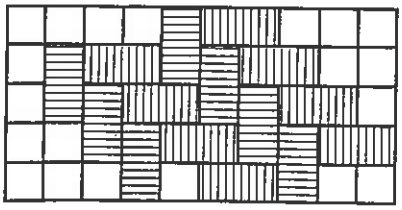
What shapes have been used in this tessellation pattern?

Answer: Triangles and rectangles. The triangles have been translated and reflected. The rectangles have been translated.

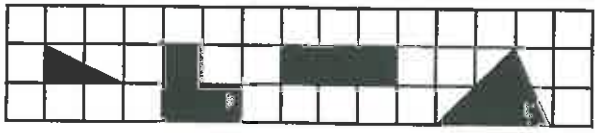
Task 24

Copy this diagram onto the squares in your maths book. Continue the pattern as you tessellate the shape to create a design.

1.



2. **Create** a design by tessellating any of these shapes.



Geometry

G7

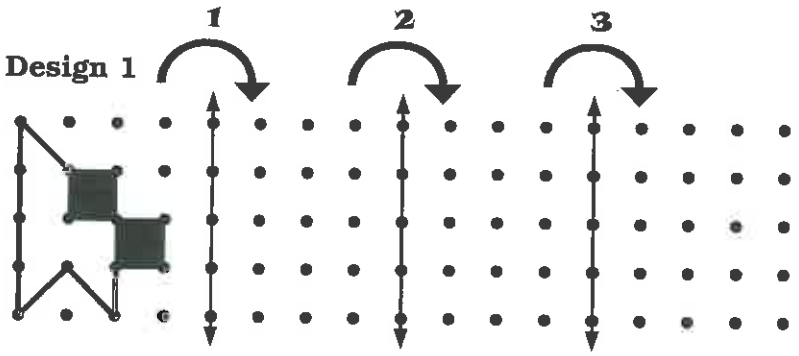
'Square Dotted' Paper A

Name: Class:

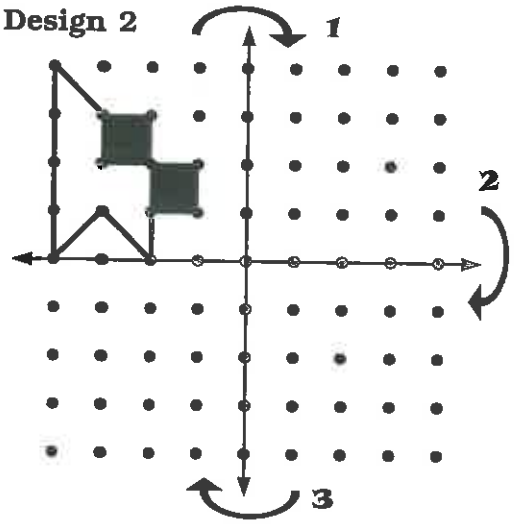
Task 23 Question 1

Reflect the design in the left-hand square 3 times, as shown by the numbered arrows, to create two different patterns, using the arrows as lines of symmetry.

Design 1

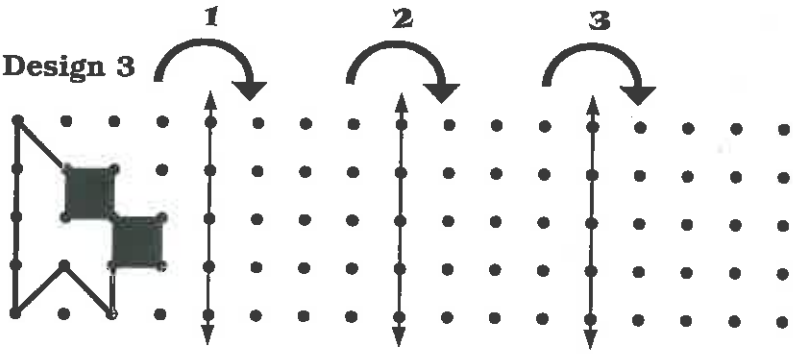


Design 2

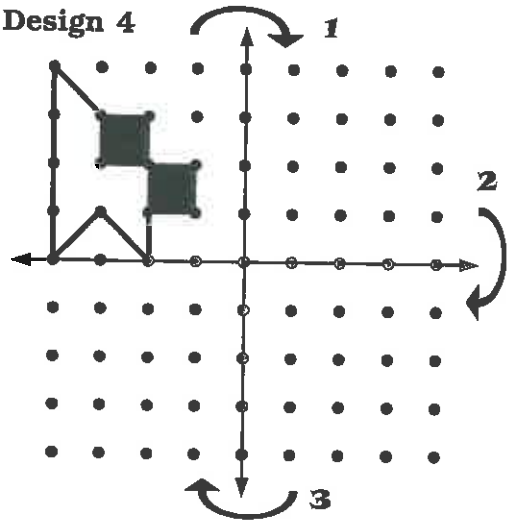


Rotate the design in the left-hand square a **¼ turn clockwise** 3 times, as shown by the numbered arrows, to create two different patterns.

Design 3

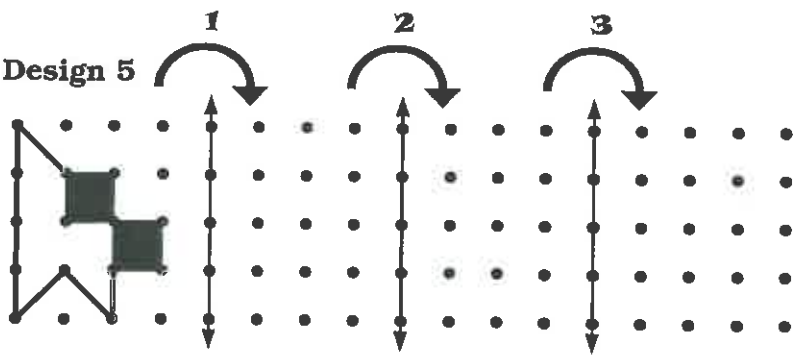


Design 4

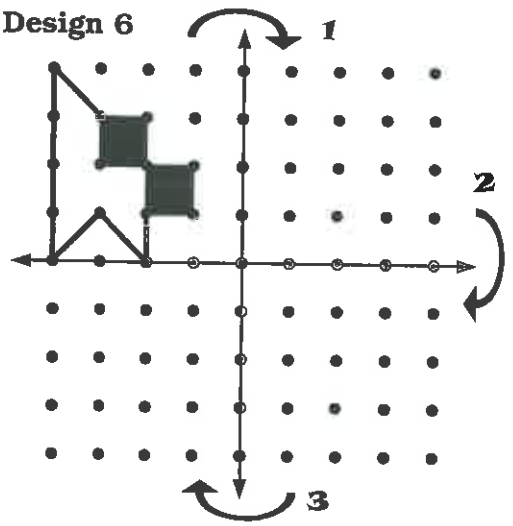


Translate the design in the left-hand square 3 times, as shown by the numbered arrows, to create two different patterns.

Design 5



Design 6



Geometry

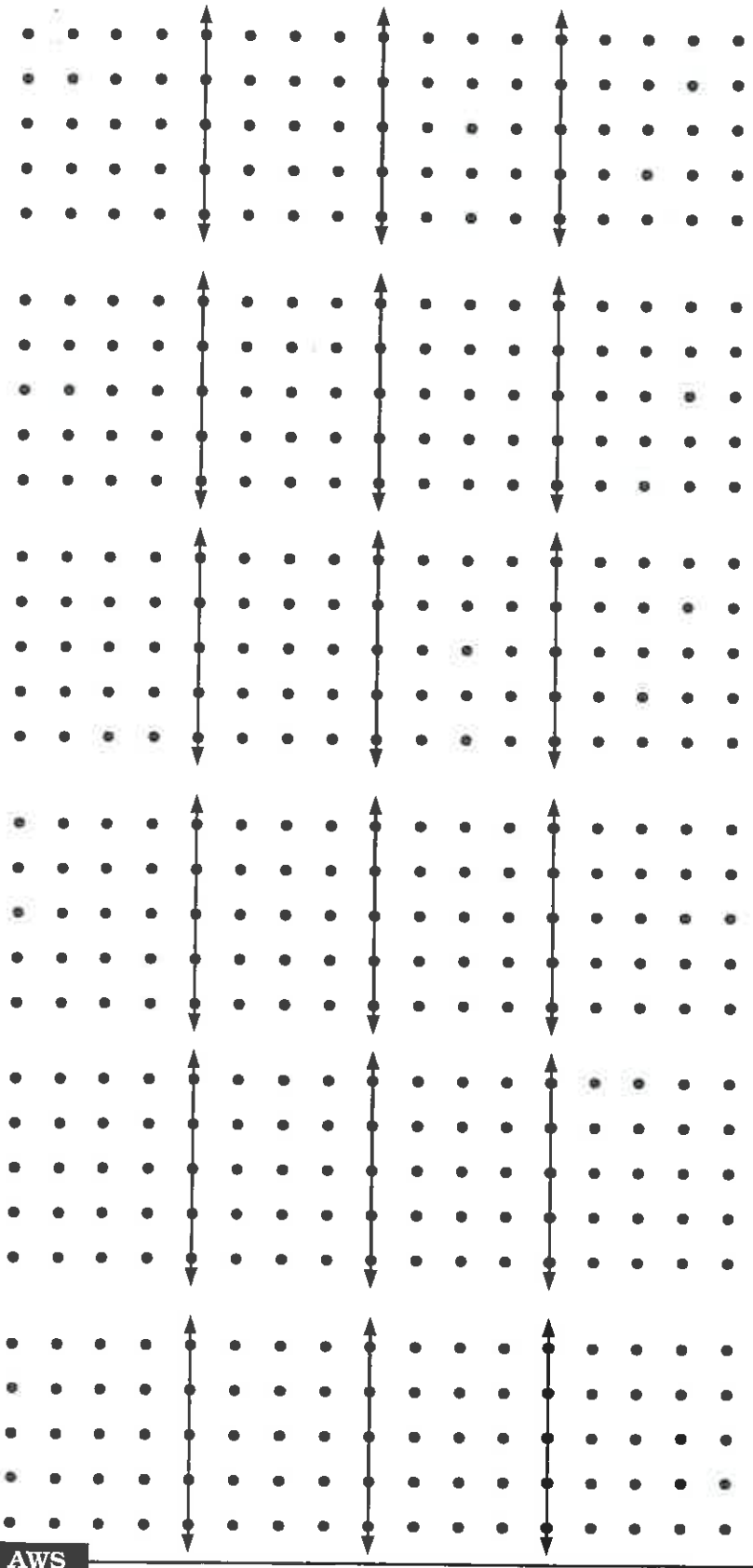
G7

'Square Dotted' Paper B

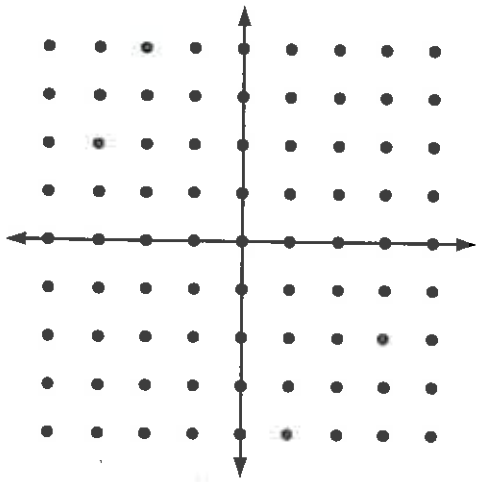
Name: Class:

