Assessment task

Year level	6
Learning area	Mathematics
Content Strand	Measurement and Geometry
Title of task	Transformers

Task details

Description of task	This task is to be completed in two parts. Component (A) of Part 1 requires students to demonstrate their understanding of locating and plotting ordered pairs on a grid to create a superhero logo for a t-shirt. Component (B) of Part 1 requires students to use a Cartesian plane to answer questions and plot points. Part 2 requires students to use combinations of transformations to transform one shape into separate letters which make up a 'word' for a logo.
Type of assessment	Summative
Purpose of assessment	To inform moderation practices
Assessment strategy	Written
Evidence to be collected	Student Booklet
Suggested time	2 x one-hour lessons (not including prior learning that must be completed before this task is implemented)

Content description

Content from the Western Australian Curriculum	Investigate combinations of translations, reflections and rotations, with and without the use of digital technologies Introduce the Cartesian coordinate system using all four quadrants			
Proficiencies	Understanding	Fluency	Problem solving	Reasoning
	✓	✓	✓	✓

Task preparation

Prior learning	Students will have an understanding of congruent shapes and integers. They have had experience with transformations (translations, reflections and rotations) of two-dimensional shapes and are able to identify line and rotational symmetry. Students have used a grid reference system to describe locations and explored the Cartesian coordinate system using all four quadrants.
Assessment differentiation	Teachers should differentiate their teaching and assessment to meet the specific learning needs of their students, based on their level of readiness to learn and their need to be challenged. Where appropriate, teachers may either scaffold or extend the scope of the assessment tasks.

Assessment task

Assessment conditions	This is an individual, in-class assessment
Resources	Student Booklet Extra grid paper if required

	Select the correct transformation:
	http://www.scootle.edu.au/ec/viewing/L6565/asset1.html
	Identifying different kinds of transformations:
	https://www.sheppardsoftware.com/mathgames/geometry/shapeshoot/TranslateShapesShoot.htm
	Understanding how to read ordered pairs on the Cartesian plane:
	https://content.echalk.co.uk/esa/Maths/coordinates/placingCoords/placingCoords.html
	The Cartesian plane explained: https://www.mathsisfun.com/data/cartesian-coordinates.html

Instructions for teacher

Explain to students that they will be completing the task in two parts to demonstrate their understanding of:

- ordered pairs on the Cartesian Plane
- transformations of shapes.

Part 1 (A) – Superhero logo for a t-shirt
Students will follow the steps and use the table of ordered pairs to plot part of a superhero logo for a t-shirt.

Part 1 (B) – The Cartesian plane
Students will answer questions to show their understanding of the Cartesian plane.

Part 2 – Transformations of shapes
Students will transform or create a shaded shape to produce letters that form the 'word' for a car company logo.
Using a combination of transformations (translation, reflection or rotation) students will be required to:

i. identify correct transformations
ii. describe combinations of transformations
iii. correctly use the language of transformations
iv. explain steps taken to produce an image
v. produce an image given steps for a combination of transformations.

Instructions to students

There are two parts to this task. They are:

i.   Part 1 (A) Superhero logo for a t-shirt creation and Part 1 (B) The Cartesian plane worksheet
ii.   Part 2 Transformations of shapes

In Part 1, you will be required to follow a series of steps to create a superhero logo for a t-shirt and answer questions to demonstrate your understanding of the Cartesian plane.

In Part 2, you will use shapes to demonstrate your understanding of transformations.

Student Booklet – Mathematics	
Task title	Transformers
Student name	
School	
Year level	6
Date	

