



How did the Ancient Egyptians live within the cycles of Nature?

Geometry teaching pack



GEOMETRY ACTIVITIES

ENQUIRY OF LEARNING How did the Ancient Egyptians live within the cycles of Nature?

The six activities in this geometry pack have been developed to explore with students some of the ways in which geometry played a key role in Ancient Egyptian society and daily life. They can be used to support learning about shape and measure in maths, to enrich an exploration of Ancient Egyptian civilisation in art or to teach geometry as a standalone activity. They could also be used to introduce students to the principle of Geometry. You can find out more about Nature's principles of Harmony on [The Harmony Project](#) website.

For each activity, step-by-step text instructions are provided as a guide for teachers, with accompanying diagrams and lists of the resources students will need to complete each activity. There are also photocopiable templates, which can be used to help students complete each activity.

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WHY GEOMETRY?

Learning the geometry of Nature provides students with a new way of looking at the world. The observational skills and careful drawings that are required to recreate this geometry can have a powerful impact on students' understanding of Nature and their place in it. If we are to create a sustainable future, we need to see the world through a different lens, to understand that the patterns of life that exist around us also exist in us. This way of seeing the world means we view everything from a place of connection, rather than separation. This sense of connection is an essential part of learning to live sustainably. After all, the word 'Harmony' means joined or connected.



COMPASSES

The activities in this pack can be adapted so that there is no need to use a compass to complete them by using the templates provided at the end of each activity. However, if you would like your students to engage in more of the geometric construction, Jakar compasses will help ensure accuracy and are easy to use. They can be purchased at a discount through [The Harmony Project website](#).

GEOMETRY ACTIVITY 1

ENQUIRY OF LEARNING How did the Ancient Egyptians live within the cycles of Nature?

LEARNING QUESTION How do I draw an Ancient Egyptian lotus?

The Ancient Egyptian lotus, also known as the waterlily, held special meaning in Egyptian art, religion and culture. There were two main types of lotus flower in Ancient Egypt: the white lotus and the blue lotus. Both were admired for their beauty and were often shown in Egyptian art, including paintings, sculptures and building decorations. The lotus flower was linked with the sun and rebirth because it closes at night and reopens in the morning, in response to the rising and setting of the sun. It was also a symbol of purity and resurrection, growing in the muddy waters of the Nile but rising above the surface to bloom.

In this activity, students use symmetry and the template on Resource 1A to draw their own lotus flower.

YOU WILL NEED
Copies of Resource 1A
HB pencil
Good-quality eraser
Tracing paper
Coloured pencils



DID YOU KNOW?

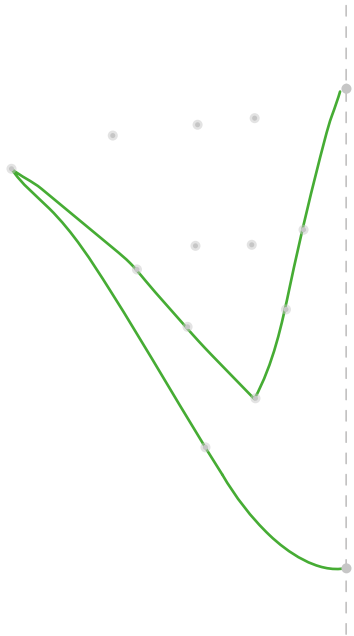
For the Ancient Egyptians, the lotus flower was connected to creation and symbolised new beginnings. People thought that the sun god Ra was born from a lotus flower, which emerged from the watery chaos of Nun, the primordial ocean.



ACTIVITY 1

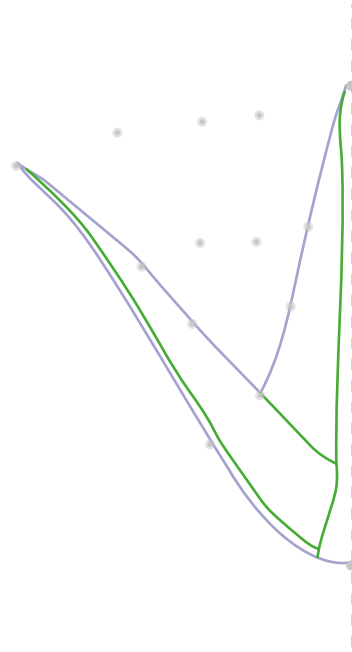
STEP 1 Draw the outer sepals

Start with a printout of Resource 1A. Draw the left-hand sepal and the left-hand half of the central sepal using the dots as a guide, as shown below.