Task 23

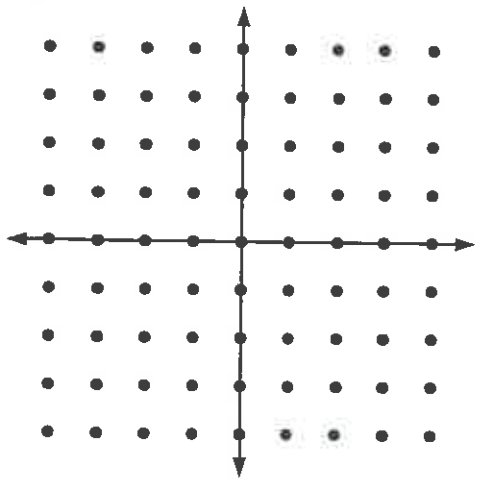
Creating designs that involve reflection, rotation or translation:



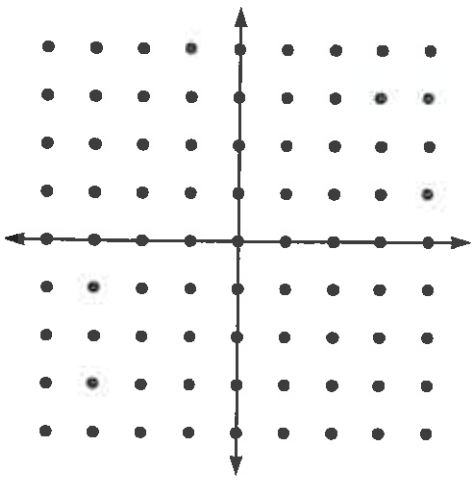
Question 2



Question 3



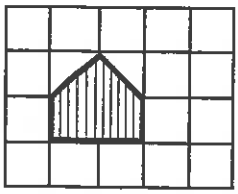
Question 4



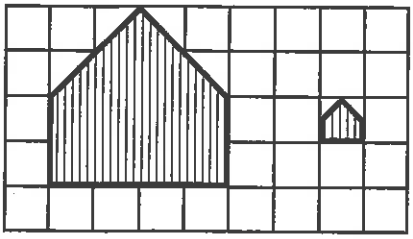
Please **DO NOT** write on the sheets

Drawing enlargements:

Sam drew a diagram of a shape on some maths paper. *Example:*



Sam decided to draw the same shape
twice as big ... and then twice as small.



How many times longer or shorter are the sides of Sam's two new shapes?

Answer: For the diagram of the shape that is twice as big, all sides are twice as long. The shape has been enlarged by a **scale of 2**.
For the diagram of the shape that is twice as small, all sides are half as long as they were. The shape has been enlarged by a **scale of ½**.

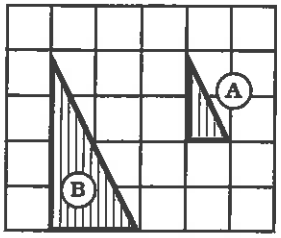
Notice that for these two **enlargements** above the diagrams are all still the same shape, but they are just different sizes.

If the scale of the enlargement is a fraction, the new diagram will be smaller.

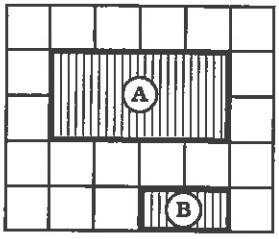
Task 24

Study each pair of diagrams, then work out the **scale** of each enlargement.
A is the original diagram, **B** is the new diagram.

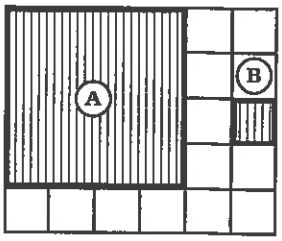
1.



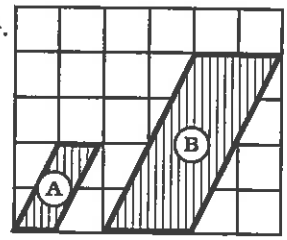
2.



3.

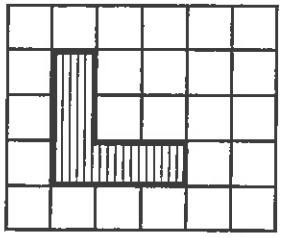


4.



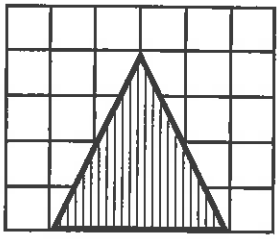
Copy each diagram, then enlarge the shape by the **scale** given. Note that some shapes will get smaller.

5.



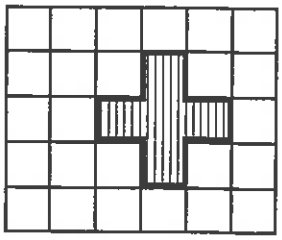
scale = 2

6.



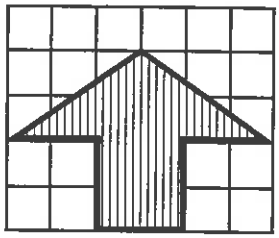
scale = $\frac{1}{2}$

7.



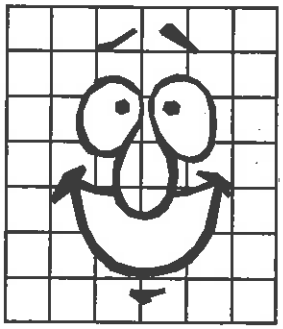
scale = 2

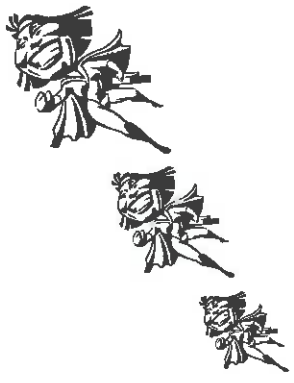
8.



scale = $\frac{1}{2}$

9. Sam drew a smiley face.
Enlarge his diagram by a scale of 2





10. **Draw** your own cartoon character.
Enlarge your original diagram by a scale of 2 and then by a scale of $\frac{1}{2}$.

'In-class' Worksheet

Teaching Notes & Answers

How to use this section:
Teaching notes are enclosed in a box with a 'push-pin' at the top left corner. The teaching notes precede the answers for each worksheet / task. The teaching notes have been included to provide assistance and background information about each topic or unit of work.

Worksheet 1

Introduction:

The topic of geometry is concerned with exploring shape and space. It involves drawing and describing the properties of 2-dimensional shapes; representing 3D shapes on paper and drawing the 'nets' that could be used to create 3-dimensional shapes, plus describing their properties using geometric words; creating models and scale maps; using shapes to create designs or patterns that involve transformations such as reflection, rotation, translation or enlargement.

Geometry words involving directions:

Task 1 is concerned with the revision of general geometry words that refer to directions.

Task 2 is to allow pupils to create their own diagram from which they can further gain understanding of directional words.

There are no model answers for **Task 2**.

Task 1

1. desk B 2. desk F 3. east
4. ... enter the classroom and do a $\frac{1}{4}$ turn clockwise, then walk to the maths corner;
   ... enter the classroom and turn towards the south, then walk to the maths corner;
   ... enter the classroom, turn right and go to the maths corner .... are possible answers

Worksheet 2

Parallel and perpendicular:
Lines on diagrams or parts of objects can be connected in various ways. Describing them as parallel or perpendicular is one way.

Task 3 is designed to illustrate the difference between things that are parallel or perpendicular, as pupils describe parts of diagrams and objects within their classroom. There will be more than one correct answer.

Faces, edges and vertices:
On most 3D shapes, and many 2D shapes, 'faces', 'edges' and 'vertices' are other geometric words that can be used to describe parts of the shape.

Task 4 is designed to allow pupils to gain an understanding of these geometric words.

Task 3

Below are possible answers, but there will be other possibilities.

1. opposite sides of the milk carton are parallel, the bottom is perpendicular to the sides
   the large word 'milk' on the side is parallel with the sides it is written on, but perpendicular to the bottom of the carton, the small word 'milk' is perpendicular to the sides it is written on and parallel to the bottom of the carton

2. the drawers of this unit are parallel, the handles on the drawers are parallel to the top and bottom of the drawers, but perpendicular to the sides, the opposite sides of the cabinet are parallel, the top and bottom are parallel, the top and bottom of the cabinet are perpendicular to the sides
3. the strings holding this parcel together are perpendicular where they cross, opposite sides are parallel, the sides are perpendicular to the top and bottom
4. the bench top is parallel to the floor, the legs of the bench are perpendicular to the top and floor, the bottom shelf is parallel to the bench top and floor, and perpendicular to the bench legs

Task 4

As these are 3D shapes, remember to include the faces, edges and vertices that you cannot see.

1. faces = 5, edges = 9, vertices = 6
2. faces = 6, edges = 12, vertices = 8
3. faces = 8, edges = 18, vertices = 12
4. faces = 7, edges = 15, vertices = 10

Worksheet 3

Naming 2-dimensional shapes:

A 2D shape is a flat surface. Many 2D shapes are so named because of the number of sides they have. A **polygon** is a 2D shape that has three or more sides that can be of any dimensions. If all sides are of equal length and all angles are the same size, then the polygon is known as a **regular polygon**. Any four sided polygon is called a quadrilateral.

Task 5 is designed to give practice at recognising and naming 2-dimensional shapes. Having named the 2D shapes, pupils can then create a picture using these shapes.

Describing and drawing 2D shapes:

Having learnt the names of 2D shapes and by knowing some geometric words, pupils can write a description of a 2D shape.

Task 6 is designed to give practice at writing descriptions of 2D shapes. Exchanging their descriptions with classmates will help to improve what they say about a shape, as from this description the shape is drawn.

Task 5

1. circle
2. ellipse (oval)
3. triangle
4. square
5. rectangle
6. parallelogram
7. pentagon
8. hexagon
9. heptagon
10. octagon
11. nonagon
12. decagon
13. *Example:* the door is a rectangle

Task 6

1. the shape has four sides, opposite sides are parallel, all sides are the same length, there is a right-angle in each corner, the shape is a square
2. this shape has five sides, therefore it is called a pentagon (not a regular pentagon), two sides are parallel and have right angles between these two sides and a third side
3. this shape has four sides, opposite sides are parallel, opposite sides are equal in length, there are no right angles between the sides, this shape is a parallelogram
4. this shape has eight sides of equal length, it is called an octagon
5. —

Worksheet 4

Drawing diagrams involving 2D shapes:

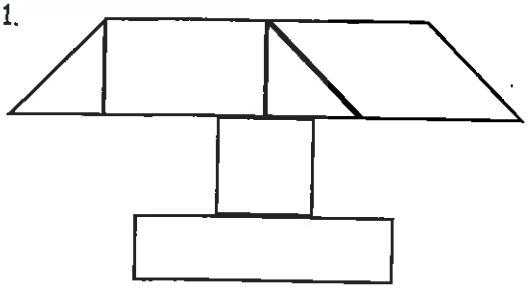
Using some 2D shape pieces, diagrams can be created by placing the pieces in various positions. A **photocopy master** sheet of shapes is provided for pupils to use in **Tasks 7 & 8.**

Task 7 is designed to give practice at working out how diagrams were created using these pieces.

Task 8 allows pupils to create their own diagrams, exchange them with classmates to see if they can work out how they were created.

Task 7

1.