Part 1 (A) – Superhero logo for a t-shirt
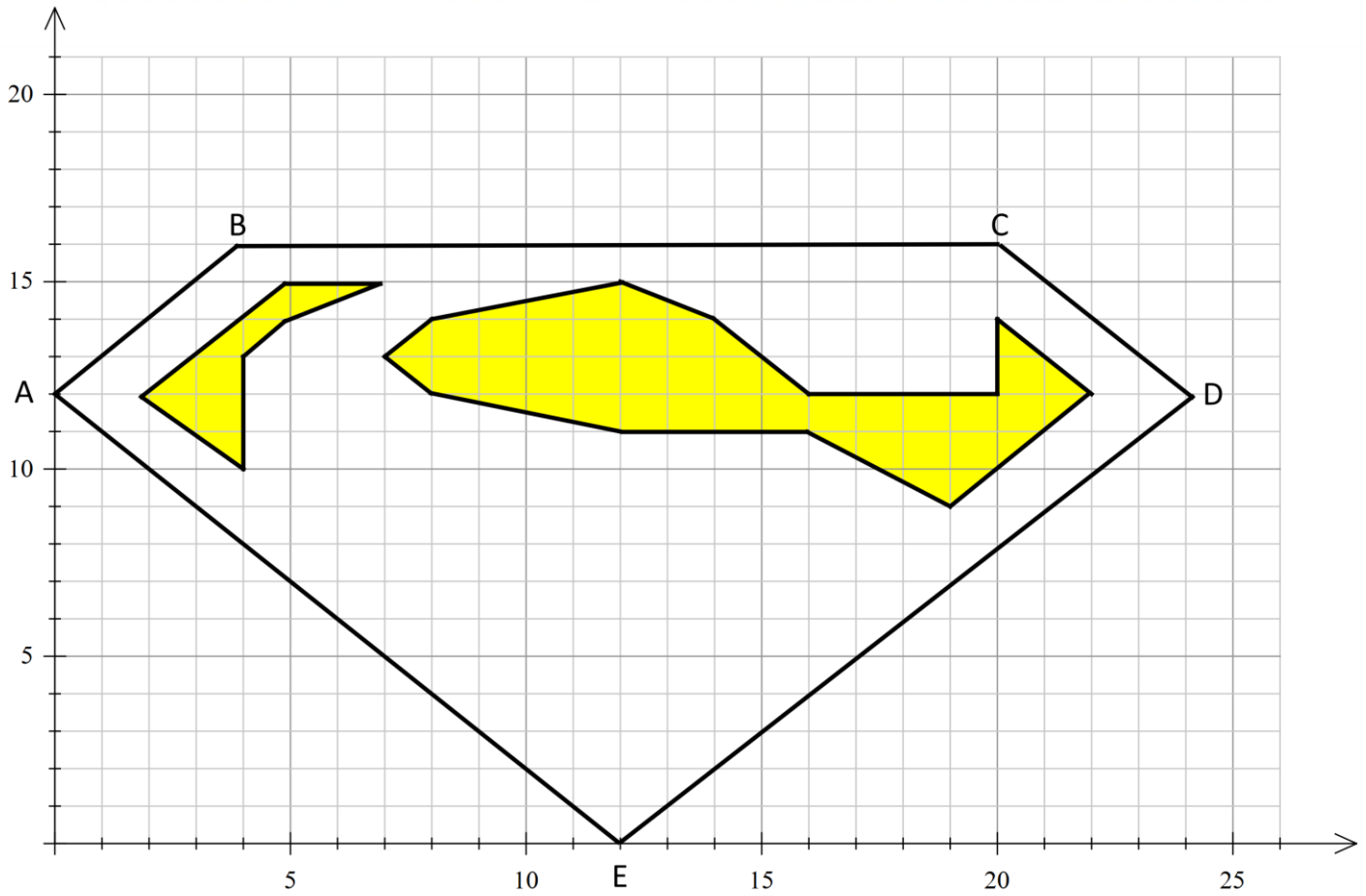
Use the ordered pairs in the table below to plot part of a superhero logo for a t-shirt on the Cartesian plane above. The outside shape has been plotted, drawn and labelled for you.

 i.   Locate the points A B C D E on the Cartesian plane above and write the ordered pairs in the first column.
 ii.   Plot the set of ordered pairs from each of the remaining columns. Connect the points in the order given.

