



MIGHTY MINDS
Educational Consultants

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SAMPLE

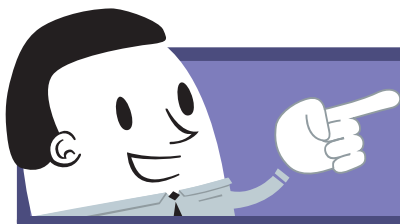


& Transformation

Numeracy

- Knights and Nations
 - Symbols
- By Land or By Sea

Resource code: 27052742



Knights and Nations

Symmetry and reflection are geometric techniques that allow patterns to be replicated from a single piece. *The following history of symmetry and reflections in art and architecture then use a pencil to draw the answer.*



Q1

In the Middle Ages, knights used to paint a system of heraldry, in order to recognise each other. Complete the drawing by drawing the mirror image to make a symmetrical

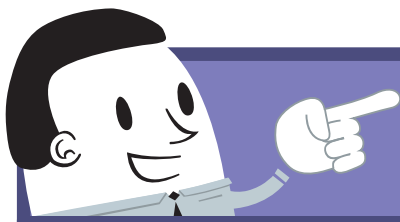


Q2

The Armoured Triskelion and has been in use since the 17th Century. It is a symbol of the British Army. Using a pencil, complete the flag by drawing in the missing parts.



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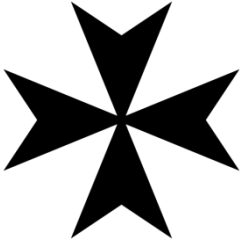
Symbols

Symmetry and reflection are geometric techniques that allow patterns to be replicated from a single piece. *The following history of symmetry and reflections in art and architecture then use a pencil to draw the answer.*



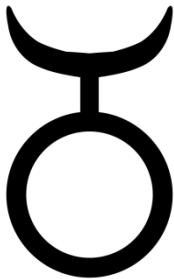
Q1

Many historic shapes and symbols have more than one line of symmetry. Draw all of the lines of symmetry that exist on the shape.



Q2

Transformation of a shape is when a shape is moved through translation, rotation and reflection. Draw the shape that is created as a translation, a reflection and a rotation of 90° anticlockwise of the original shape.



Original shape

Rotation

Reflection

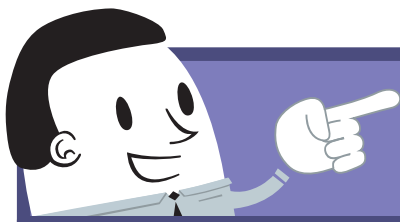
Q3

Below is a grid of letters. When you are looking for symmetry in all of the letters that have at least one line of symmetry (vertical, horizontal or diagonal), you will reveal a hidden image!

		B	Z	J	H	Z	G		
		P	N	V	S	R	J		
		A	M	H	W	K	S	Z	
		C	T	Y	R	O	D	P	
	M	E	X	H	V	I	H	Y	
	C	K	D	U	T	K	Z	D	
	R	G	P	J	G	V	R	A	
	J	M	Y	J	T	C	F	B	P



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By Land or by Sea

Symmetry and reflection display how shapes can change a single piece. The following questions show the history of science and architecture. Read each question carefully, then use a ruler.