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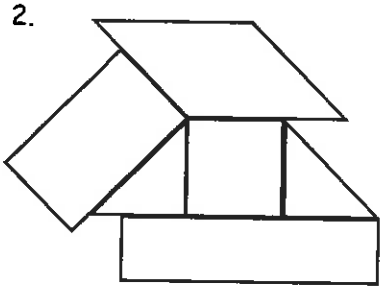

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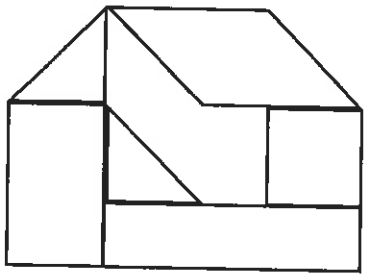

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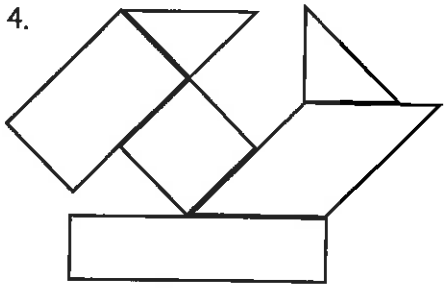

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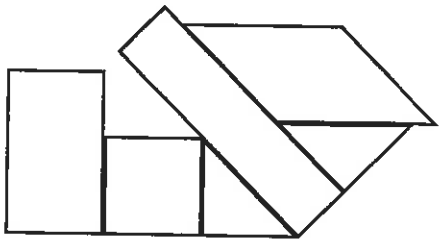

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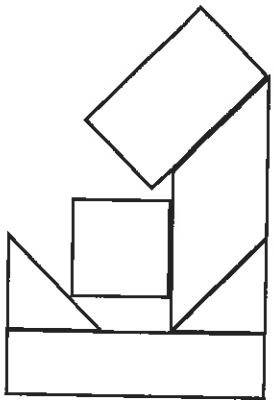

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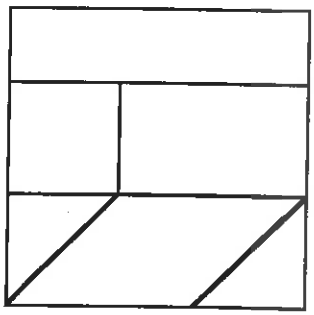


This is one possible answer.

Worksheet 5

Naming 3-dimensional shapes:

A 2D shape can be turned into a 3D shape when the extra dimension of depth is added.
Example: A 2D square can be converted into a cube.

Task 9 is designed to give practice at naming common 3D shapes. Having named these shapes, pupils attempt to draw a 2D representation of these 3D shapes.

Describing 3-dimensional shapes:

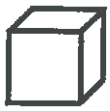
Once again, 3D shapes can be described using geometric words, such as face, edge, vertex, parallel, perpendicular and right-angled.

Task 10 is designed to give practice at working out which 3D shape is being described. It also encourages pupils to describe 3D shapes in such a way that their classmates can work out which shape is being described.

Task 9

1. cube
2. triangular prism
3. cuboid (rectangle prism)
4. cone
5. sphere
6. cylinder
7. —
8. cube
9. cylinder
10. sphere
11. cuboid

Task 10

1. cube
2. 
3. the top and bottom are the same size and parallel to each other, opposite sides are the same size and also parallel to each other, it has 6 faces, 12 edges and 8 vertices, the shape is a cuboid

Worksheet 6

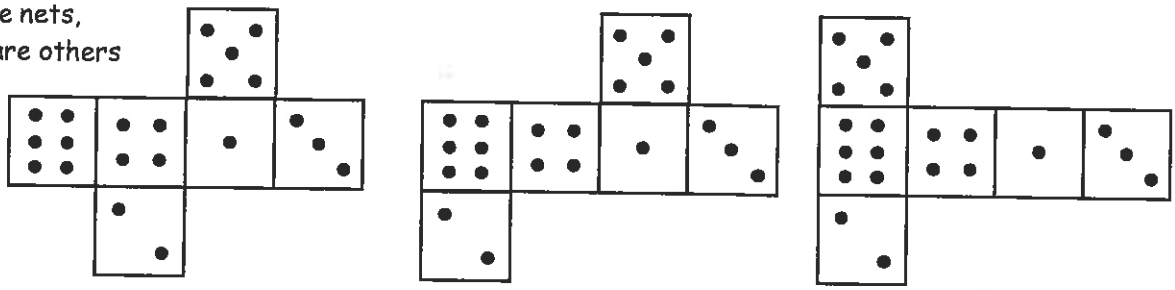
Understanding and using 'nets':

Many objects made out of paper or cardboard that are used everyday have been created by folding. The designs for the objects, such as an envelope or breakfast cereal box, drawn on the paper or cardboard before they are cut out and folded are called nets. By looking at a net, the object that it will create when folded can be worked out.

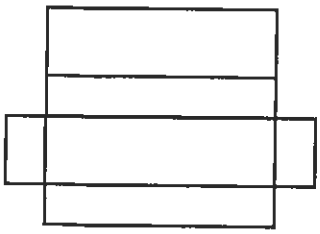
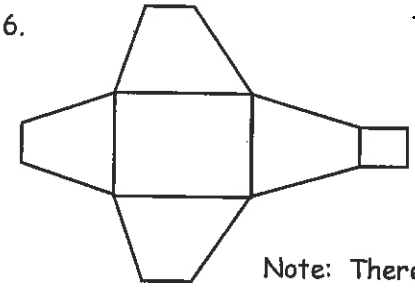
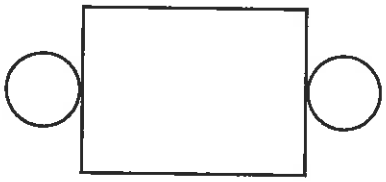
Task 11 is designed to give practice at drawing nets, working out what shape can be created from a given net and creating a 3D shape from a net diagram.

Task 11

1. possible nets, there are others



2. cube
3. —
4. triangular prism

5. 
6. 
7. 

Note: There will be more than one correct answer.

Worksheet 7

Creating 3D models:

A scale model is often used for new buildings, cars, planes, toys, appliances etc, before the actual product is made. Designing a scale model is a lot cheaper than building full-sized products.

Task 12 is designed to give pupils an opportunity to create a model stage set, using maybe a shoe box as the stage. Pupils working in groups are to design and build a stage set using some of the 3D shapes they have learnt about.

There are no answers given for **task 12.**

Worksheet 8

Drawing 3D shapes on isometric paper:

Isometric paper masters A & B have been created to assist pupil to draw 3D shapes on 2D paper.

Task 13 is designed to give practice at drawing on isometric paper, as pupils copy diagrams given. Note that a **photocopy master sheet (A)** is available for **Task 13**.

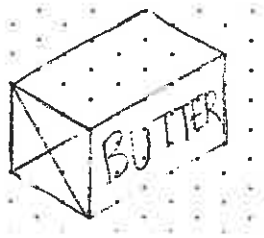
No answers are given for **Task 13**.

Task 14 is designed to give practice at drawing objects on isometric paper, given a particular object to copy or objects from within the classroom. A second plain **photocopy master sheet (B)** of isometric paper is provided. This isometric paper is the same paper that will be used at Level 4 and above.

For **Task 14**, sample diagrams have been given to illustrate possible answers.

Task 14

1.



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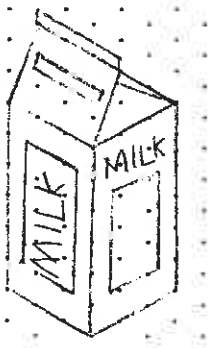

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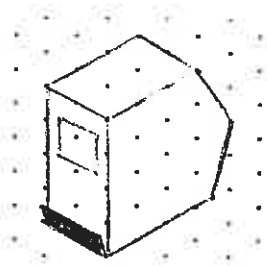

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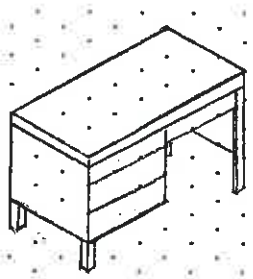

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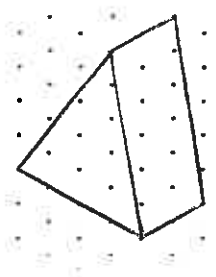

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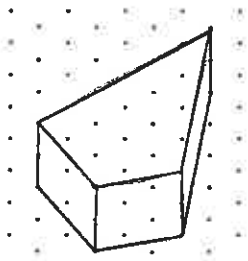

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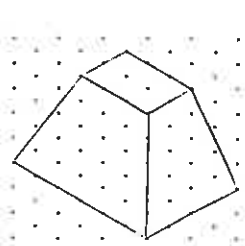

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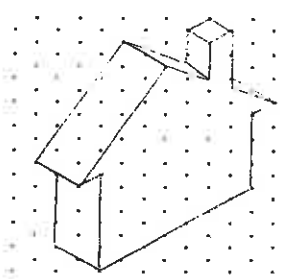


Worksheet 9

Understanding scale maps

Maps of city streets are one example of scale maps. Being able to read and understand scale maps is a valuable skill. Being able to follow directions on a map is another important skill.

Task 15 is designed to give practice at reading and following directions on a scale map. A scale has been given and from this actual distances can be calculated.

Task 16 is designed to allow pupils to create their own scale maps, including noting some main features on the map. *Example:* a school, a church, a shopping centre, their house, a friend's house, a swimming pool etc. Having completed their maps, pupils are to write instructions as to how to get from one main feature to another.

There are no model answers for **Task 16**.

Task 15

1. Rugby park, the sport played most at this park is rugby.
2. approximately 8km

Worksheet 10

Creating pathways (locus):

As objects, animals or people move across the ground or through the air, they create a path. The path that is made is called a locus (loci is plural).

Task 17 is designed to give practice at following a locus or path created by a teacher who has moved around the classroom. From this drawn locus, a description of the path can be written. Other loci are to be drawn given several situations.

Task 18 is designed to allow pupils to create their own loci, from which they are to write descriptions of what happened.

There are no model answers for Task 18.

Task 17

1. —
2. pupil D, pupil C, pupil A, pupil B
3. Mr Moore left his desk, turned left and then right walking towards the front of the classroom. Walking past two rows of desks he stopped to talk to pupil D. Turning left, he moved past 2 desks, then turned right again. He stopped to talk to pupil C who sits in the front row of desks. He continued to the front of the class where he walked back and forth 3 times before heading for the computer corner at front left of the classroom. He then walked towards the back of the classroom, turning right between the two front rows of desks to stop at pupil A, before reaching the maths corner in the back left corner of the classroom. He returned to his desk having stopped at pupil B, in the back row, along the way.

For questions 4, 5 & 6 there are many correct answers.

Worksheet 11

Exploring reflection:

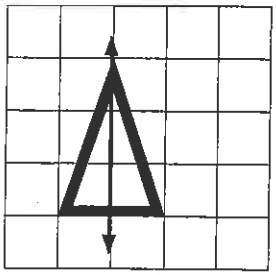
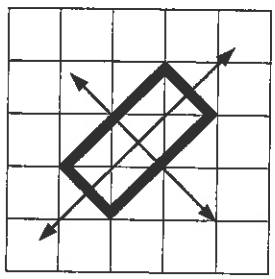
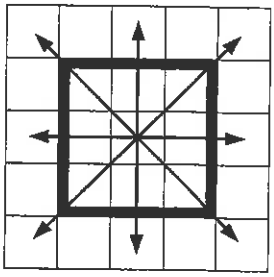
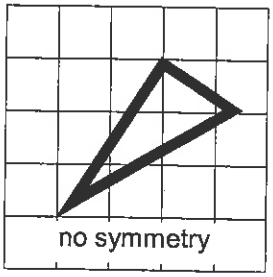
Pupils will be familiar with reflections. They see one every time they look in the mirror or pass a shiny shop window or look into a still pond of water. The word 'ambulance' is written on the front of an ambulance so that it looks correct when the driver of a car sees it in the rear vision mirror.