Table of Ordered Pairs

	Start	Start	Start	Start
A		(12, 2)	(5, 9)	(16.5, 15)
B		(15, 5)	(8, 8)	(18, 15)
C		(9, 5)	(12, 8)	(18, 14.5)
D		(12, 2)	(16, 7)	(16.5, 15)
E		Stop	(14, 6)	Stop
	Stop		(12, 6)	
			(10, 7)	
			(7, 5)	
			(5, 9)	
			Stop	

Part 1 (B) – The Cartesian plane

1. Answer the following questions to show your understanding of the Cartesian plane. Label each shape that you draw.
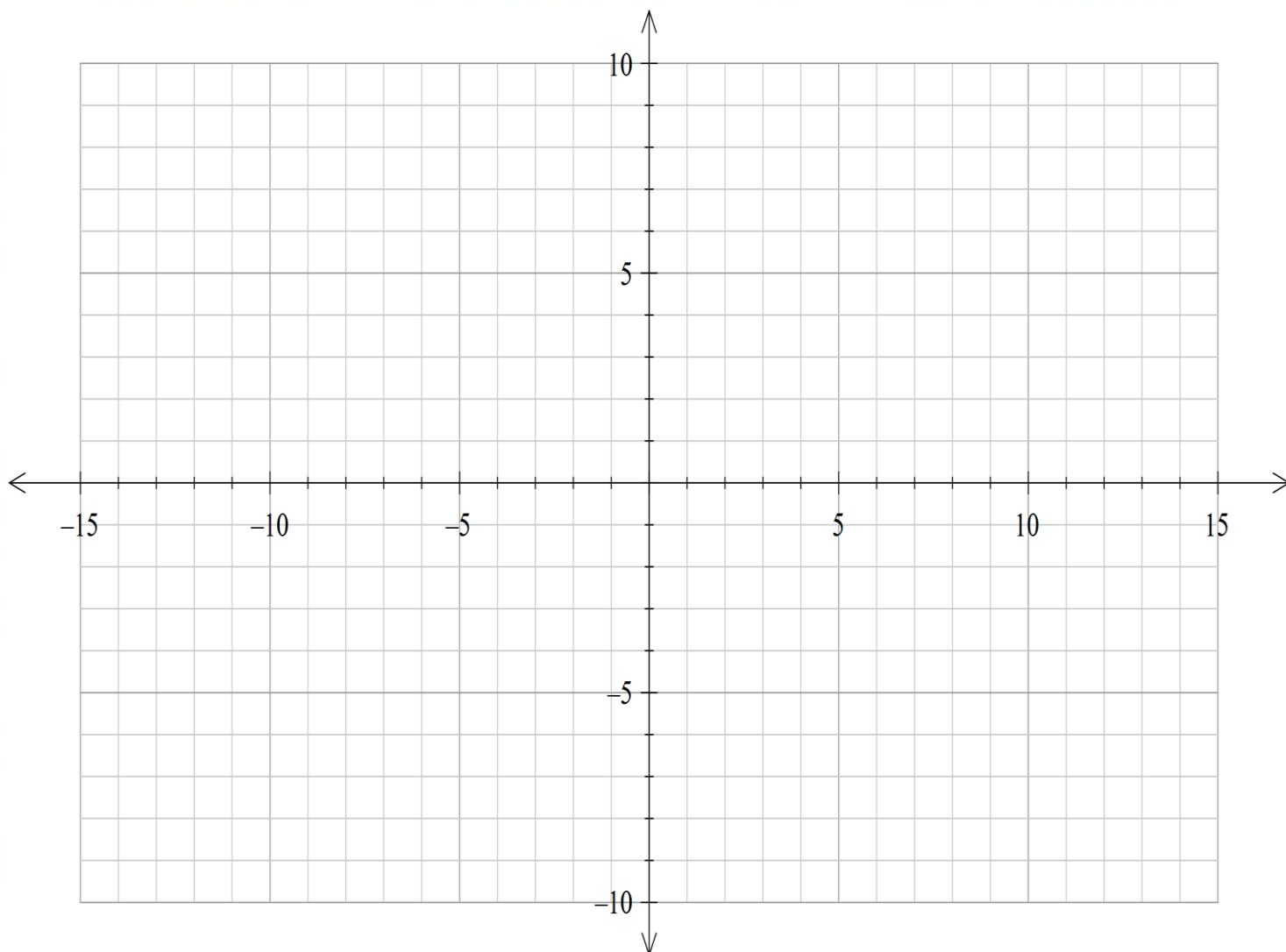
a) Shape 1