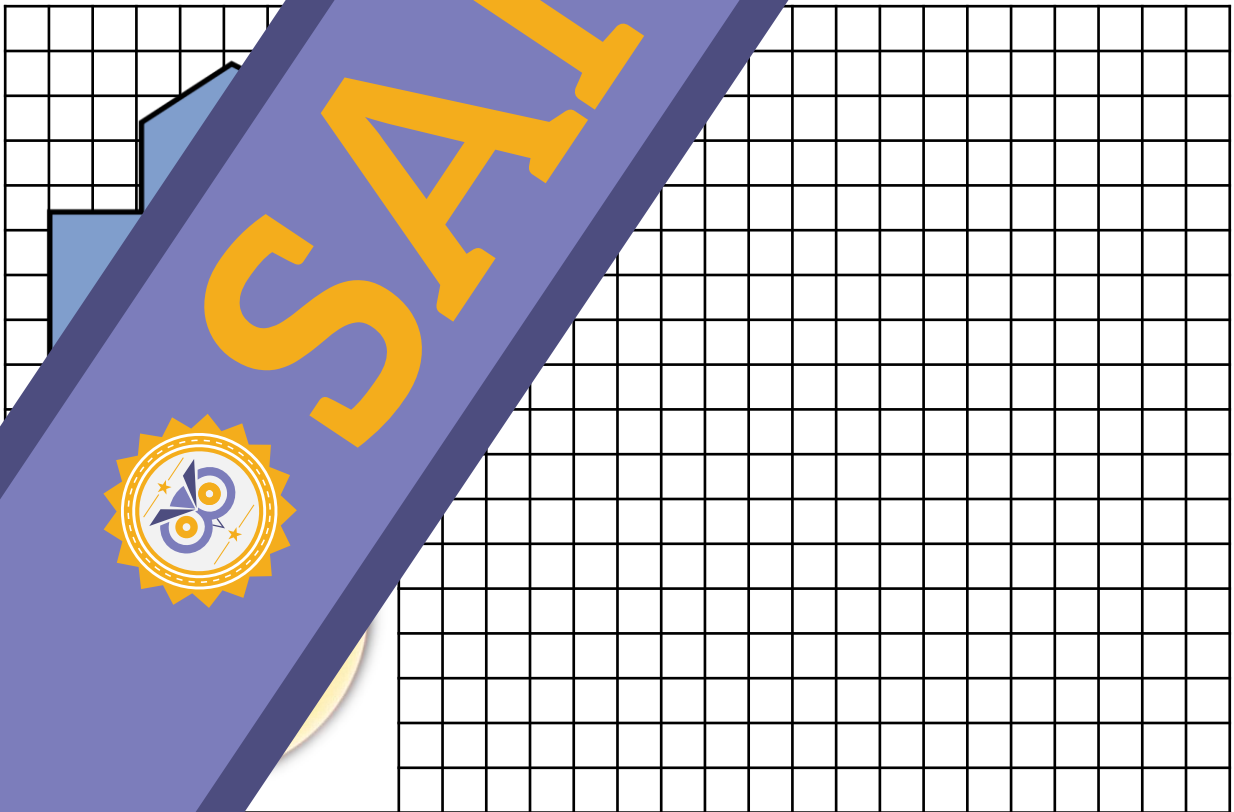
Q1

When ships are spotted on the horizon, their reflections are seen underwater. Draw the reflections of these vessels and label them.



Q2

The floor plan of a new castle is shown below. The King doesn't like its current location and wants to move it 3 units east, reflected along the vertical line of symmetry. Draw the castle's new location.



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 **MIGHTY MINDS**
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Mighty Minds Lesson Installs

'Fundamentals' Lesson



Firstly, thank you for your support of Mighty Minds and our resources. We are proud to provide quality resources that are both educational and engaging, and we hope you enjoy using our works.

To assist you in using this resource, we have compiled some information for you.

About this resource

This Mighty Minds 'Fundamentals' Lesson focuses on a specific skill (in this case, Maps and Plans) and presents this skill through a theme from the Australian Curriculum (in this case, Geography). This lesson is also targeted at a certain skill level (in this case, Year 5) and is designed for completing work that is suited to them.

How to use this resource

Our 'Fundamentals' Lessons are split into two parts: a Teacher's Copy and a Student Workbook. Each contain different types of resources.

The student workbook contains:

- The main title page; and
- The blank student workbook pages.