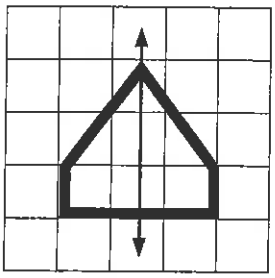
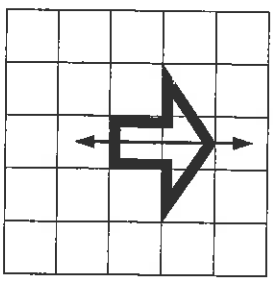
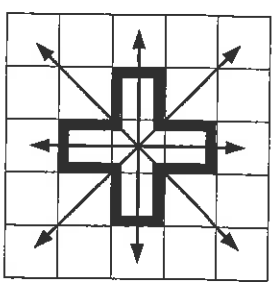
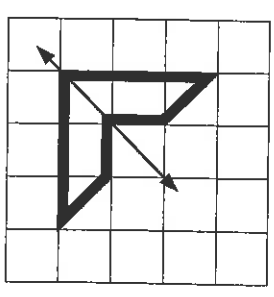
If a shape has a mirror line, it has **reflective symmetry** or **line symmetry**. A shape can have more than one line of symmetry, or none at all.

Task 19 is designed to give practice at creating designs, using paper and scissors, which have 0, 1, 2 or 4 lines of symmetry. Pupils then draw the lines of symmetry on their designs. These designs could be pasted into their books or pinned on the classroom wall.

Also involved in **Task 19** is the finding of the lines of symmetry of given designs and classroom items.

Task 19

6. 
7. 
8. 
9. 

10. 
11. 
12. 
13. 

Worksheet 12

Patterns involving rotation:

For rotation to occur there must be a centre of rotation and an angle of rotation. At this level the angles of rotation will be restricted to ¼, ½ or ¾ turns clockwise or anticlockwise.

A shape has **rotation symmetry** if, as it is being rotated you can stop in a position whereby the shape looks the same as it did before it was rotated. The number of times this occurs will determine the number or order of rotational symmetry a shape has. *Example:* a square has a rotational symmetry of 4.
All shapes have at least one rotational symmetry, that is, any shape looks the same once it has been rotated one complete turn or revolution.

Task 20 is designed to give practice at describing a rotation that has occurred to a shape, drawing a shape then rotating the shape a given angle and exploring rotational symmetry of various shapes.

Task 20

1. a ¼ turn clockwise or ¾ turn anticlockwise
2. a ½ clockwise or anticlockwise turn
3. a ¾ turn clockwise or ¼ turn anticlockwise
5. circle, as it can go into its 'space' in the puzzle in an infinite number of ways
6. triangle
7. four
8. rectangle

Worksheet 13

Exploring translation:

A **translation** is a movement that involves NO reflection or rotation of the shape. It is like sliding the shape either to the left or right and / or up or down. If a shape or object is being translated, directions need to be given. Encourage pupils to give the left / right direction first before the up / down direction.

Task 21 is designed to give practice at describing a translation that has occurred to a shape. Movement around a scale map can also be achieved by performing a series of translations. Pupils are to draw their own maps, and describe translations as they move between main features of their map.

Task 21

1. 2 squares right, 1 square up
2. 2 squares right, 2 squares down
3. 2 squares left, 2 squares up
4. 2 squares left, 3 squares down
5. 2 squares right, 0 squares up / down
6. 0 squares left / right, 2 squares down
7. 3 squares right, 1 square down
8. 2 squares right, 1 square up
9. 1 metre east, 2 metres north
10. 3 metres east, 1 metre south
11. 3 metres west, 2 metres south
12. 2 metres east, 1 metre north

Worksheet 14

Describing patterns / designs:

Many items, such as wallpapers, floor coverings, materials etc, are created by repeating a pattern either by reflecting, rotating or translating the pattern to create a design.

Task 22 is designed to give practice at describing how designs on special 'square' dotted paper have been created. This is followed by describing other designs and then looking around the classroom to locate and describe examples of objects that have been created by either using reflection, rotation or translation.

Task 22

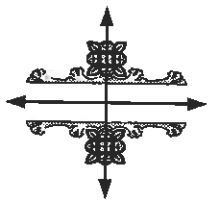
1. The design in the top left corner has been translated across to the right and below, to create this design.
2. the design in the top left corner has been a rotated ¼ turn clockwise, using where the arrowed lines cross as the centre, to its new position in the top right corner. From here the design has been rotated a further ¼

turn clockwise to the bottom right corner. A further ¼ turn clockwise results in the design being placed in the bottom left corner. (Note: This is one explanation of how this design was created, but there will be other ways to describe it, involving ½ or ¾ turns clockwise or anticlockwise.)

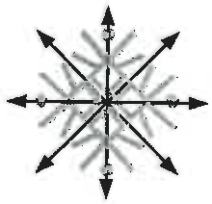
3. The design in the top left corner has been reflected to the top right corner using the vertical arrowed line as the line of symmetry. Both top designs have then been reflected below the horizontal arrowed line.

4. Design 4 has been rotated, with a similar explanation as for design 2 (see question two above).

5. This design has been created using reflection, two lines of symmetry as marked., **or** created by a ½ turn rotation, clockwise or anticlockwise, of the complete top design, with the centre between the two designs.



6. This design has been created using reflection, with 4 lines of symmetry **or** created by rotating one of the designs by ¼ turn either clockwise or anticlockwise and so on, centre in the middle of the 4 similar designs.



7. This design has been created by repeated rotations of the shape, centre in the middle between all shapes.

8. This design has been created by translating the various squares into their new positions.

Worksheet 15

Creating patterns / designs:

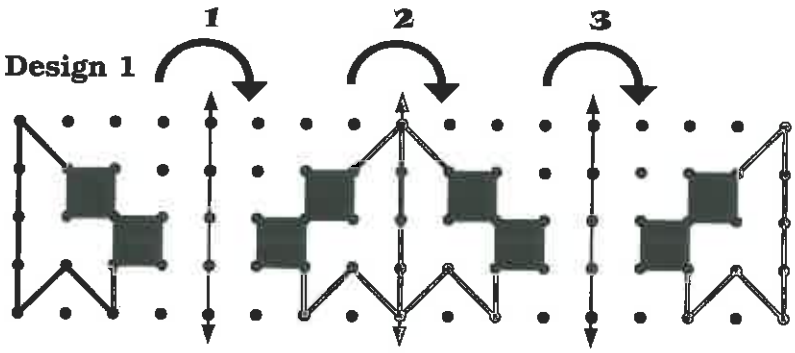
Task 23 is designed to give practice at creating designs, using special 'square' dotted paper. **Photocopy masters A & B** have been created for this task.

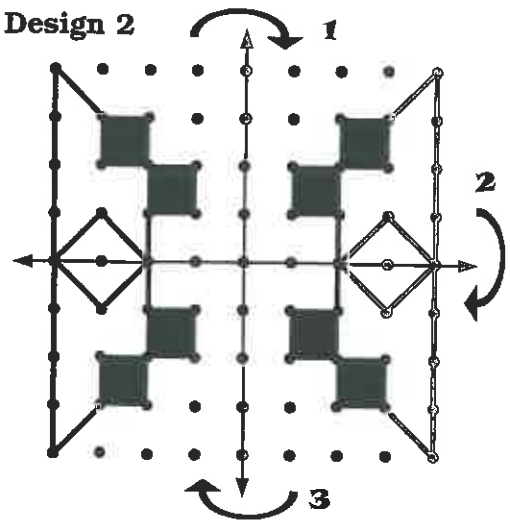
Tessellations:

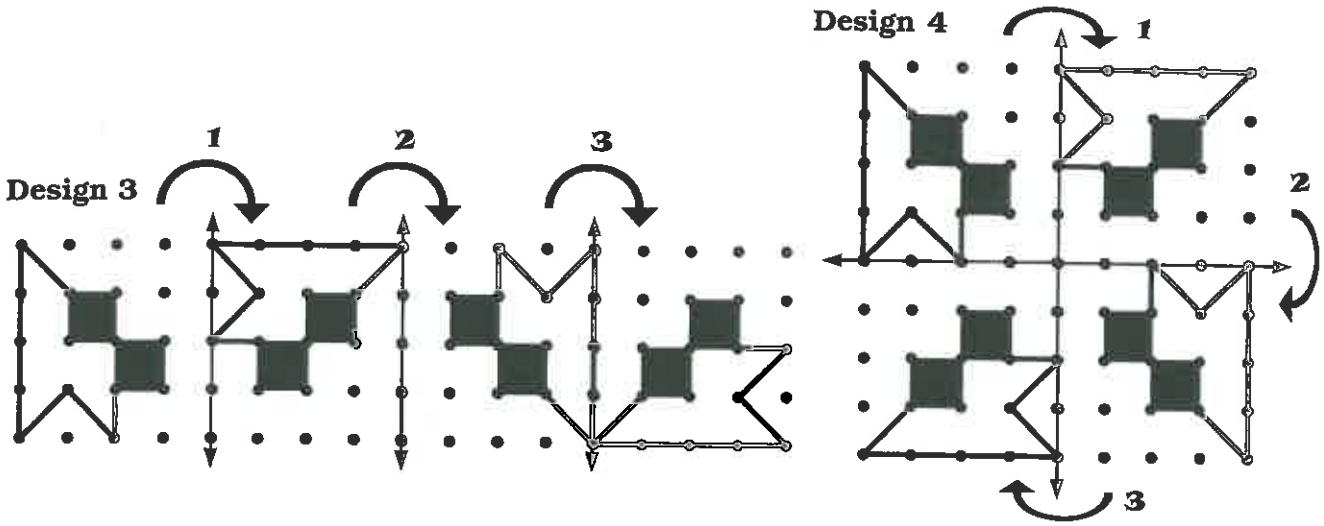
A tessellation is a design made up of shapes that join together creating a pattern that has no gaps between shapes. Many different shapes can be used to create the pattern. Floor tiles and cobblestones are good examples of tessellations.

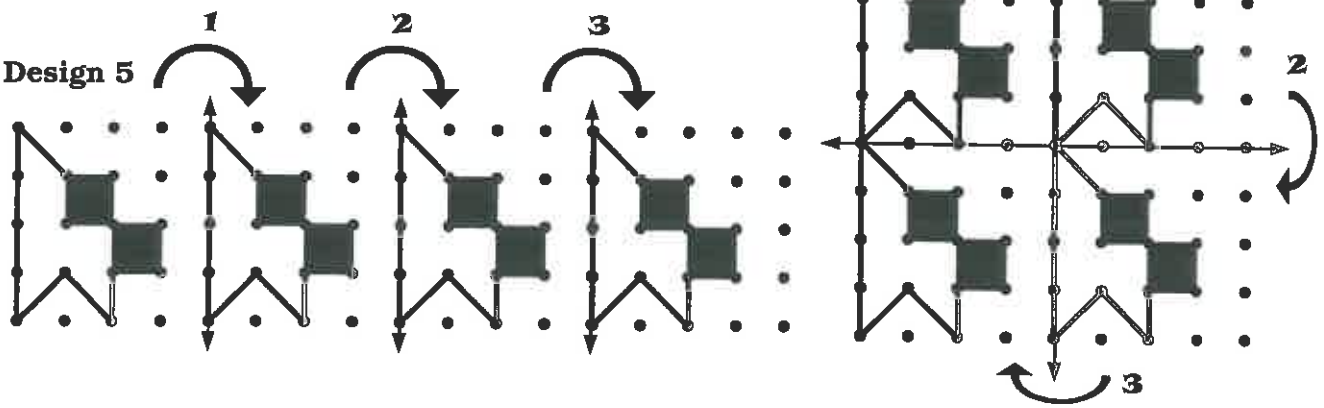
Task 24 is designed to give practice at creating tessellation designs using various shapes.

Task 23









Worksheet 16

Drawing enlargements:

For an **enlargement** to occur there must be a scale factor. The **scale factor** indicates the size of the enlargement. A positive **whole number** results in the enlarged object or diagram becoming **bigger** than the original, whereas a scale factor that is a **fraction** results in the enlarged object or diagram becoming **smaller** than the original. The original shape is called the object and the new shape is called the image. The words can also be used for any of the other transformations that have been looked at so far, that is, reflections, rotations and translations. Enlargement also needs a centre of enlargement, but at this level, locating the centre is not required.