Plot a set of ordered pairs to show a triangle. List the set of ordered pairs in the box.

b) Shape 2

Plot a set of ordered pairs to show a square in the second quadrant. List the set of ordered pairs in the box.

c) Shape 3

Plot and draw a triangle, using the following criteria:
  i.   one vertex whose horizontal coordinate of the ordered pair is positive
  ii.   one vertex whose vertical coordinate of the ordered pair is negative
  iii.   one vertex that lies on the origin.

List the set of ordered pairs for your shape in the box below.

2. In which quadrant are each of the following ordered pairs located? Explain your thinking.
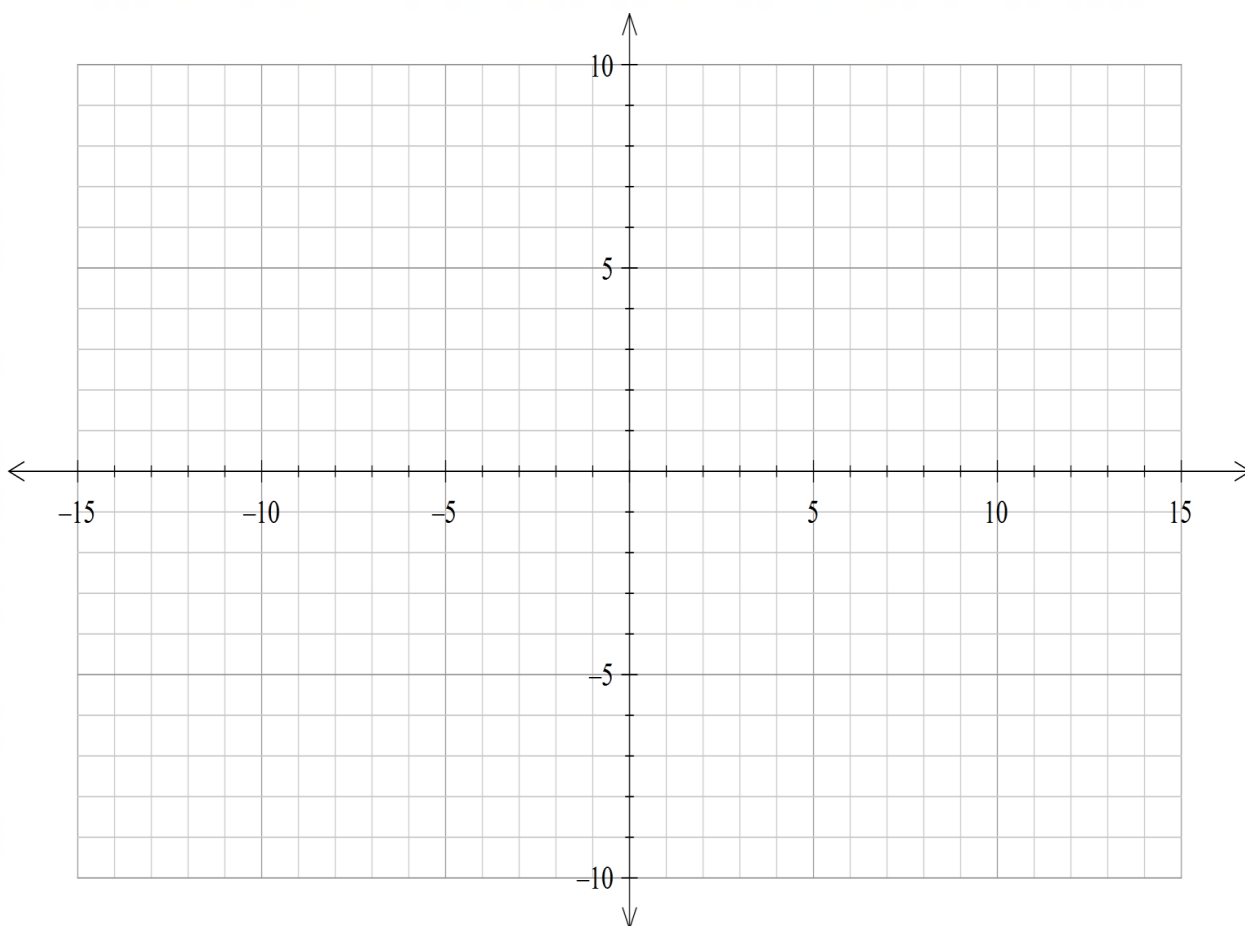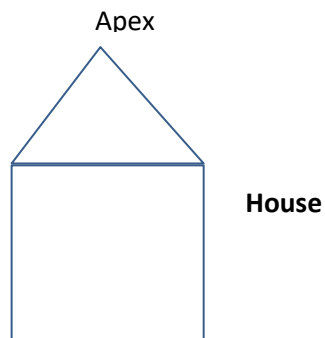
  i.   (8, 6)