The teacher resources contain:

- This set of instructions for how to use the resources;
- The Teacher's Copy of the lesson, which includes the lesson plan, the lesson content, and any resources that will be needed to teach the lesson;
- The Item Description, which includes the lesson's aims, the lesson's objectives, and any extension ideas;
- The student model responses, which are provided as examples of student responses on the student worksheets to ensure that answers are clear and easy to understand;
- The teacher's model responses, which are provided as examples of more detailed explanations of the model responses that you can use to support your students;
- The student answer key, which provides the correct answers to the questions on the student worksheets;
- The teacher's answer key, which provides the correct answers to the questions on the teacher's copy of the lesson.

We also provide a Student Workbook (the first set of pages) for the students. If students are using the Student Workbook, you may also like to provide them with the student answer key.



Contacting us

We would love to hear from you. If you have any feedback or suggestions that if you email us with suggested changes to any lesson, we will be happy to consider them. We will send you the revised lesson – free of charge.

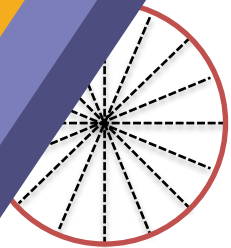
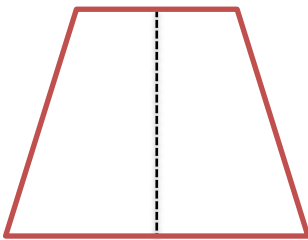
You can contact us by email at resources@mightyminds.com.au and we'll get back to you as soon as we can.



Symmetry and Transformations

Symmetry

A two-dimensional shape is described as symmetrical if it can be divided into two equal halves by a line of symmetry. The edges of the two halves match. In other words, a line of symmetry divides a shape into two parts which are each other's mirror image. Some shapes have one line of symmetry, some have two, and some have multiple ways in which they can be folded. Of the shapes mentioned above, the circle has an infinite number of symmetry whilst the square has four. A circle has an infinite number of lines of symmetry.

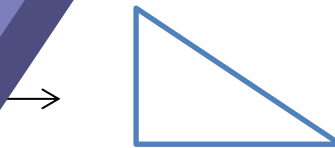


Transformation

A shape can be transformed into another shape without changing its size or shape, just maintaining its other properties. There are three types of transformation: translation, reflection and rotation.

Translation

Translation of a shape is moving it in a straight line without changing any other properties of the shape.

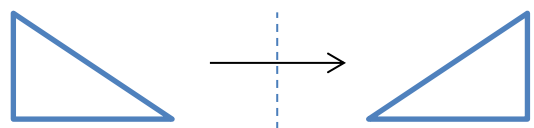


Reflection of a shape is moving it into its mirror image.



Vertical reflection: shape moves vertically.

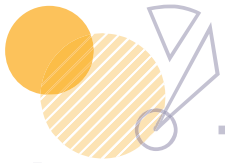
Horizontal reflection: shape moves horizontally.



Imaginary mirror

This teaching guide is continued on the next page...



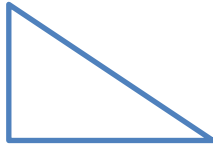


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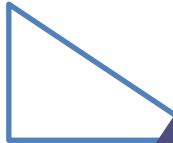
Rotation

Rotation is the transformation of a shape by 'spinning' it around

Rotated 90°
clockwise



Rotated 90°
anticlockwise,
or 270°
clockwise



Rotated 180°



SAMPLE





Item Description

Please note: any activity that is not completed during class time will be undertaken at a later date.

'Knights and Nations', 'Symbols' and 'The



Activity Description:

- Students will be required to correctly identify the type of transformation while completing activities.
- The first worksheet requires students to identify lines of reflection symmetry and rotational symmetry to a number of degrees. Some images need to be replaced.
- The second worksheet requires students to identify lines of symmetry in letters and in an irregular shape.
- The third worksheet requires students to identify lines of reflection symmetry in the physical world, and to apply their knowledge to solve a difficult question within a grid context.

Purpose of the activity

- Students will be able to solve problems concerning the axis of symmetry and also to solve problems concerning transformations used to change shapes.