When performing enlargements, count the number of squares on a side of the shape. Multiply this number by the scale of the enlargement to find the number of squares the new shape will have on that side. This can be done for all sides.

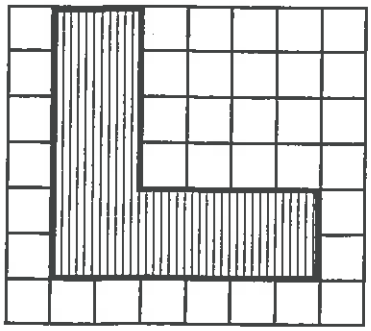
Note that if the scale of the enlargement is 2, the sides are all twice as long, but the area is 4 times as big.

Task 24 is designed to give practice at creating enlargements, given a diagram to enlarge and the scale of the enlargement. The new 'enlarged' shape can be drawn anywhere as the centre of the enlargement is not noted.

Task 24

1. scale of the enlargement = 2
2. scale of the enlargement = ½
3. scale of the enlargement = ¼
4. scale of the enlargement = 2

5.



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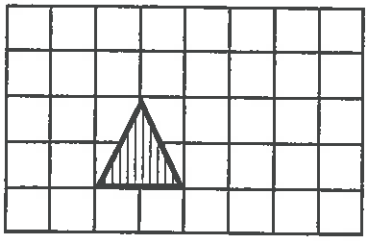

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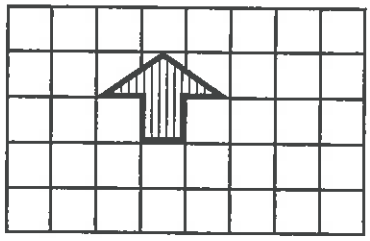

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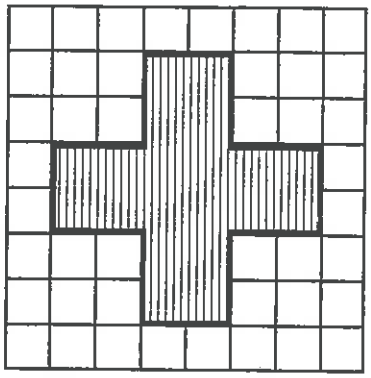
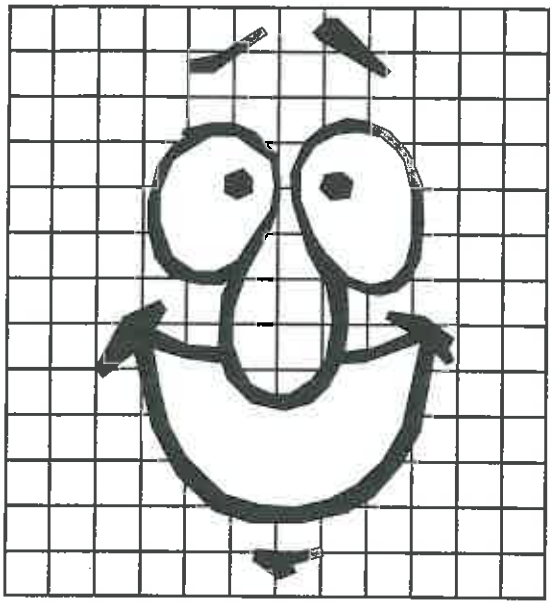


9.



1 Geometry

The following are the objectives for **Geometry**, **Level 3**, as written in the **MATHEMATICS** *in the New Zealand Curriculum* document, first published 1992. *[REFER PAGE 100]*

Exploring shape and space

Within a range of meaningful contexts, students should be able to:

- **G1** describe the features of 2-dimensional and 3-dimensional objects, using the language of geometry;
- **G2** design and make containers to specified requirements;
- **G3** model and describe 3-dimensional objects illustrated by diagrams or pictures;
- **G4** draw pictures of simple 3-dimensional objects;
- **G5** draw and interpret simple scale maps.

Exploring symmetry and transformation

Within a range of meaningful contexts, students should be able to:

- **G6** describe patterns in terms of reflection and rotational symmetry, and translations;
- **G7** design and make a pattern which involves translation, reflection, or rotation;
- **G8** enlarge, on grid paper, simple shapes to a specified scale.

At the top of each **'In-class' worksheet** and **Homework / Assessment worksheet**, the Geometry objective(s) being covered has been indicated. *EXAMPLE:* **G1** means objective 1, **G2** means objective 2, etc.

The **Mathematical Processes Skills:** **Problem Solving**, **Developing Logic & Reasoning**, **Communicating Mathematical Ideas**, are learned and assessed within the context of the more specific knowledge and skills of number, measurement, geometry, algebra and statistics. The following are the **Mathematical Processes Objectives** for **Level 3**.

Problem Solving Achievement Objectives *[Refer page 24]*

- **MP1** pose questions for mathematical exploration;
- **MP2** effectively plan mathematical exploration;
- **MP3** devise and use problem-solving strategies to explore situations mathematically;
- **MP6** use equipment appropriately when exploring mathematical ideas.

Developing Logic and Reasoning Achievement Objectives *[Refer page 26]*

- **MP8** classify objects, numbers and ideas;
- **MP9** interpret information and results in context;
- **MP14** use words and symbols to describe and continue patterns.

Communicating Mathematical Ideas Achievement Objectives *[Refer page 28]*

- **MP15** use their own language and mathematical language and diagrams to explain mathematical ideas;
- **MP16** devise and follow a set of instructions to carry out a mathematical activity;
- **MP18** record, in an organised way, and talk about the results of mathematical exploration.

Note:
The codes **MP1**, **MP2**, etc. have been created by numbering the **Mathematical Processes Achievement Objectives** in order as listed in the **MATHEMATICS** *in the New Zealand Curriculum* document. The numbering gaps occur as not all objectives are covered at **Level 3**. *[REFER TO PAGES 23 - 29 OF THE CURRICULUM DOCUMENT]*

Table of Content for the Homework / Assessment Worksheet Masters for Geometry, Level 3

Geometry

Revision / G1

Homework / Assessment Worksheet

1

Name: **Class:** **Complete by:**

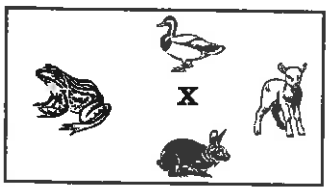
A: 10 'Quick Questions'

1. 25.3 + 96.8 = ...
2. 50.00 − 28.62 = ...
3. 105 × 12 = ...
4. 640 ÷ 80 = ...
5. Convert 5700mL to L
   .....
6. $3.65 × 9 = ...
7. What is the time on this clock?
   
   .....
8. Find 10% of $3.70
   .....
9. How many centimetres in 3.7m? .....
10. What would 7 books at $6.85 each cost?
    .....

B: Directional words

Darren is standing at the point marked by an **X** on this diagram, surrounded by his pets. He is facing north.

1. As Darren is facing north, which pet is directly in front of him?
   .....



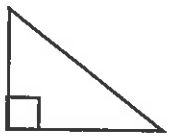
2. Which animal will Darren see if he turns to his left? .....
3. If Darren does a $\frac{1}{4}$ turn clockwise, which pet will he face?
   .....
4. Which pet is south of Darren? .....
5. Describe **two** different ways in which Darren could move, so that he could see the frog.
   .....
   .....
   .....

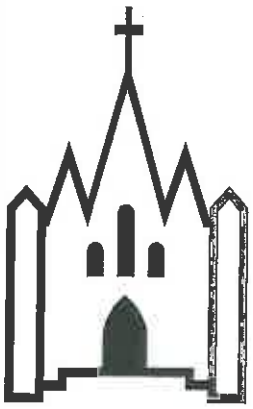
C: Parallel and perpendicular

1. Draw two lines that are parallel.

2. Draw two lines that are perpendicular.

3. What do we call an angle between two lines that has a small box drawn in the corner, as in this diagram?
   .....





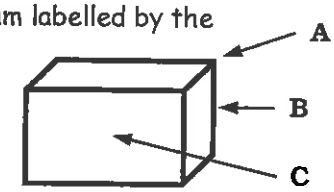
4. On this diagram, circle a pair of lines that are perpendicular. Label with the letter **A**.

5. On this diagram, circle a pair of lines that are parallel. Label with the letter **B**.

D: Faces, edges & vertices

Use the words **face**, **edge** and **vertex**, to name the parts of this diagram labelled by the letters A, B & C.

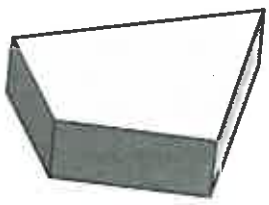
1. A = ...
2. B = ...
3. C = ...

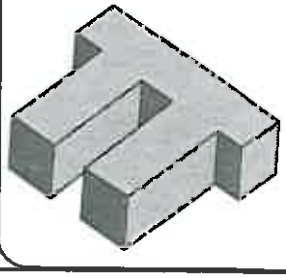


How many faces, edges and vertices do these 3D shapes have, including the ones you cannot see?

4. faces = ...
   edges = ...
   vertices = ...

5. faces = ...
   edges = ...
   vertices = ...





6. faces = ...
   edges = ...
   vertices = ...

Comments: .....
.....
.....

Please sign: Parent / Caregiver

AWS

Geometry

G1 / G3

Homework / Assessment Worksheet

2

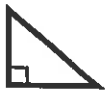
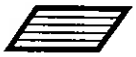
Name: **Class:** **Complete by:**

A: 10 'Quick Questions'

1. 2.36 + 10.80 = ...
2. 600 - 194 = ...
3. 3.56 × 8 = ...
4. 420 ÷ 7 = ...
5. List the factors of 16
   .....
6. $420 ÷ 60 = ...
7. Convert 3:45 p.m. to 24 hour time
   [:]
8. Find 50% of 560kg
   .....
9. How many days in $9\frac{1}{2}$ weeks? .....
10. If 9 books cost $20.25, what does one book cost?
    .....

B: Naming 2D shapes

Name these 2D shapes drawn below, using the names in the box.

1.  .....
2.  .....
3.  .....
4.  .....
5.  .....
6.  .....
7.  .....
8.  .....
9.  .....
10.  .....
11.  .....
12.  .....

hexagon, triangle, ellipse (oval), decagon, heptagon, circle, octagon, rectangle, parallelogram, nonagon, pentagon, square

C: Naming 3D shapes

Name these 3D shapes, using the words in the box.

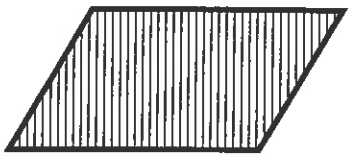
1.  .....
2.  .....
3.  .....
4.  .....
5.  .....
6.  .....

cylinder, cube, cone, cuboid (rectangular box), sphere, triangular prism

D: Describing 2D shapes

Describe using geometry words, each of these 2D shapes.

1. .....
   .....
   .....
   .....
   .....



2. .....
   .....
   .....
   .....
   .....

E: Describing 3D shapes

Imagine you are talking on the telephone. Describe each 3D shape below, using geometry words such as face, edge, vertices, parallel, perpendicular and right-angled.

1. .....
   .....
   .....
   .....

2. .....
   .....
   .....
   .....

Comments: .....
.....
.....

Please sign:
Parent / Caregiver
.....

AWS

Geometry

G2 / G4

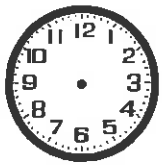
Homework / Assessment Worksheet

3

Name: **Class:** **Complete by:**

A: 10 'Quick Questions'

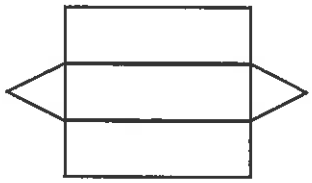
1. 0.36 + 5.90 = ...
2. 20.00 - 12.6 = ...
3. 325 × 9 = ...
4. 720 ÷ 90 = ...
5. Convert 5.3g to mg
   .....
6. $2.50 × 8 = ...
7. Draw 20 to 4 on this clock face



8. Solve $X + 25 = 57$
   X = ...
9. How many days in September? .....
10. If 8 books cost $27.60, what does one book cost?
    .....

