Name: ………………………………..

Year Level: ……… Date: …….

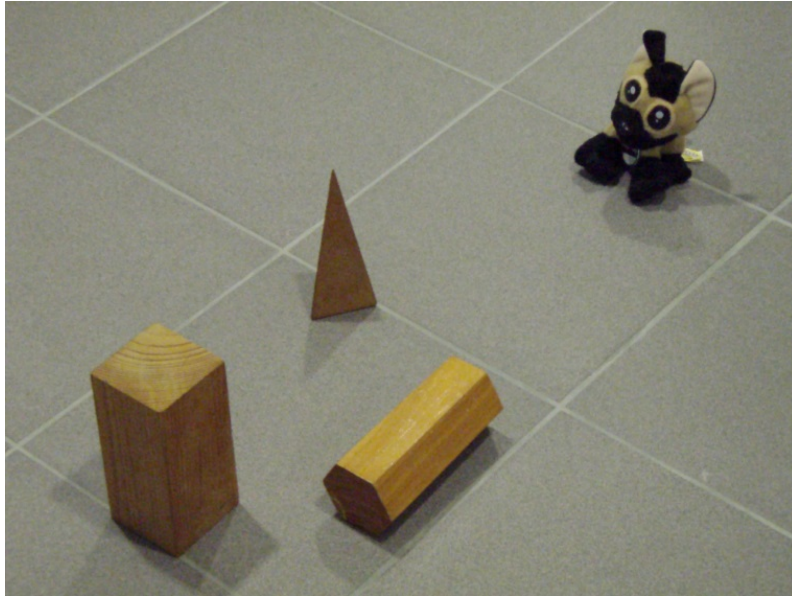# GEOMETRY FORM B

Assessment Booklet

Reframing Mathematical Futures II

An Australian Mathematics & Science Partnership Project (2015-2018)

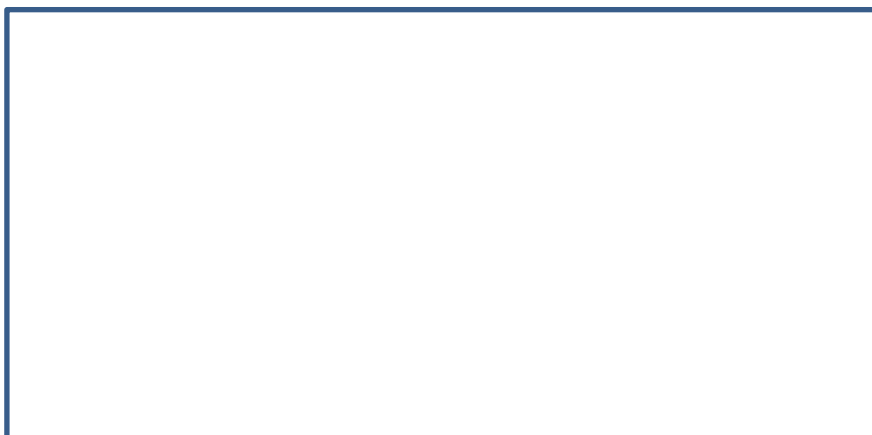# GEOMETRY FORM B

1. Different Perspectives

The dog in the picture below is looking at three wooden shapes.

a [GPERS1]

Looking at the picture, name the wooden shape

1. On your left _____

2. On your right _____

3. In the middle at the top _____

b [GPERS2]

Draw what the dog sees

c [GPERS3]

Explain how you decided what to draw (in **part b**) and where to draw it.