  ii.   (14, -7)

  iii.   (-4, -8)

3. Using all four quadrants of the Cartesian plane below, draw the image of a house with the apex located on the vertical axis. In the Table of Ordered Pairs, list a set of instructions (similar to the superhero logo for a t-shirt drawing) that can be followed to recreate the image.

Table of Ordered Pairs

Start	Start

Apex

House

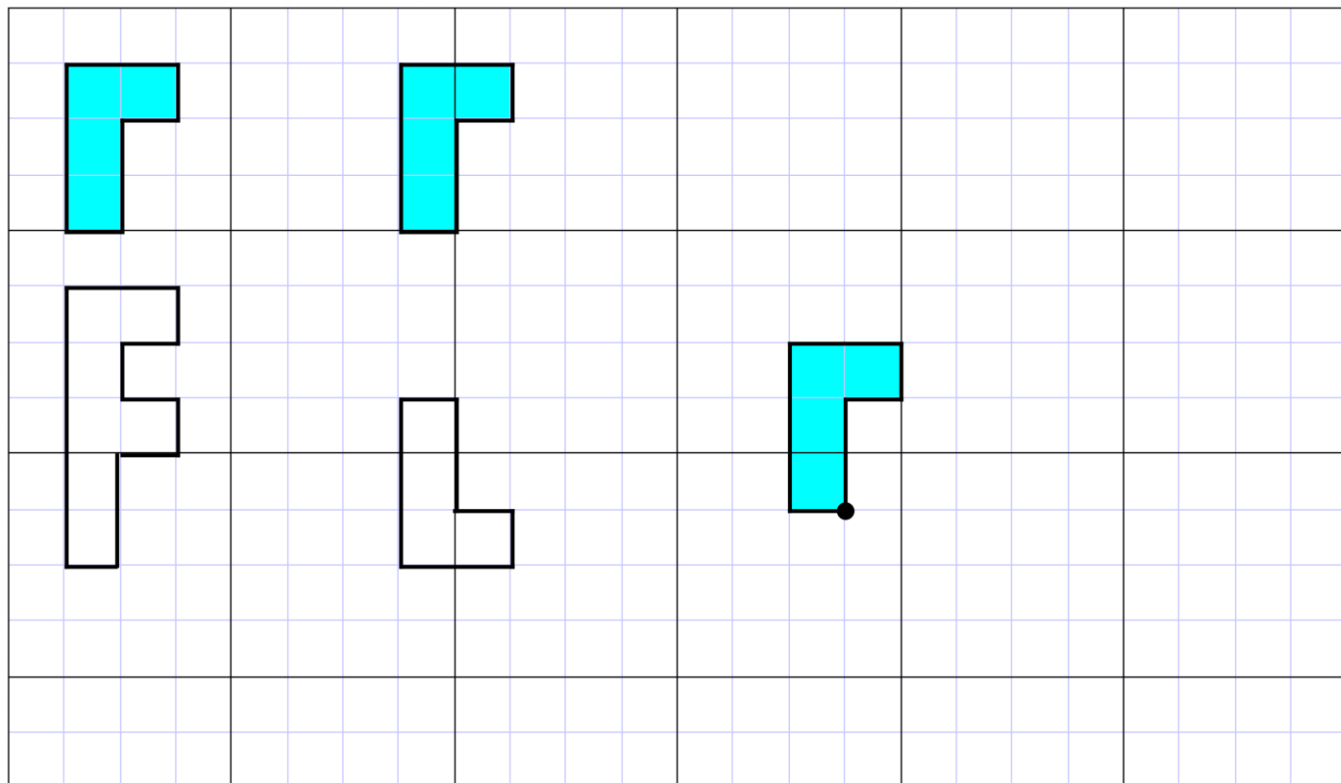**Part 2 – Transformations of shapes**

The shaded shapes below are going to be transformed into a logo for a car company. Each part of the