Key

- Knowledge of reflection, rotation and translation
- Ability to identify lines of symmetry in letters and in an irregular shape
- Ability to identify lines of reflection symmetry in the physical world
- Ability to apply their knowledge to solve a difficult question within a grid context
- Ability to solve problems concerning the axis of symmetry and also to solve problems concerning transformations used to change shapes.
- Ability to identify lines of symmetry in letters and in an irregular shape
- Ability to identify lines of reflection symmetry in the physical world
- Ability to apply their knowledge to solve a difficult question within a grid context
- Ability to solve problems concerning the axis of symmetry and also to solve problems concerning transformations used to change shapes.

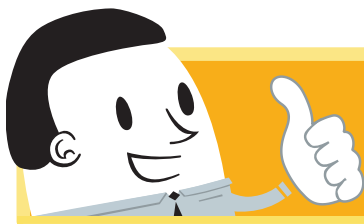


It will take approximately an hour to complete – 20 minutes per

of the correct answers and how to correctly approach and answer each question is valuable in the development of problem solving strategies, as well as the understanding of all class members. Alternatively, an activity in which the students propose their own questions for each other will aid in the development of critical thinking and further ensure their understanding.



SAMPLE



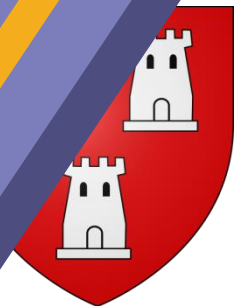
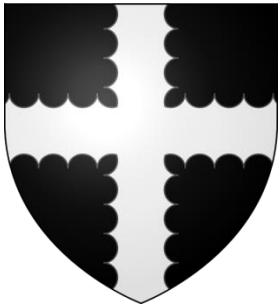
Knights and Nations

Symmetry and reflection are geometric techniques that allow patterns to be replicated from a single piece. *The following history of symmetry and reflections in art and architecture then use a pencil to draw the answer.*



Q1

In the Middle Ages, knights used to paint a system of heraldry, in order to recognise each other. Complete the drawing by drawing the mirror image to make a symmetrical shield.



Q2

The Armoured Triskelion and has been in use since the 17th Century. It is a symbol of the British Royal Air Force. Using a pencil, complete the drawing by drawing in the missing parts.





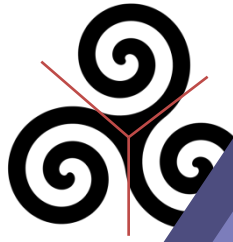
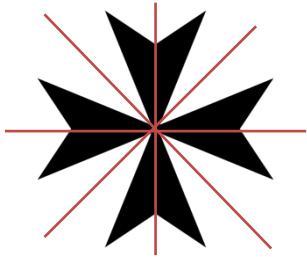
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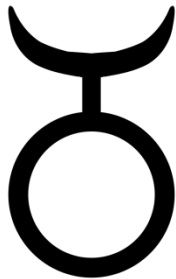
Q1

Many historic shapes and symbols have more than one line of symmetry. Draw all of the lines of symmetry that exist on the shape.



Q2

Transformation of a shape is when a shape is changed through translation, rotation and reflection. Draw the shape that is formed as a translation, then a rotation of 90° anticlockwise, then a reflection of the original shape.



Original shape

Rotation

Reflection

Q3

Below is a grid of letters. When you look at the letters during in all of the letters that have at least one axis of symmetry (vertical, horizontal or diagonal), you will reveal a hidden image!