2. Spy squad: Racing to the Clue

Your squad is being sent to a phone booth on Bray St to pick up a clue. You are in a taxi going along Centre Rd but the traffic is bad so the average speed is only 8 km per hour. You are following your progress on the map below but the taxi is currently stopped at point A on the map.
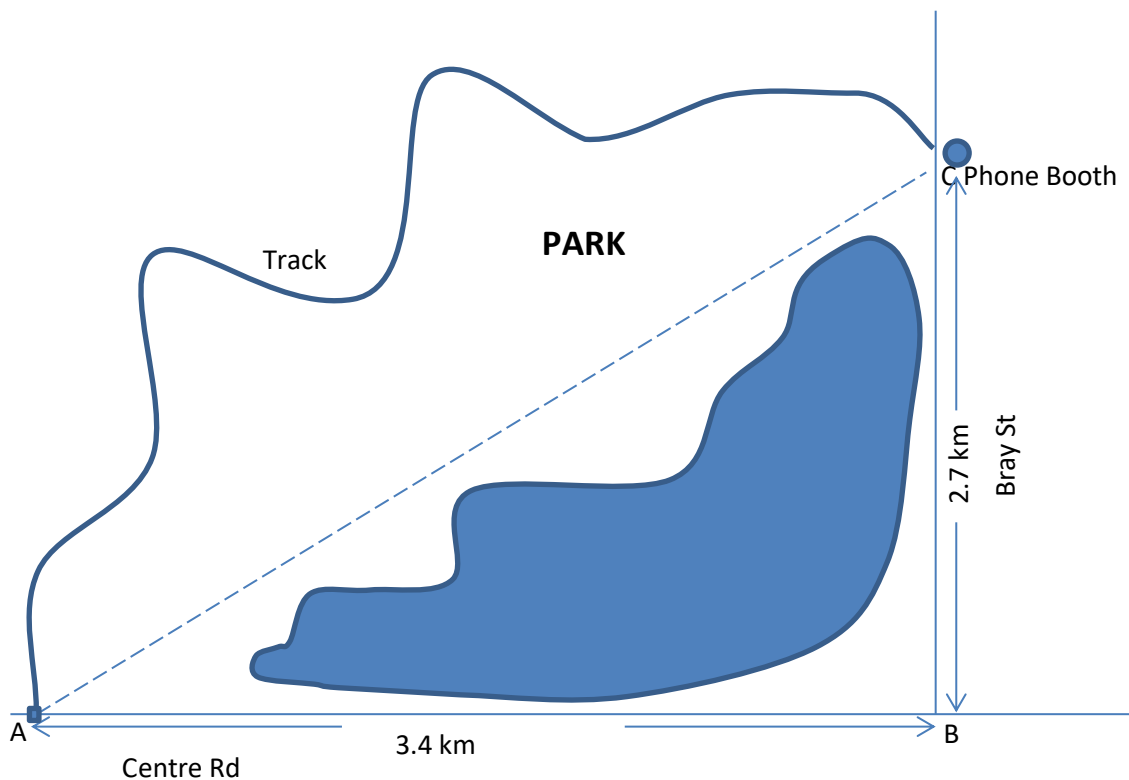
a [GSPSQ7]

How long will it take the taxi to get to point B if the speed is 8 km per hour?

b [GSPSQ8]

How long will it take the taxi to travel from B to the phone booth at C if average speed is still 8 km per hour?

3. All about size

a   [GSZLV]

Matt said that if you double the length of all the edges of a shoe box, it will double in volume.

Do you agree? Explain your reasoning (You may use diagrams if you wish).

b   [GSZLSA]

Matt then says that if you double the lengths of all the edges of a shoe box, its surface area will double. Do you agree? Explain your answer (You may use diagrams if you wish).

c   [GSZLJ]

Jane makes a Christmas cake that is 20 centimetres in diameter and 7 centimetres in height.

She cuts the cake in half and sends half of the cake and a small present to her grandma.

The present is 12 centimetres long, 7 centimetres wide and 8 centimetres high.

Postage at the post office is charged by the size of the box.

	Length	Width	Height
Box 1	200mm	180mm	77mm
Box 2	310mm	225mm	102mm

Which of these two boxes should Jane choose? Explain how you decided.