logo requires a combination of transformations including translation, reflection or rotation.
Note: in some cases, one transformation may overlap another.

SHAPE 1   SHAPE 2   SHAPE 3

1. For Shape 1 and Shape 2:

- identify the transformations required to fill the unshaded letter below Shape 1 and Shape 2
- describe clearly, the combination of transformations.

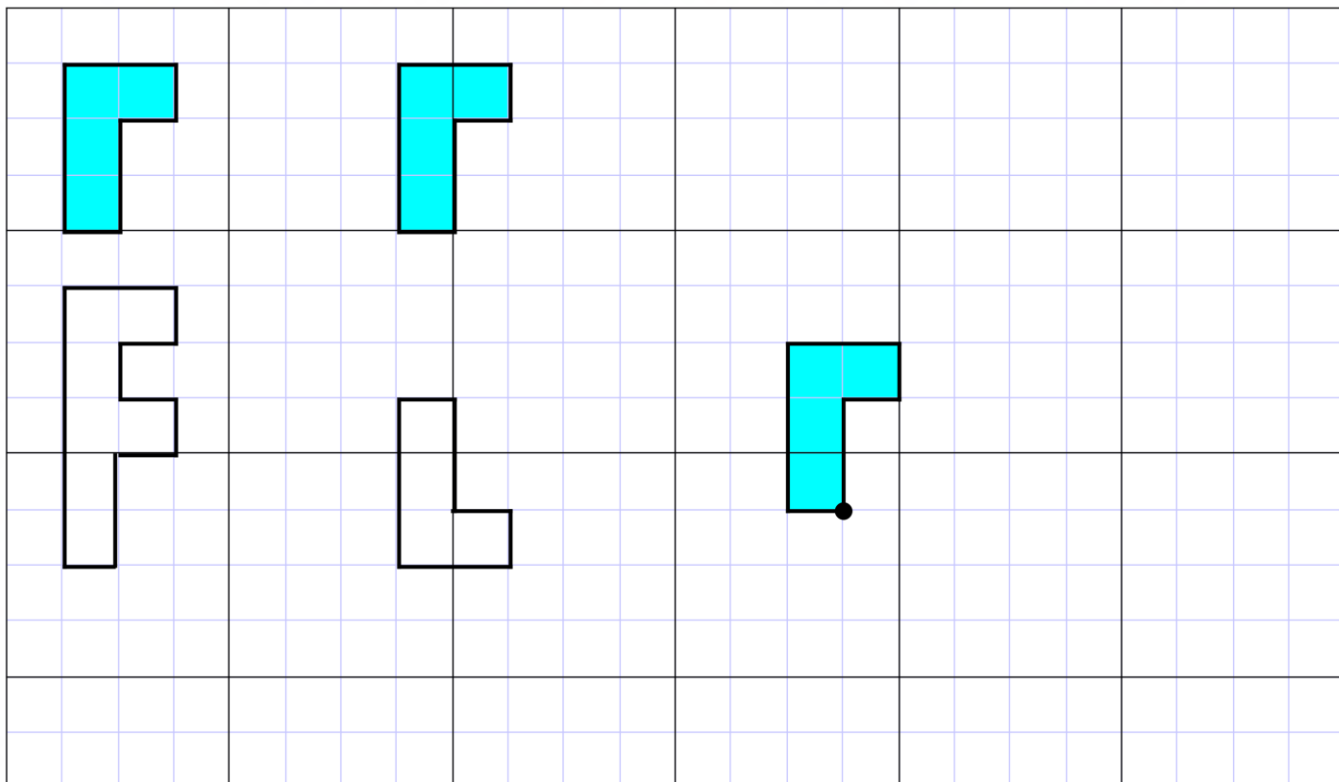   **SHAPE 1**   **SHAPE 2**

2a) For Shape 3, apply the following transformations to this shaded shape to produce the final part of the car logo.