B: Understanding and using 'Nets'

Peter made a special box for a birthday present. Below is the net for his box.



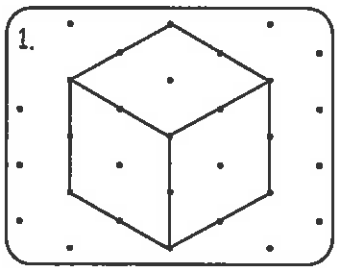
1. When this net is folded to form the box, what shape does it create?
   .....

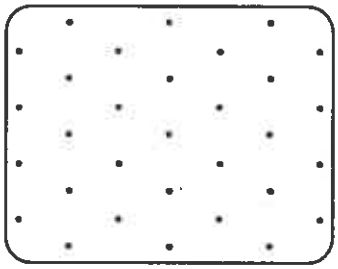
2. Draw a net for this container.

C: Drawing 3D objects / Isometric paper

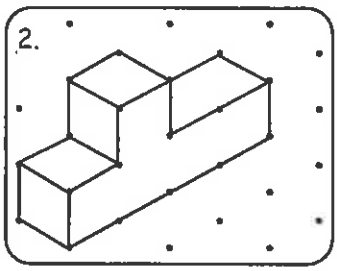
Copy these diagrams onto the isometric paper.

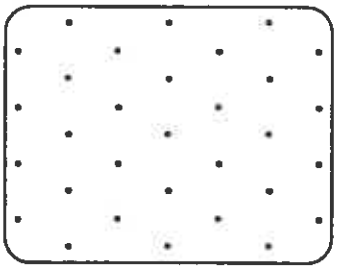
1.



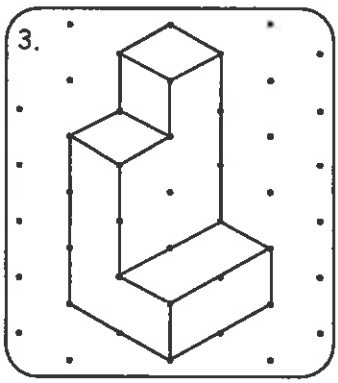


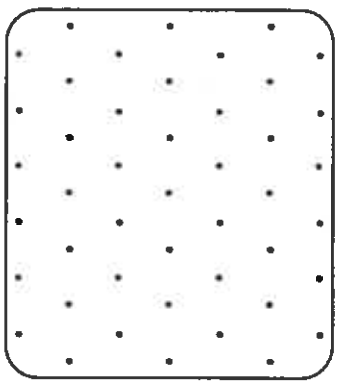
2.





3.

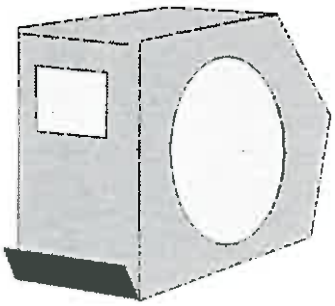


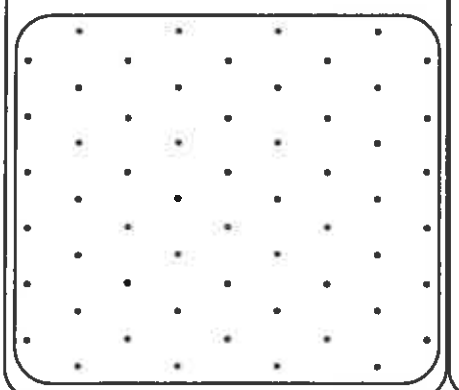


D: Drawing 3D object

Draw this object on the isometric paper below.

1.





Comments: .....

.....

.....

Please sign:
Parent / Caregiver

.....

AWS

Geometry

G5

Homework / Assessment Worksheet

4

Name: **Class:** **Complete by:**

A: 10 'Quick Questions'

1. 56.30 + 0.96 = ...
2. 1111 − 586 = ...
3. 8.65 × 40 = ...
4. 3200 ÷ 8 = ...
5. List the first 5 multiples of 12

   .....
6. $2400 ÷ 30 = ...
7. Convert 8:24 a.m. to 24 hour time

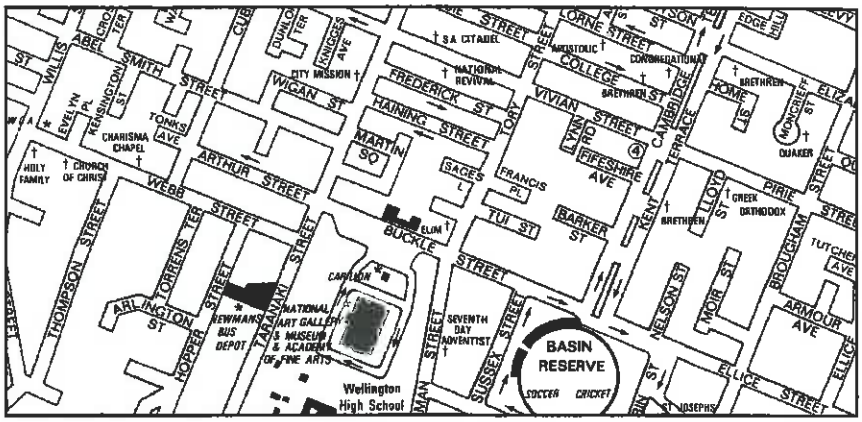
   :
8. Find $\frac{3}{4}$ of 240mm

   .....
9. How many weeks in $52\frac{1}{2}$ days? .....
10. If 12 books cost $9.00, what does one book cost?

    .....

B: Understanding scale maps

Below is part of a map of Wellington.



Scale: 0 500m 1000m

1. On the scale above, 2cm is equal to ..... metres.
2. Find and measure the length of Webb Street, to the nearest centimetre. .....
3. Using your measurement in question 2 and the scale, is Webb Street 500m, 1000m or 1500m long? .....

Locate the Basin Reserve on the map. Follow these instructions ...

- exit the Basin Reserve using Sussex Street,
- turn right as you exit, then turn left into Buckle Street,
- turn right into Taranaki Street, then turn down the fourth street on your right,

4. What street are you in now? .....
   - walk to the end of this street and turn right,
5. What street are you in now? .....
   - continue walking, then turn into the 3rd street on your left,
6. What street are you in now? .....
   - walk down this street until you come to a park.
7. Where are you now? .....

C: Drawing pathways (loci)

Draw the locus for each of these situations.

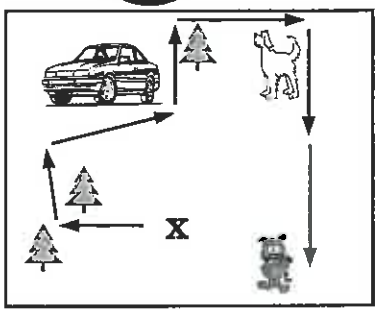
1. A bee flying around your head.

2. A ball rolling off a stool.

D: Describing a pathway (locus)

Billy ran around his backyard as follows.
Describe his path, starting at point **X**.

.....
.....
.....
.....
.....
.....
.....
.....



Comments: .....
.....
.....

Please sign:
Parent / Caregiver

AWS

Geometry

G6 / G7

Homework / Assessment Worksheet

5

Name: **Class:** **Complete by:**

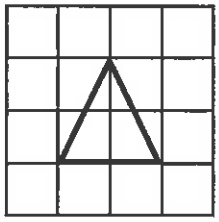
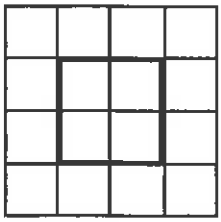
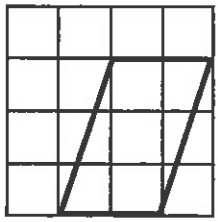
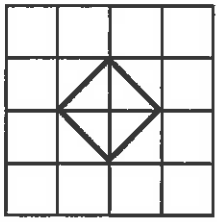
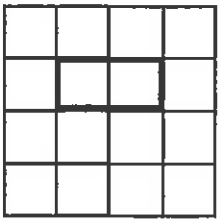
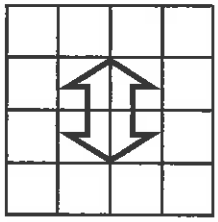
A: 10 'Quick Questions'

1. 23.60 + 1.39 = ...
2. 56.30 − 9.65 = ...
3. 9.85 × 8 = ...
4. 4500 ÷ 90 = ...
5. Convert 8.4m to cm
   .....
6. $8.64 × 11 = ...
7. Draw 25 past 7 on this clock face

8. Solve $X - 42 = 64$
   X = ...
9. How many days in December? .....
10. If 11 books cost $46.20, what does one book cost?
    .....

B: Exploring reflections

On these simple shapes, draw in the lines of symmetry, if they have any.

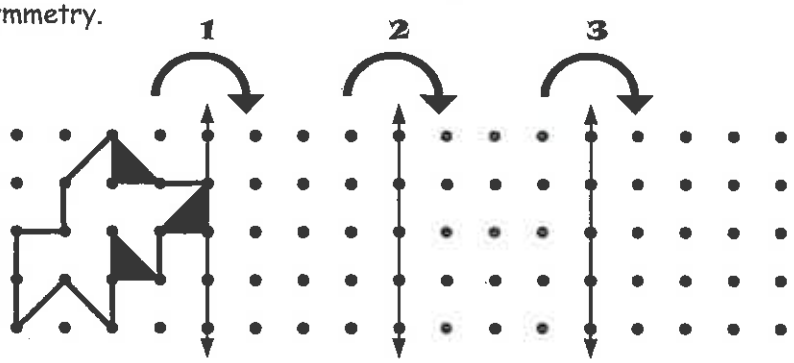
1. 
2. 
3. 
4. 
5. 
6. 

How many lines of symmetry does each shape above have?

7. question 1 = ... question 2 = ... question 3 = ...
   question 4 = ... question 5 = ... question 6 = ...

C: Creating designs

Reflect the design in the left-hand square 3 times, as shown by the numbered arrows, to create a design using the arrows as lines of symmetry.



D: Paper designs

Cut two small pieces of paper that will fit in the boxes below. By folding the paper and using scissors, create designs with the following number of **lines of symmetry**.

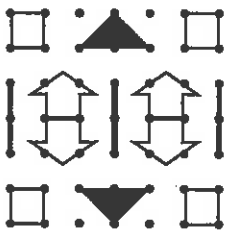
1. **1** line of symmetry.

2. **2** lines of symmetry.

E: Describing patterns

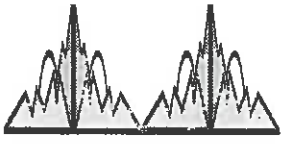
Describe how each design was created.
Draw in any lines of symmetry.

Design 1



1. .....
   .....
   .....

Design 2



2. .....
   .....
   .....

Comments: .....
.....
.....

Please sign:
Parent / Caregiver
.....

AWS

Geometry

G6 / G7

Homework / Assessment Worksheet

6

Name: **Class:** **Complete by:**

A: 10 'Quick Questions'

1. 0.36 + 12.90 = ...
2. 222 – 109 = ...
3. 7.39 × 60 = ...
4. 5600 ÷ 70 = ...
5. List the first 5 multiples of 8

   .....
6. $63.60 ÷ 30 = ...
7. Convert 11:56 p.m. to 24 hour time

   [:]
8. Find 75% of 36m

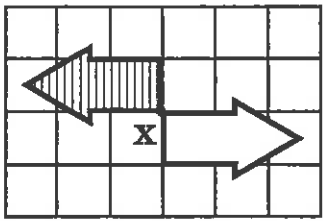
   .....
9. How many weeks in one year? .....
10. What would 14 books at $1.25 each cost?