4. Shape definitions

Look at the shapes below.
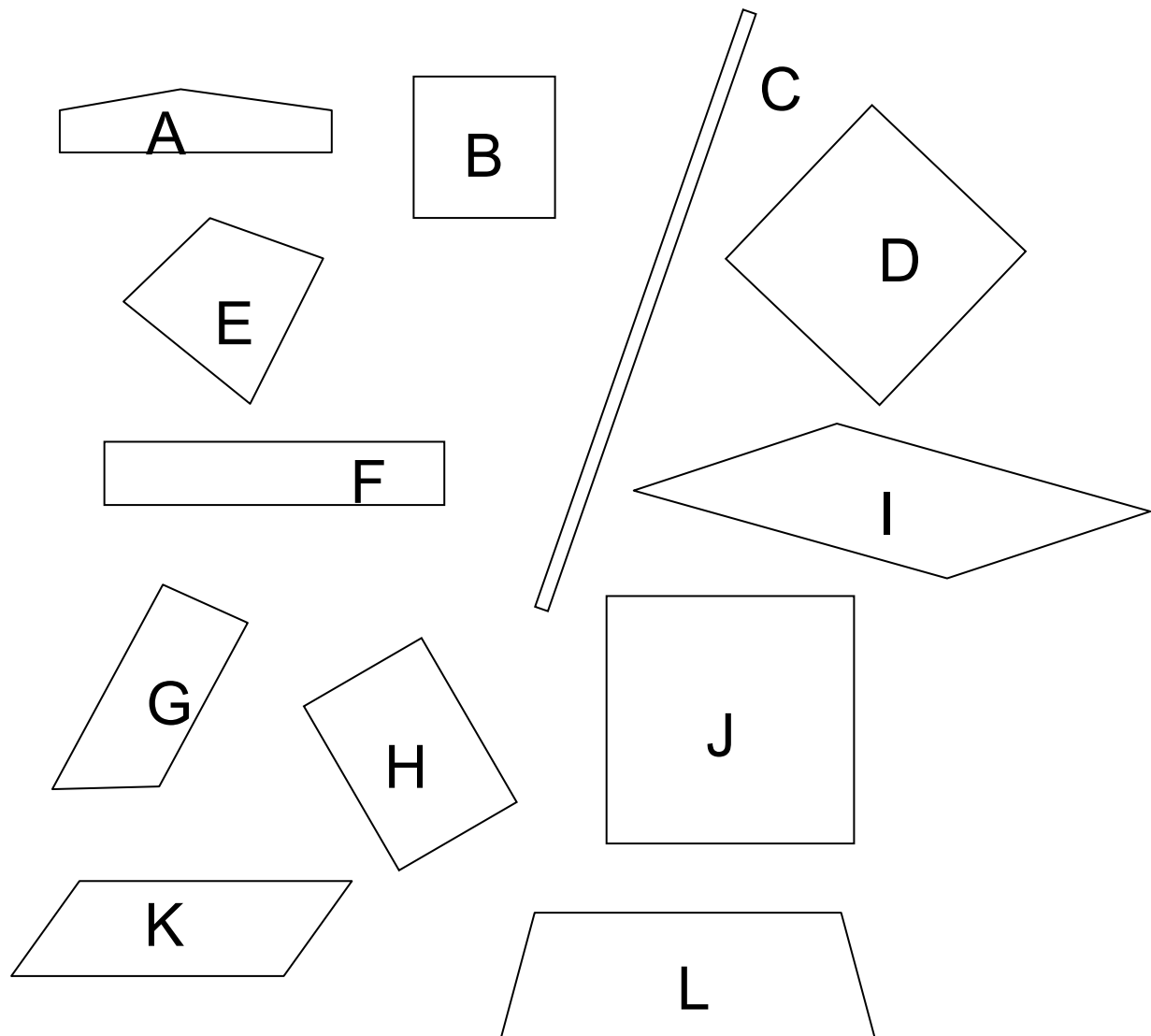
a [GRECT1]
Circle each shape that is a rectangle