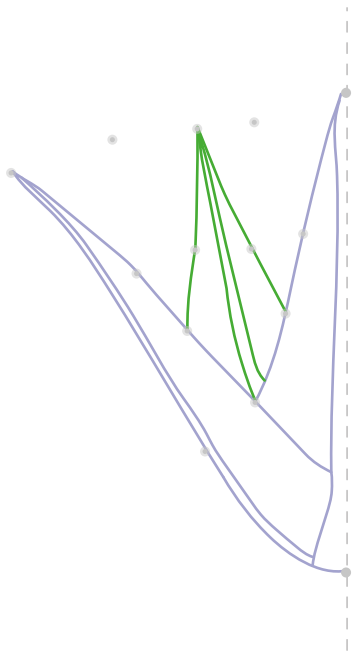
STEP 2 Add details

The relief carving on page 3 is our inspiration for this lotus flower. Draw the lines that divide the sepals and add lines of detail, as shown below.



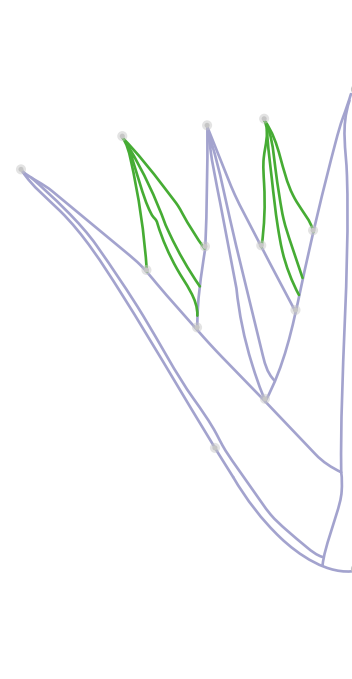
STEP 3 Draw the first petal

Draw a petal in the space between the two sepals, as shown below.



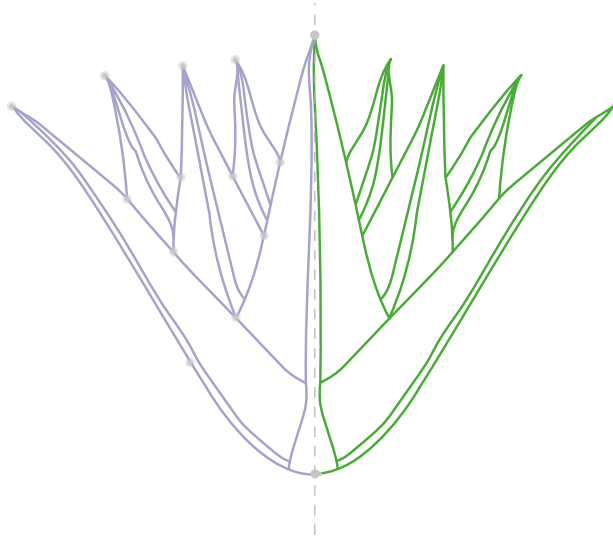
STEP 4 Draw two more petals

Draw two more petals in the gaps between the petal and each sepal, as shown below. One half of the lotus flower is now complete.

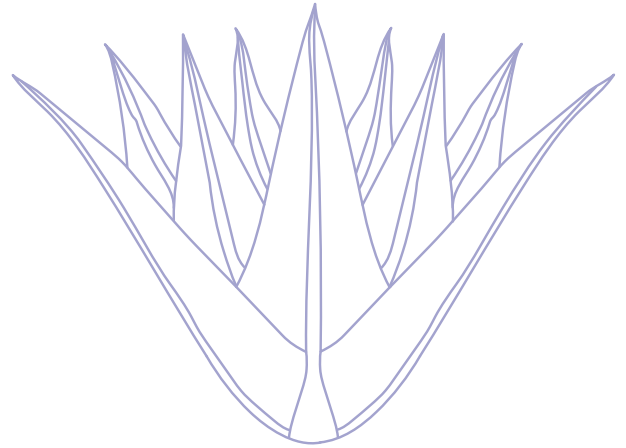


STEP 5 Draw the other half

Use tracing paper to copy and complete your drawing, so that you have a perfectly symmetrical lotus flower.