		B	Z	J	H	Z	G	
	F	P	N	V	S	R	J	
	A	M	H	W	K	S	Z	
	C	T	Y	R	O	D	P	
	M	E	X	H	V	I	H	Y
	C	K	D	U	T	K	Z	D
	R	G	P	J	G	V	R	A
J	M	Y	J	T	C	F	B	P

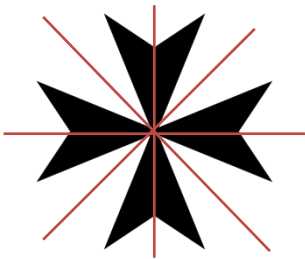




Symbols:

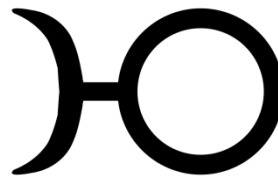
Question One:

The students are required to draw in the lines of axial symmetry of the following images. The first image has four axes of symmetry, the second has two axes of symmetry and the third has six axes of symmetry. The axes of the first three images are drawn through the centre of the image, otherwise not all of the images have an axis of symmetry.



Question Two:

The students are required to complete the first blank, as the translation is merely a shift of an object and the orientation of the object remains the same. The second blank shows a rotation of the object, as the 'horns' point towards the left side of the page at a 90° turn. The third blank shows a reflection of the object, as the 'horns' facing towards the right of the page at a 90° turn.



Translation

Rotation

Reflection

This answer guide is continued on the next page...



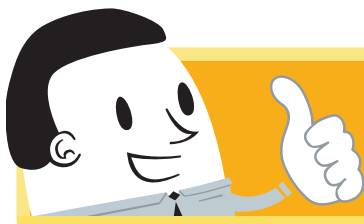
...This answer guide is continued from the previous page.

Question Three:

The students are required to shade only the boxes containing D, E, H, I, K, M, O, T, U, V, W, X and Y. If these are shaded, an easily recognisable, symmetrical image.

Q	Z	K	N	L		G			
N	F	B	M	F		R	J		
J	P	H	X			S	Z		
G	Y	K	P			D	P		
I	W	A				I	H	Y	
H	G	E				K	Z	D	
D	Z					G	V	R	A
B	F					C	F	B	P





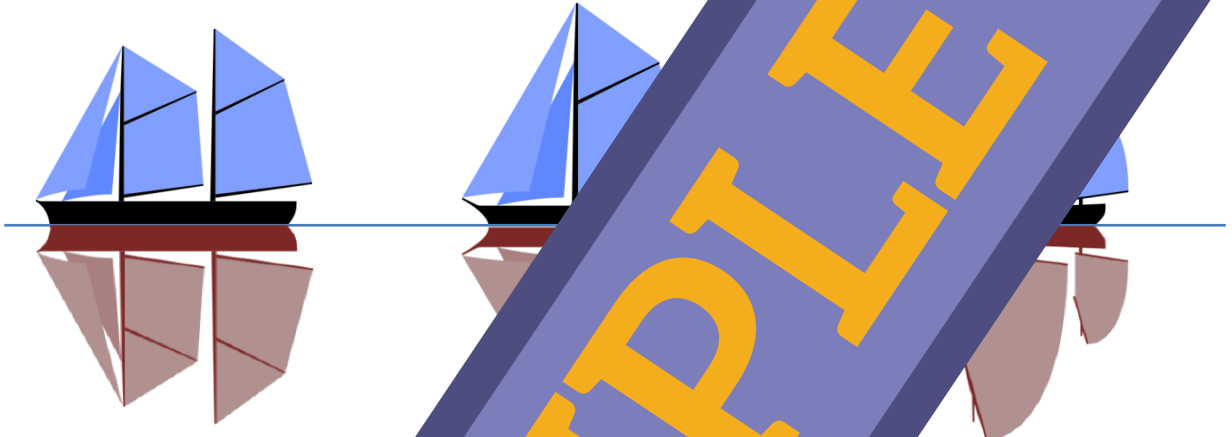
By Land or by Sea

Symmetry and reflection display how shapes can change from a single piece. The following questions show the history of science and architecture. Read each question carefully, then use a ruler.