b [GRECT2]
Explain your reasoning

c [GRECT3]
Explain why shape D **is** OR **is not** a rectangle

5. Logo

A designer draws a triangular logo on grid paper. He wants to enlarge the logo so the sides are twice
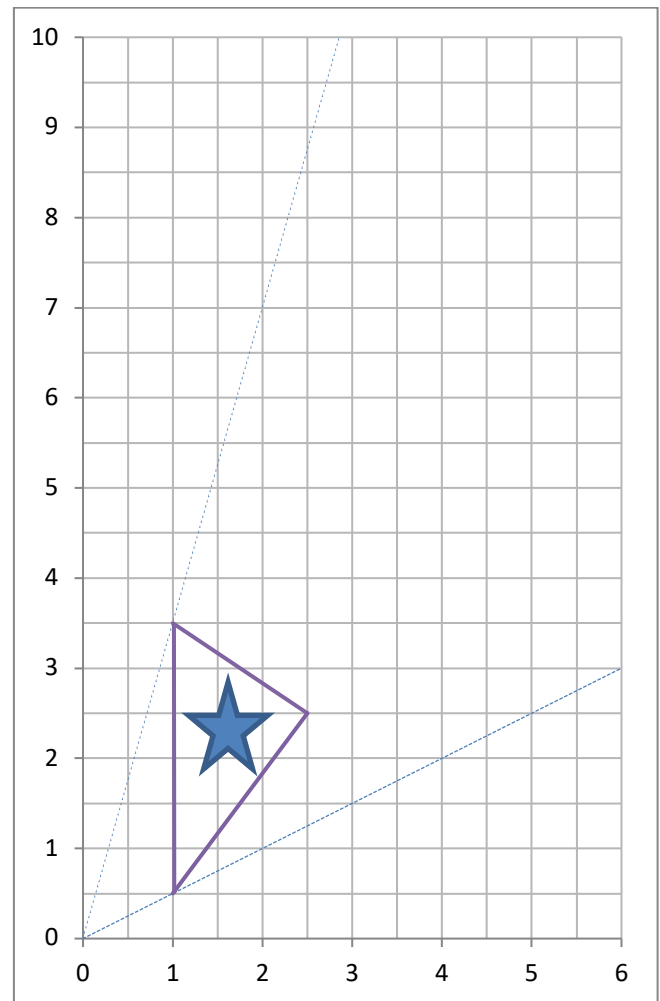as long.

a [GCRD1]
Draw his enlarged logo on the graph.

b [GCRD2]
Write the coordinates of the corners A',
B', and C' of the new large triangle:

A' _____

B' _____

C' _____

c [GCRD3]
If the area of the original logo is 2.25m²,
what will the area of the new logo be?
Explain how you know?

6. Tiling

a [GTESS]

Jo is using a shape of tile to completely cover his bathroom floor (no gaps).

Circle any of the tile shapes shown here that he cannot use.

Explain your reasoning.
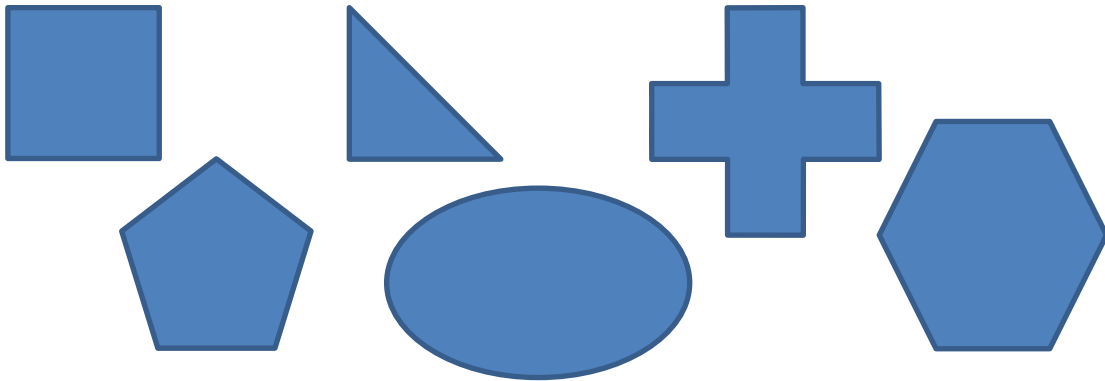
b [GTILE1]

Charles is putting a rectangular mosaic feature in his courtyard.