    .....

B: Exploring rotation

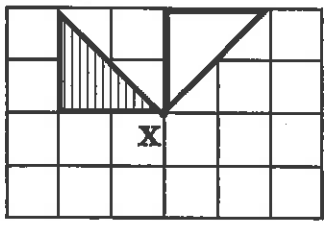
Each striped shape has been rotated to a new position (clear shape). **Describe** how each rotation has been carried out. The centre of each rotation is marked by the letter **X**.

1.



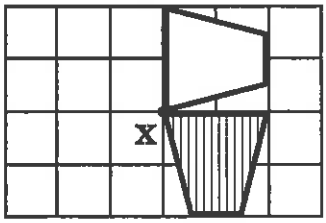
.....
.....
.....

2.



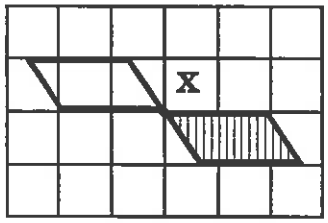
.....
.....
.....

3.



.....
.....
.....

4.



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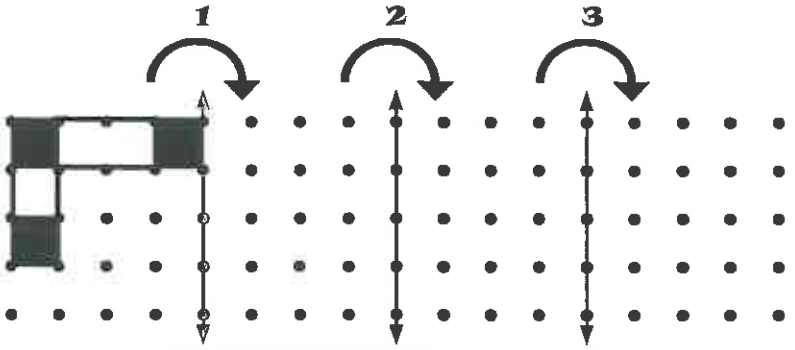
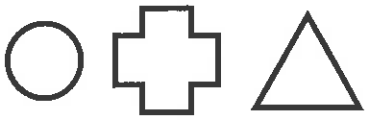
C: Creating designs

Rotate the design in the left-hand square ¼ **turn clockwise** 3 times, as shown by the numbered arrows, to create a design.



D: Rotational symmetry

The following pieces are from a puzzle.



The number of different ways these shapes can fit into this puzzle is the rotational symmetry for that shape.

What is the rotational symmetry for each shape?

1.  .....
2.  .....
3.  .....

E: Describing designs

Describe how this design has been created.

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.....
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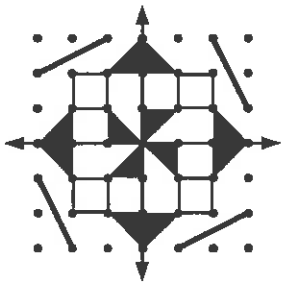

Comments: .....
.....
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Please sign:
Parent / Caregiver

.....

AWS

Geometry

G6 / G7

Homework / Assessment Worksheet

7

Name: **Class:** **Complete by:**

A: 10 'Quick Questions'

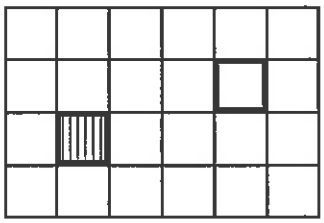
1. 56.80 + 8.65 = ...
2. 85.60 - 4.75 = ...
3. 7.63 × 9 = ...
4. 3600 ÷ 120 = ...
5. Convert 562mm to cm
   .....
6. $4.63 × 11 = ...
7. Draw $\frac{1}{4}$ past 6 on this clock face

8. Solve X × 12 = 108
   X = ...
9. How many days in January? .....
10. If 100 books cost $75.00, what does one book cost?
    .....

B: Exploring translations

The striped shapes have been translated to a new position (clear shape). Describe each translation starting with the left or right movement first, followed by the up or down movement.

1.



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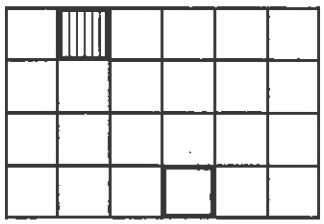
2.



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.....
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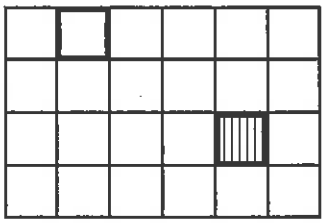
3.



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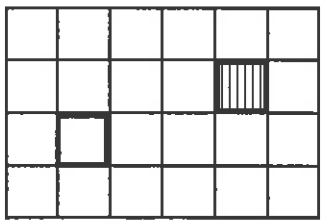
4.



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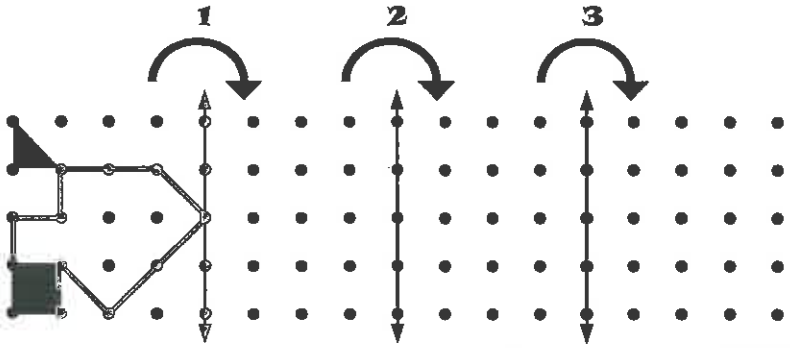
C: Creating designs

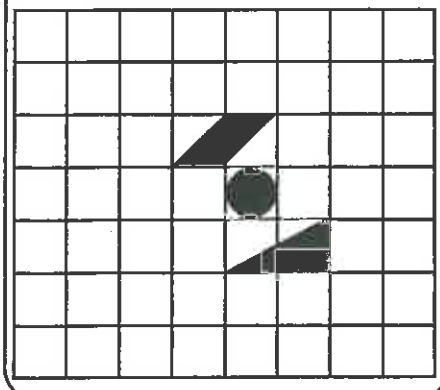
Translate the design in the left-hand square 3 times, as shown by the numbered arrows, to **create** a design.



D: Translating shapes

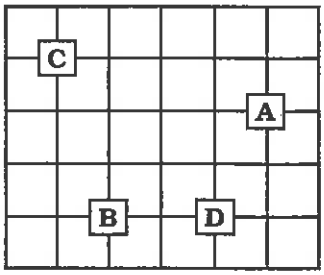
Move each shape by the directions given. **Draw** the new position of each shape.

1. Move the triangle 2 squares to the right, then 3 squares up.
2. Move the circle 3 squares to the left, then 3 squares up.
3. Move the parallelogram 1 square to the left, then 4 squares down.



E: Describing translations

Using the compass directions, describe how you would get from ... (1 square = 10 metres across)



1. A to B .....
2. B to C .....
3. C to D .....

Comments: .....
.....
.....

Please sign:
Parent / Caregiver
.....

AWS

Geometry

G7 / G8

Homework / Assessment Worksheet

3

Name: **Class:** **Complete by:**

A: 10 'Quick Questions'

1. 0.48 + 19.62 = ...
2. 444 - 268 = ...
3. 6.95 × 80 = ...
4. 6300 ÷ 70 = ...
5. List the first 5 multiples of 13

   .....
6. $84.80 ÷ 20 = ...
7. Convert this time to a.m or p.m. .....

   15:45
8. Find 25% of 48km

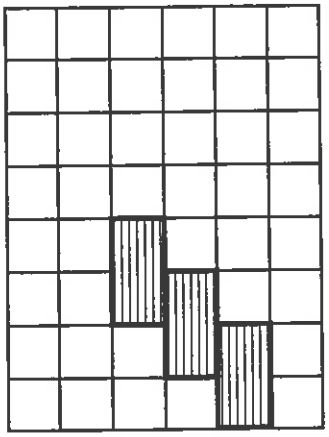
   .....
9. How many days in a leap year? .....
10. What would 200 books at $0.65 each cost?

    .....

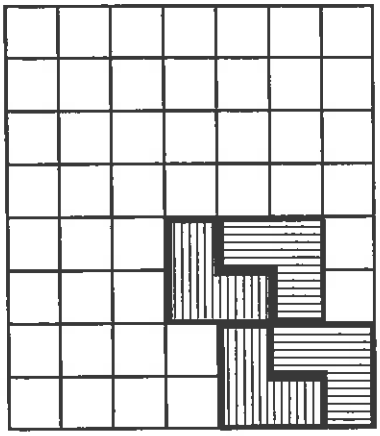
B: Tessellations

Add 10 more of the same shape to each diagram to show you understand what tessellating is.

1.



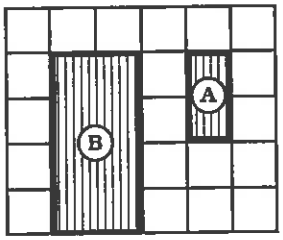
2.



C: Exploring enlargement

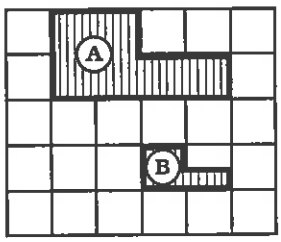
Study each pair of diagrams, then work out the **scale** of the enlargement. **A** is the original diagram, **B** is the new diagram.

1.



The scale of the enlargement is .....

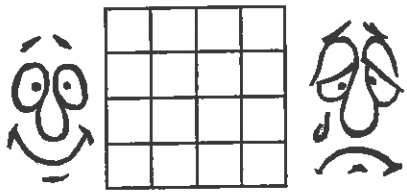
2.



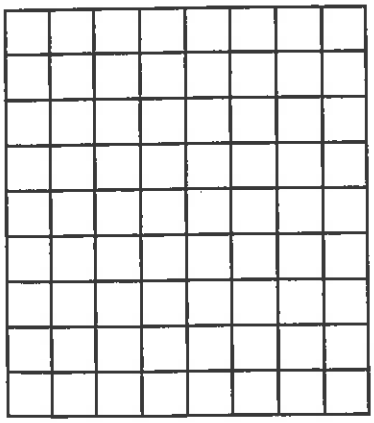
The scale of the enlargement is .....

D: Drawing enlargements

Draw a face in the top grid.

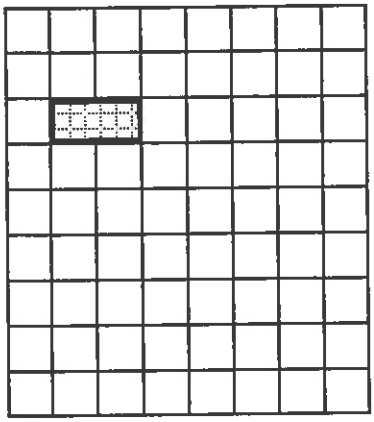


Draw a new diagram of your face but, **enlarge** your diagram by a **scale of 2**.

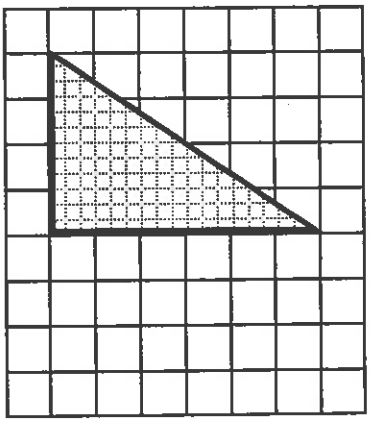


E: Drawing enlargements

Enlarge each shape by the **scale** given. Note that one of the shapes will get smaller.