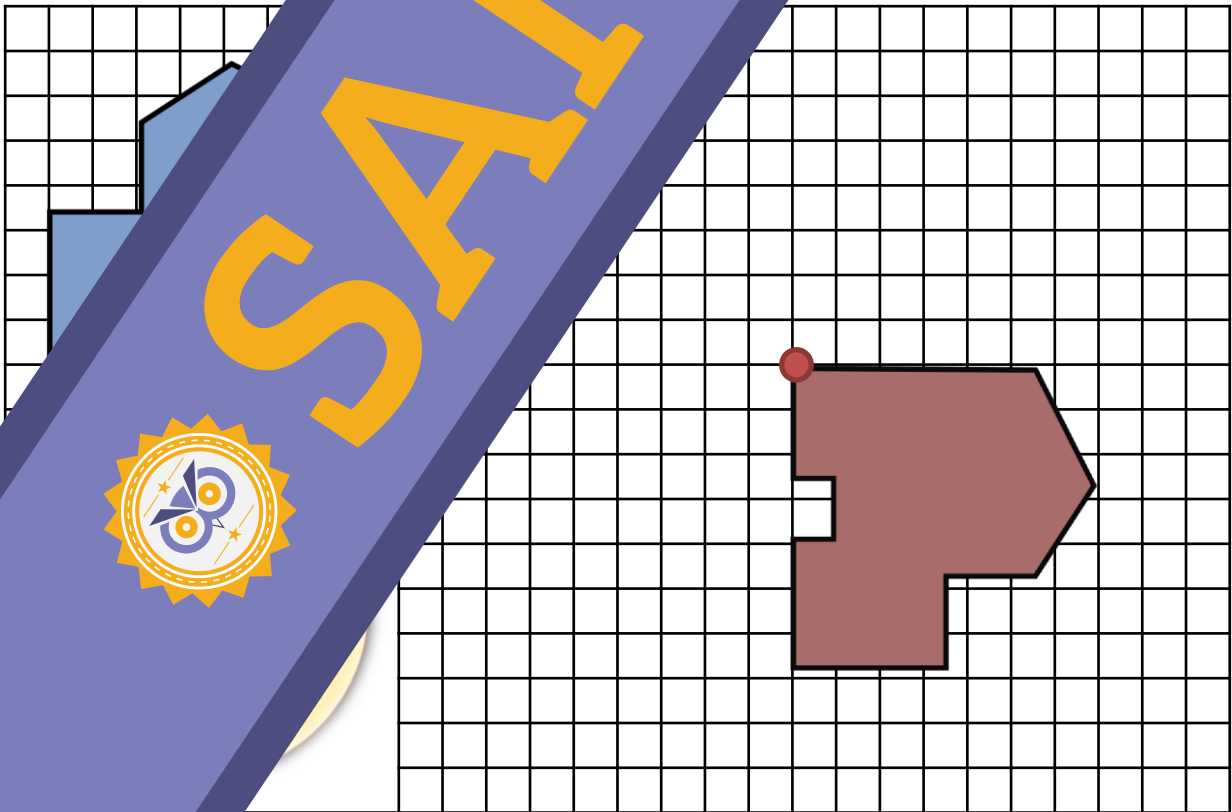
Q1

When ships are spotted on the horizon, their reflections are seen underwater. Draw the reflections of these vessels and their sails.



Q2

The floor plan of a new castle is shown below. The King doesn't like its current location and wants to move it 3 units east, reflected along the eastern side and then 3 units north. Draw the castle's new location.