He has 36 special tiles for the feature. Each tile has an area of 100 cm^2. The feature is to have a thin metal strip around the outside edge to hold it in place.

Draw three different size rectangles he could make. Mark their dimensions.

How long will the metal strip need to be for each one?
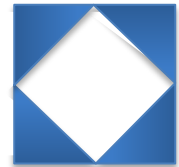
c [GTILE2]

He wants to keep the metal strip as short as possible. What are the dimensions of the rectangle he should make?

GEOMETRY FORM B RUBRIC

1. GPERS1

SCORE	DESCRIPTION
0	No response or irrelevant response
1	Names at least two objects in terms of their faces (e.g., square, rectangle, hexagon or triangle), may name one object correctly (e.g., cuboid or rectangular prism) or names faces or objects from dog's perspective)
2	Names at least two objects correctly relative to the student's perspective (see below)
3	All objects named correctly relative to the student's perspective (i.e., cuboid or rectangular prism, hexagonal prism and triangular pyramid)

GPERS2

SCORE	DESCRIPTION
0	No response or irrelevant response
1	Draws shapes (2D) or objects (3D) from the student's perspective
2	Draws at least one correct shape from the dog's perspective (see below)
3	Draws three correct shapes (2D) or objects (3D) from the dog's perspective but in reverse order (i.e., for 2D triangle, rectangle, hexagon).
4	Draws three correct shapes or objects (2D or 3D) in the correct position from the dog's perspective (i.e., for 2D a hexagon on the left, a rectangle in the middle and a triangle on the right)

GPERS3

SCORE	DESCRIPTION
0	No response or irrelevant response
1	Explanation relates to what the student sees
2	Explanation relates to correct shapes or correct position but not both
3	Reasonable explanation provided for naming all shapes and their position

2. GSPSQ7

SCORE	DESCRIPTION
0	No response or irrelevant response
1	Incorrect due to errors in calculation but recognises relevance of distance divided by speed in some way
2	Correct (0.425 hours, approximately 0.4 hours or 24-26 minutes). Working should show 3.4/8 which gives the hours or some similar approach (e.g., find time for 3 km and 4 km and split the difference)

GSPSQ8

SCORE	DESCRIPTION
0	No response or irrelevant response
1	Incorrect due to errors in calculation but recognises relevance of distance divided by speed in some way
2	Correct (0.3375 hours, approximately 0.33 hours or 20 minutes). Working should show 2.7/8 which gives the hours or some similar approach (e.g., recognise fraction as close to 1 third)

3. GSZLV

SCORE	DESCRIPTION
0	No response or irrelevant response
1	Agrees with Matt with little/no explanation
2	Agrees with Matt giving reasons that only enlarge one or two dimensions (e.g., may double length only not all edges)
3	Disagrees with Matt with little/no reasoning, may say that it is quadrupled
4	Disagrees with Matt reasoning based on doubling all side lengths (e.g., *doubling all sides means volume is 8 times larger*), may use formula to show V = 2l x 2 w x 2h

GSZLSA

SCORE	DESCRIPTION
0	No response or irrelevant response
1	Agrees with Matt with little/no explanation
2	Agrees with Matt giving reasons that only enlarge one or two dimensions (e.g., may double length only not all edges)
3	Disagrees with Matt with little/no reasoning, may think increase is larger because of the 6 faces
4	Disagrees with sound reasoning recognises that each face will increase area by 4 times so overall increase is quadrupled, may use formula to show that surface area quadrupled