1. Enlarge the shape using a scale of 3.



2. Enlarge the shape using a scale of $\frac{1}{2}$.

Comments: .....

.....

.....

Please sign:
Parent / Caregiver

.....

AWS

Homework / Assessment Worksheet

Answers

Worksheet 1

A:

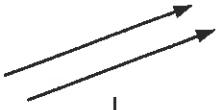
1. 122.1 2. 21.38 3. 1260 4. 8 5. 5.7L 6. $32.85 7. 10 past 8 8. 37 cents or $0.37 9. 370cm 10. $47.95

B:

1. duck 2. frog 3. lamb 4. rabbit 5. turn towards the west, ¼ turn anticlockwise, ¾ turn clockwise, turn to his left

C:

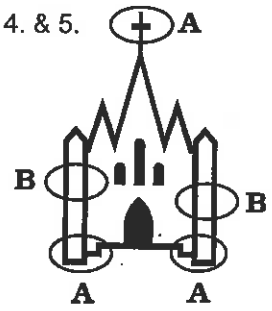
1.



2.

3. a right-angle

4. & 5.



D:

1. A = vertex, 2. B = edge, 3. C = face
4. faces = 5, edges = 9, vertices = 6
5. faces = 6, edges = 12, vertices = 8
6. faces = 14, edges = 36, vertices = 24

Worksheet 2

A:

1. 13.16 2. 406 3. 28.48 4. 60 5. 1,2,4,8,16 6. $7.00 7. 15:45 8. 280kg 9. 66½ days 10. $2.25

B:

1. circle 2. ellipse 3. triangle 4. square 5. rectangle 6. parallelogram 7. pentagon 8. hexagon
9. heptagon 10. octagon 11. nonagon 12. decagon

C:

1. cube 2. triangular prism 3. cuboid 4. cone 5. sphere 6. cylinder

D:

1. this shape has three sides of different length, two of the sides are perpendicular or have a right-angle between them, the shape is called a right-angled triangle
2. the shape has four sides, opposite sides are parallel to each other, there are no right-angles between the sides, the shape is a parallelogram

E:

1. this shape has 6 faces, 12 edges and 8 vertices, the opposite faces / sides are parallel, there are right-angles between faces, the top and bottom of the shape are perpendicular to the sides, the shape is called a cuboid
2. this shape has 3 faces, 2 edges, but no corners, the top and bottom of the shape are circular and are perpendicular to the sides, the shape is called a cylinder

Worksheet 3

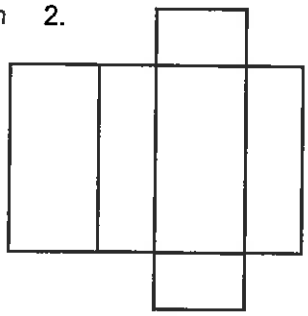
A:

1. 6.26 2. 7.4 3. 2925 4. 8 5. 5300mg 6. $20.00 7.

8. X = 32 9. 30 days 10. $3.45

B:

1. triangular prism 2. this is one possible net



Worksheet 4

A:

1. 57.26 2. 525 3. 346 4. 400 5. 12,24,36,48,60 6. $80 7. 08:24 8. 180mm 9. 7½ weeks 10. 75 cents or $0.75

B:

1. 500m 2. 4cm 3. 1000m 4. Frederick Street 5. Tory Street 6. Buckle Street 7. Basin Reserve

C:

1. any path you like 2. up and down lines getting smaller each time

D:

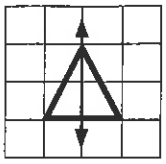
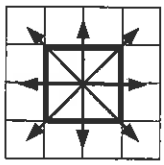
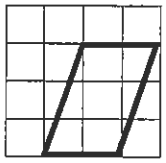
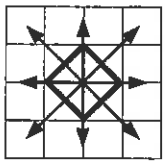
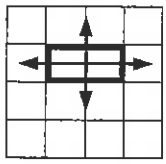
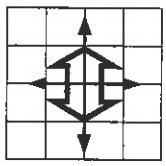
Starting from point X, head west, going between the two trees. Turn to your right and head north towards a car, turning right towards the east and go to the back of the car. Head north again up to a tree, before turning east past the tree towards a dog. Having gone past the dog, turn towards the south and go to the cat, then stop.

Worksheet 5

A:

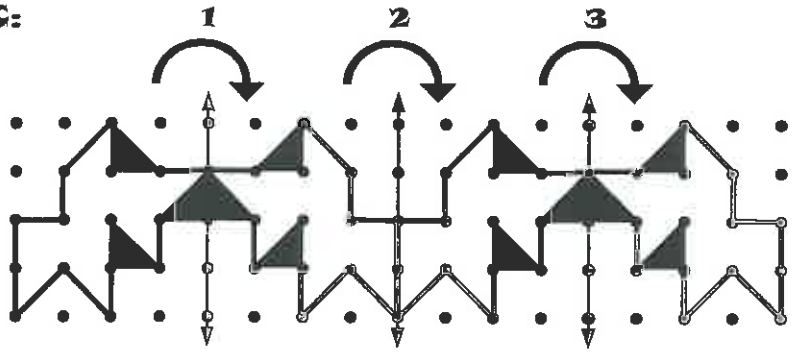
1. 24.99 2. 46.65 3. 78.8 4. 50 5. 840cm 6. $95.04 7.  8. 106 9. 31 days 10. $4.20

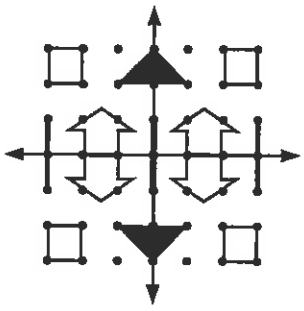
B:

1.  2.  3.  4.  5.  6. 

7. question 1 = 1, question 2 = 4, question 3 = 0, question 4 = 4, question 5 = 2, question 6 = 2

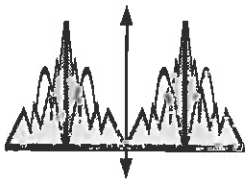
C:





E:

1. Design 1 has 2 lines of symmetry. A design was created in one corner, *example:* top left corner. The design was reflected to the right, using the vertical line of symmetry. This design (top left & top right), was then reflected down below the horizontal line of symmetry. (NOTE: There will be other explanations as well).
2. Design 2 has one line of symmetry as shown. The design on the left was reflected to the right. Within each side there is also a line of symmetry.



Worksheet 6

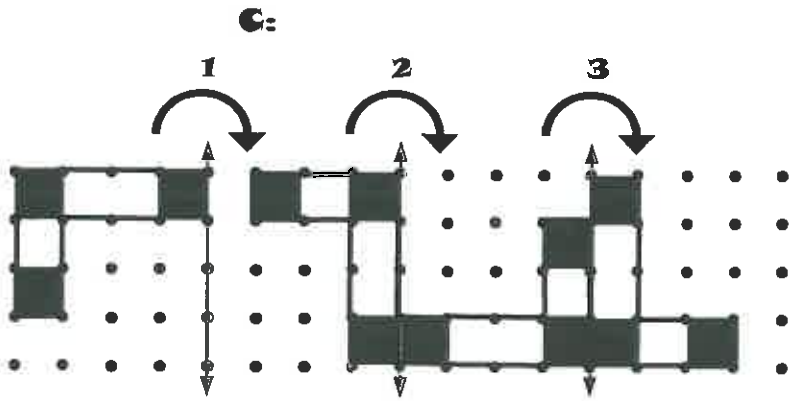
A:

1. 13.26 2. 113 3. 443.4 4. 80 5. 8,16,24,32,40 6. $2.12 7. 23:56 8. 27m 9. 52 weeks 10. $17.50

B:

1. rotate shape a ½ turn clockwise or a ½ turn anti-clockwise about point X
2. rotate shape a ¼ turn clockwise about point X
3. rotate shape a ¼ turn anti-clockwise about point X
4. rotate shape a ½ turn clockwise or a ½ turn anti-clockwise about point X

C:



D:

1. 3 2. 4 3. infinite number

E:

C:

A design was created in one corner, *example:* top left. The design was rotated a ¼ turn clockwise or a ¼ turn anti-clockwise and so on, using where the arrowed lines cross as the centre of the rotation.

Worksheet 7

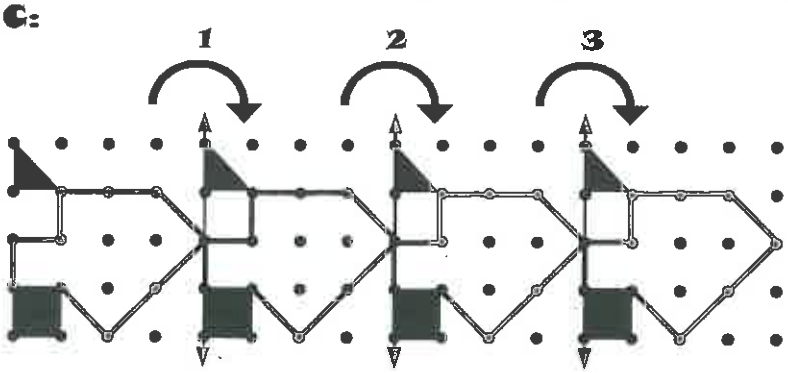
A:

1. 65.45 2. 80.85 3. 68.67 4. 30 5. 56.2cm 6. $50.93 7.  8. 9 9. 31 days
10. 75 cents or $0.75

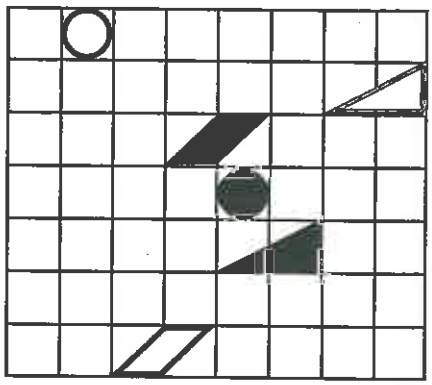
B:

1. 3 squares to the right, 1 square up 2. 2 squares to the right, 3 squares down
3. 3 squares to the left, 2 squares up 4. 3 squares to the left, 1 square down

C:



D:



E:

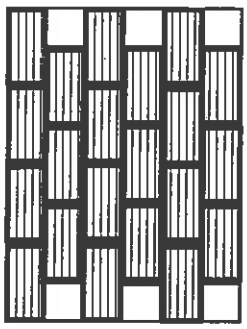
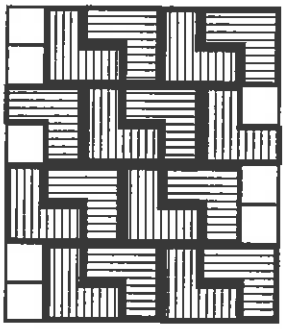
1. 30 metre west (3 squares left), 20 metres south (2 squares down)
2. 10 metres west (1 square left), 30 metres north (3 squares up)
3. 30 metres east (3 squares right), 30 metres south (3 squares down)

Worksheet 8

A:

1. 20.1 2. 176 3. 556 4. 90 5. 13,26,39,52,65 6. $4.24 7. 3:45 p.m. 8. 12km 9. 366 days
10. $130.00

B:

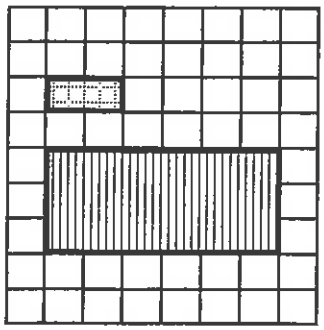
1.  2. 

Two possible tessellations

C:

1. scale of enlargement is 2 2. scale of enlargement is ½

E:

1.  2.