- Rotate the shape 90˚ clockwise about the point shown
- Rotate the resulting image 90˚ clockwise about the point
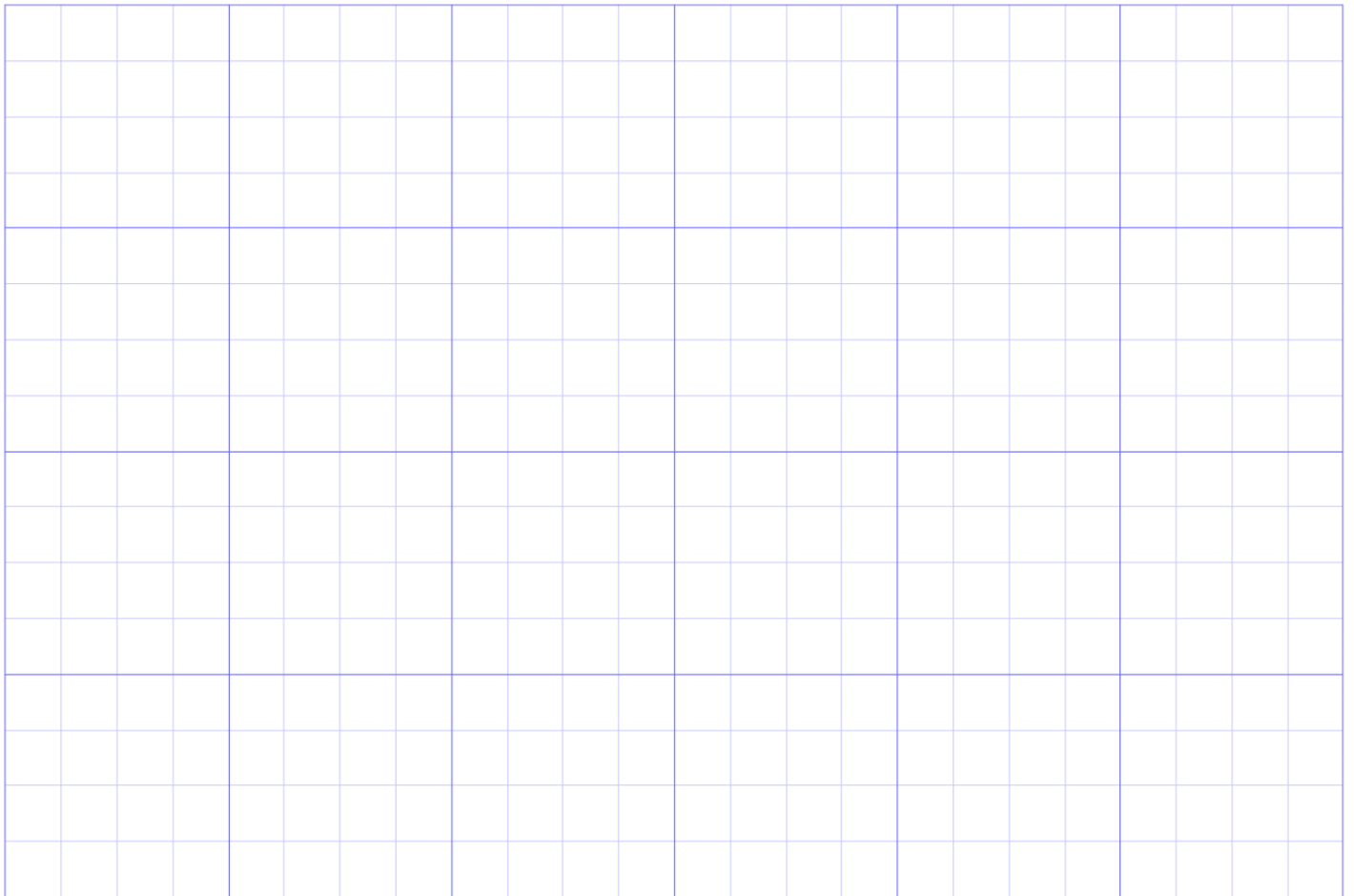- Translate that image 1 unit left and **colour the final image**