GSZLJ

SCORE	DESCRIPTION
0	No response or irrelevant response
1	Incorrect (Box 2) or correct (Box 1) with little or no reasoning
2	Box 2 with reasoning that takes some account of the relative sizes of the cake and the box without recognising that the is box much bigger than needed
3	Box 1 with reasoning that takes account of the size of half of the cake and concludes that there is sufficient space to include the other present if it is rotated

4. GRECT1

SCORE	DESCRIPTION
0	No response or irrelevant response
1	At least two shapes identified corectly

2	At least four shapes identified corectly
3	All six shapes identified correctly (i.e., B, C, D, F, H and J)

GRECT2

SCORE	DESCRIPTION
0	No response or irrelevant response
1	Any statement suggesting reasoning based on appearance (e.g., *it looks like a rectangle*) but without any properties
2	Reasoning based on one property only which may be partially correct (e.g., two opposite sides parallel) or insufficient (e.g., it has two long and two short sides or 2 sides equal in length)
3	Reasoning refers to properties correctly but excludes squares (e.g., opposite sides same length and right angle properties but two sides are longer than other two) or correct but insufficient (e.g., side properties specified such as opposite sides same length or parallel or Right angle property specified but side properties not given)
4	Necessary and sufficient conditions, that is, right angle specified (or square corner) and opposite sides equal or right angle and opposite sides parallel

GRECT3

SCORE	DESCRIPTION
0	No response or irrelevant response
1	Incorrect (D is not a rectangle), reasoning based on appearance rather than properties (e.g., *it doesn't look like a rectangle; it is a diamond*)
2	Incorrect (D is not a rectangle, it's a square), reasoning relies on single property of a square which is insufficient(e.g., it has opposite sides parallel)
3	Correct (D is a rectangle) with only one side property given so not necessary and sufficient or incorrect (D is not a rectangle) with necessary and sufficient conditions for a square (e.g., *it has right angle and four sides same length so a square*)
4	D is a rectangle with necessary and sufficient conditions for a rectangle, that is, It has four straight sides with opposite sides parallel and a right angle or It has opposite sides the same length and it has a right angle or It has four right angles

5. GCRD1

SCORE	DESCRIPTION
0	No response or irrelevant response
1	At least one side not enlarged as required or all three sides enlarged but not doubled
2	Logo correctly enlarged with or without star shape

GCRD2

SCORE	DESCRIPTION
0	No response or irrelevant response
1	Coordinate pairs are provided for the original logo or an incorrectly enlarged logo
2	At least two correct coordinate pairs are provided for a correctly enlarged logo anywhere on the grid, may be in (y,x) form
3	Three correct coordinate pairs are provided for a correctly enlarged logo anywhere on the grid

GCRD3

SCORE	DESCRIPTION
0	No response or irrelevant response
1	Incorrect response (e.g., 4.5) with or without units, with little/no reasoning or reasoning based on doubling 2.25 m^2
2	Correct (9 with or without units) but explanation largely procedural (e.g., *I counted squares, I used the formula half base times height*)
3	Correct area with reasoned explanation that recognises that doubling the sides quadruples the area

6. GTESS

SCORE	DESCRIPTION
0	No response or irrelevant response
1	All shapes circeld incorrect or just an ellipse circled
2	Ellipse and/or pentagon circled and at least one other circled, little/no reasoning
3	Ellipse and pentagon circled only, reasoning incomplete or only provided for the two shapes circled or the remaining shapes, not all
4	Ellipse and pentagon circled. Reason given for each shape (e.g., no angles for oval, three angles wont fit for pentagon, all the others can be placed together with no gaps), clear drawings are legitimate

GTILE1

SCORE	DESCRIPTION
0	No response or irrelevant response
1	At least one tile drawing correct, no correct perimeters
2	At least 2 tile drawings, with a perimeter either correct or out by factor of 10 or 3 tile drawings no perimeters
3	3 tile drawings correct, perimeter of at least one given as 74, 40, 30, 26 or 24
4	3 correct tile drawings (i.e., 1X36, 2X18, 3X12, 4X9 or 6X6) with perimeters (740 cm, 400 cm, 300 cm, 260 cm, 240 cm)