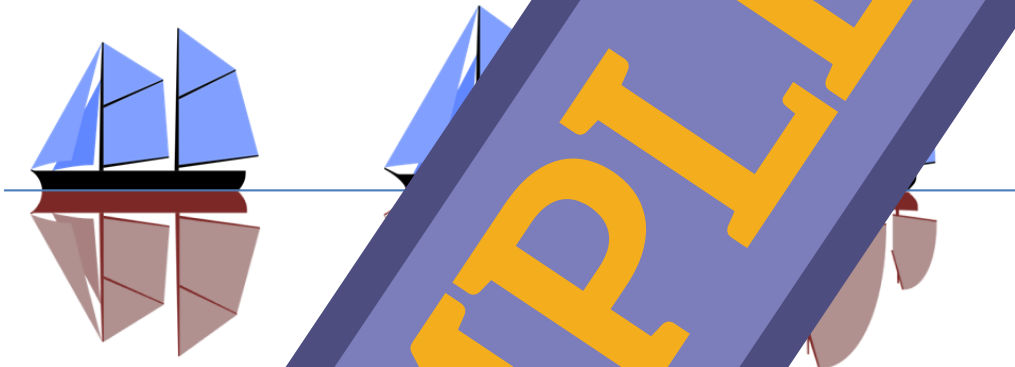


SAMPLE

By Land or by Sea:

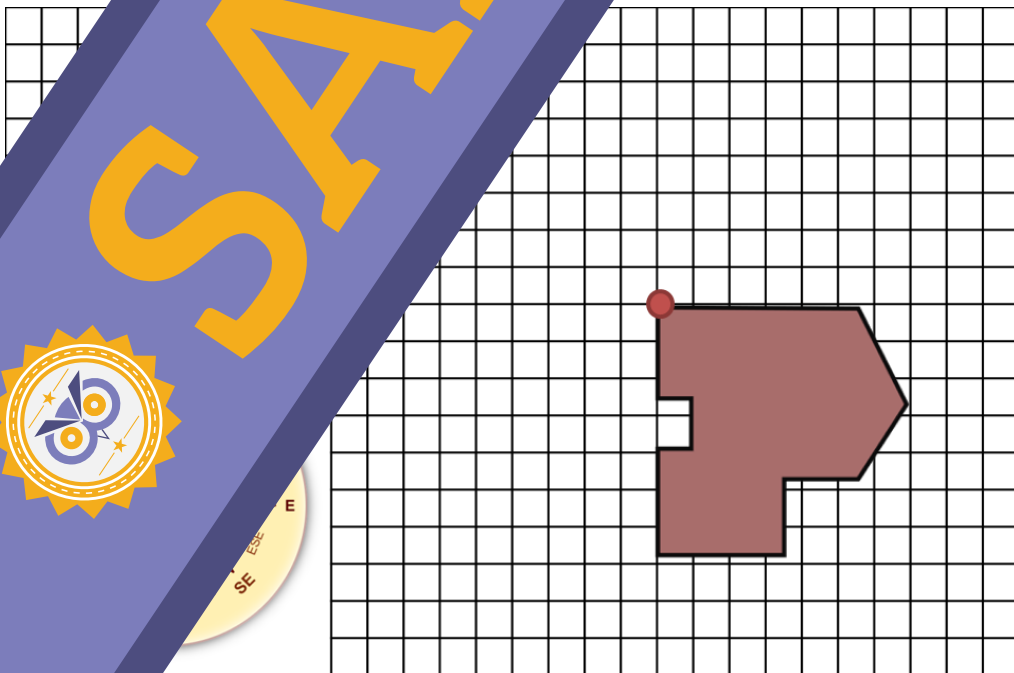
Question One:

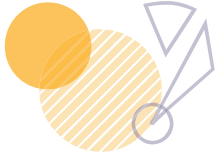
The students are required to draw a mirror image of each of the vessels shown on the left of the blue line, paying particular attention to the shape of the hull and the number of masts and sails each vessel has. For an answer to be correct, the student must have identified the number of sails and masts, and produced a mirror image that would appear reflected on still water.



Question Two:

The students are required to draw a mirror image of the castle on the left of the page, reflect it to the right of the page, and then rotate the image 90 degrees clockwise. They must then draw the general shape of the castle in its new position.





End of Learning

Please

If you feel there are any issues with this booklet for you to use with your class, you may contact us via email (whole worksheets or worksheets) for

Alternatively, you can email us the entire worksheet to us at a later date.