SHAPE 1   **SHAPE 2**   **SHAPE 3**

b) Describe another combination of transformations that would result in the same final image as that produced in 2(a).

Use the Grid paper below (if required) to perform or practise any of the above transformations.

Marking key

Description	Marks
Part 1 (A) Superhero logo for a t-shirt – Ordered pairs	
Lists ordered pairs from the first quadrant	1
Correctly labels coordinates of points located on the horizontal and vertical axes	1
Correctly plots ordered pairs in the first quadrant	1
Correctly plots non-integer ordered pairs in the first quadrant	1
Uses correct Mathematical notation to indicate ordered pairs	1
Subtotal	**5**
Part 1 (B) The Cartesian plane	
Question 1 a) Shape 1	
Chooses 3 coordinates to form a triangle by drawing them on the Cartesian Plane	1
Correctly plots the triangle	1
Correctly lists the ordered pairs for the triangle	1
b) Shape 2	
Correctly plots and draws a square	1
Locates the square completely in the second quadrant	1
Lists the correct set of ordered pairs for the square	1
c) Shape 3	
Correctly plots and draws a triangle	1
Locates one vertex in either quadrant 1 or quadrant 4	1
Locates one vertex in either quadrant 3 or quadrant 4	1
Locates one vertex at the origin (0, 0)	1
Lists the correct set of ordered pairs for the triangle	1
Question 2	
Identifies (8, 6) as located in quadrant 1	1
Identifies (14, -7) as located in quadrant 4	1
Identifies (-4, -8) as located in quadrant 3	1
Recognises positive horizontal coordinates are in quadrants 1 and 4	1
Recognises positive vertical coordinates are in quadrants 1 and 2	1
Correctly describes combinations of positive and negative coordinates	1
Question 3	
Reproduces the image on the Cartesian plane	1
Reproduces the house with coordinates in all 4 quadrants	1
Correctly labels the coordinate of the apex	1
Lists correctly the coordinates of the vertices of the square of the house	2
Creates a clear sequence of steps that will reproduce the house correctly	1
Subtotal	**23**
Total	**28**

Part 2 – Transformations of shapes (note: the combination of transformations may vary to the marking guide)	
1. SHAPE 1: Letter F	
Identifies that the coloured shape involves a combination of translations	1
States the correct direction of the vertical translation	1
States the correct distance of the vertical translations	2
Describes the correct combination of translations	1
For example: • the shaded shape is translated twice • it is translated 4 units down and printed, then translated a further 2 units down and printed again.	
SHAPE 2: Letter L	
States the correct direction of the vertical translation	1
States the correct distance of the vertical translation	1
States that the shape is reflected	1
Identifies the position of the line of reflection	1
Describes the correct combination of the transformations to produce the letter.	1
For example: • The shape has been translated down 3 units, then reflected horizontally across the baseline of the shape and printed OR • The shape has been reflected horizontally across the baseline of the shape, translated down 3 units and printed OR • the shape has been reflected vertically across the top line of the shape, translated down 9 units and printed.	
2. SHAPE 3:	
a) Correctly rotates the shape through 90˚ clockwise about the point shown to produce the first image	1
Correctly rotates the shape through 90˚ clockwise about the point shown to produce the second image	1
Translates the image in the correct direction	1
Translates the image by the correct distance	1
Correctly produces and identifies the final 'S' shape	1
b) Correctly describes a different combination of transformations that would produce the same final shape	2
For example: The shape has been rotated 180˚ clockwise and translated 1 unit left	
Subtotal	**17**
Total	**45**