GTILE2

SCORE	DESCRIPTION
0	No response or irrelevant response
1	An incorrect response giving a legitimate rectangle dimensions but not the square
2	Correct (square) but does not include dimension (e.g., 6 by 6 tiles)
3	Square with dimensions given correctly (i.e., 60 cm by 60 cm)

STUDENT SCORE SHEET GEOMETRY FORM B

Student Name:	Year Level:

		Score	Comments
1	**GPERS1**		
	GPERS2		
	GPERS3		
2	**GSPSQ7**		
	GSPSQ8		
3	**GSZLV**		
	GSZLSA		
	GSZLJ		
4	**GRECT1**		
	GRECT2		
	GRECT3		
5	**GCRD1**		
	GCRD2		
	GCRD3		
6	**GTESS**		
	GTILE1		
	GTILE2		
Total Raw Score			

RAW SCORE TRANSLATOR FOR GEOMETRY FORM B

The following table locates students on the **Learning Progression for Geometric Reasoning** based on their total score for Geometry Form B. Total scores are obtained by adding the rubric scores assigned to each item on the form. Where a total score is very close to the beginning or end of a score range, teachers are advised to use their knowledge of the student to make a decision about the most appropriate Zone.

Students need to have had an opportunity to attempt all tasks for this process to be meaningful.

Total Score	Zone	Zone Description
52=55	8	Constructs arguments based on multiple properties of 2D shapes and 3D objects, using the necessary and sufficient conditions to reason about geometric and measurement situations, conjectures and propositions (theorems). Demonstrates an understanding of both reflectional and rotational symmetry.
40-51	7	Works analytically with properties of rectangles. Beginning to recognise necessary and sufficient conditions for square and rectangle. Uses sound reasoning in argument/explanations, though examples are often procedurally based. Able to recognise the relationship between length, area, and volume.
31-39	6	Uses properties accurately when reasoning about spatial situations but lacks knowledge of geometric hierarchy. Understands properties of 2D shapes but not special cases (e.g., regular). Geometric and measurement arguments rely on examples/counter examples. Provides accurate directions from a map using appropriate language and able to describe directions from walker's perspective. Understands the impact of doubling dimensions on volume, is able to visualise volume and calculate when numbers are small. Omits one step when calculating multi-step measurement problems. Is able to make deductions about angle situations with limited explanations. Beginning to reason deductively.
23-30	5	Is able to visualise and represent 3D objects using 2D platforms (Nets) and recognises properties in non-standard orientations. Beginning to use, but not recognise, sufficient conditions. Uses either properties or orientations to reason in geometric situations and accesses relevant geometric language. Demonstrates knowledge of dilation and coordinate systems and recognises some rotational symmetry. Uses landmarks but retains personal orientations when providing direction. Can provide partial solutions and explanations when calculating measurement situations.

14-22	4	Knows some geometric language, can name some 3D objects, and is able to visualise objects from a different perspective but shows incomplete reasoning in geometric and measurement situations. Performs measurement calculations but attends to only one attribute. Gives directions from a map from personal rather than other viewer's perspective.
9-13	3	Uses one or two properties or attributes (insufficient) to explain their reasoning about shapes and measurement but often do not recognise properties in non-standard representations. Demonstrates a beginning understanding of measurement attributes. Able to visualise some objects from different perspectives and to use coordinates.
4-8	2	Identifies simple shapes in situ and on simple solids. Recognises some reflective symmetry, nets of simple solids, and simple shapes and shows emerging representation of 3D objects. Is able to make use of geometric language and understanding of measurement concepts but does not coordinate information or justify thinking.
1-3	1	Recognises simple shapes by appearance and common orientation. Shows emerging recognition of objects from different perspective, a coordinate system, and reflectional symmetry of objects and shapes. Can name some common 3D objects and identify some standard nets. Is able to identify location using simple referencing systems.