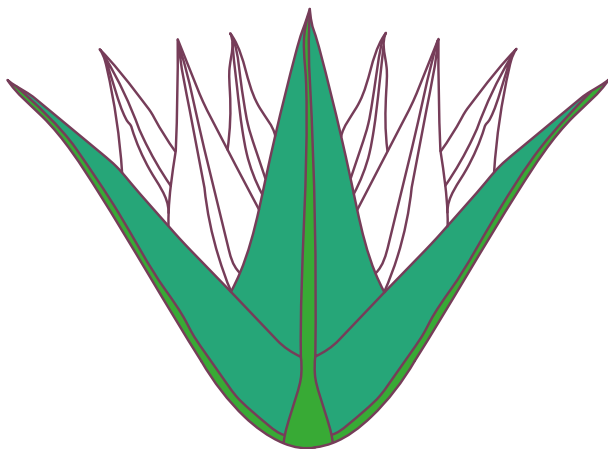


Alternatively, use the remaining dots on the template to complete the lotus flower freehand.



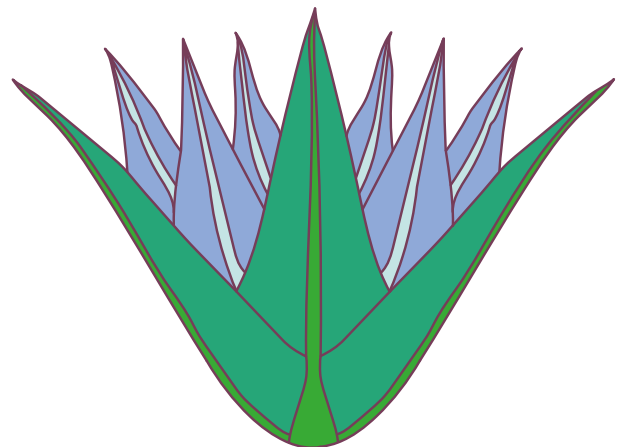
STEP 6 Colour the sepals

Colour the three sepals in a rich green colour. Use a lighter shade along the centre of each sepal to add detail.



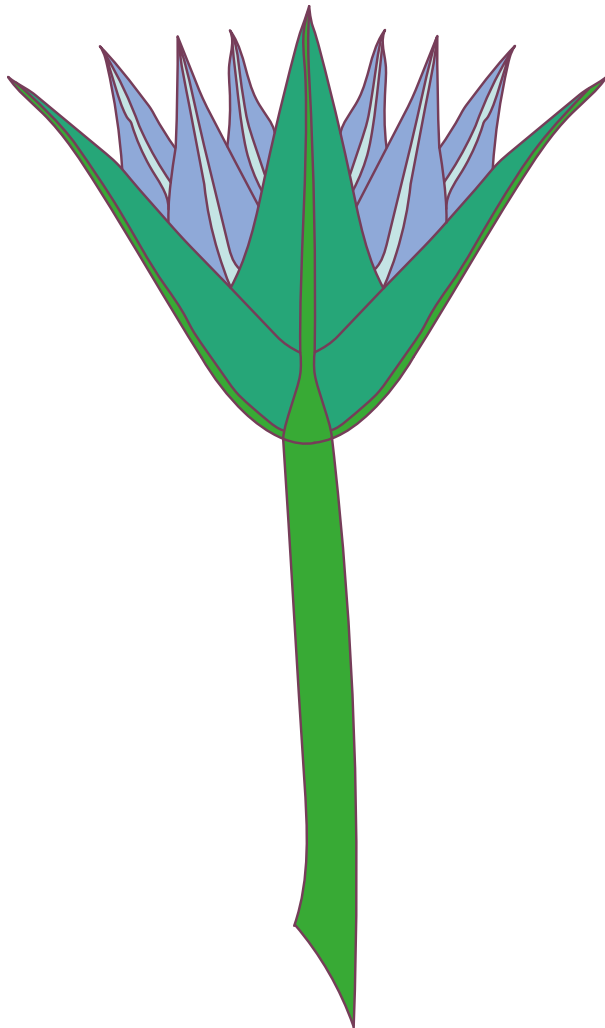
STEP 7 Colour the petals

Colour the petals in a light blue or violet colour. Use a lighter shade along the centre of each petal to add detail.



STEP 8 Draw the stem

Add a stem, shown below, to display the lotus as a complete flower. Alternatively, leave your design as it is (as shown right) and display several lotus flower heads together as in the Egyptian tiles shown at the bottom of the page.

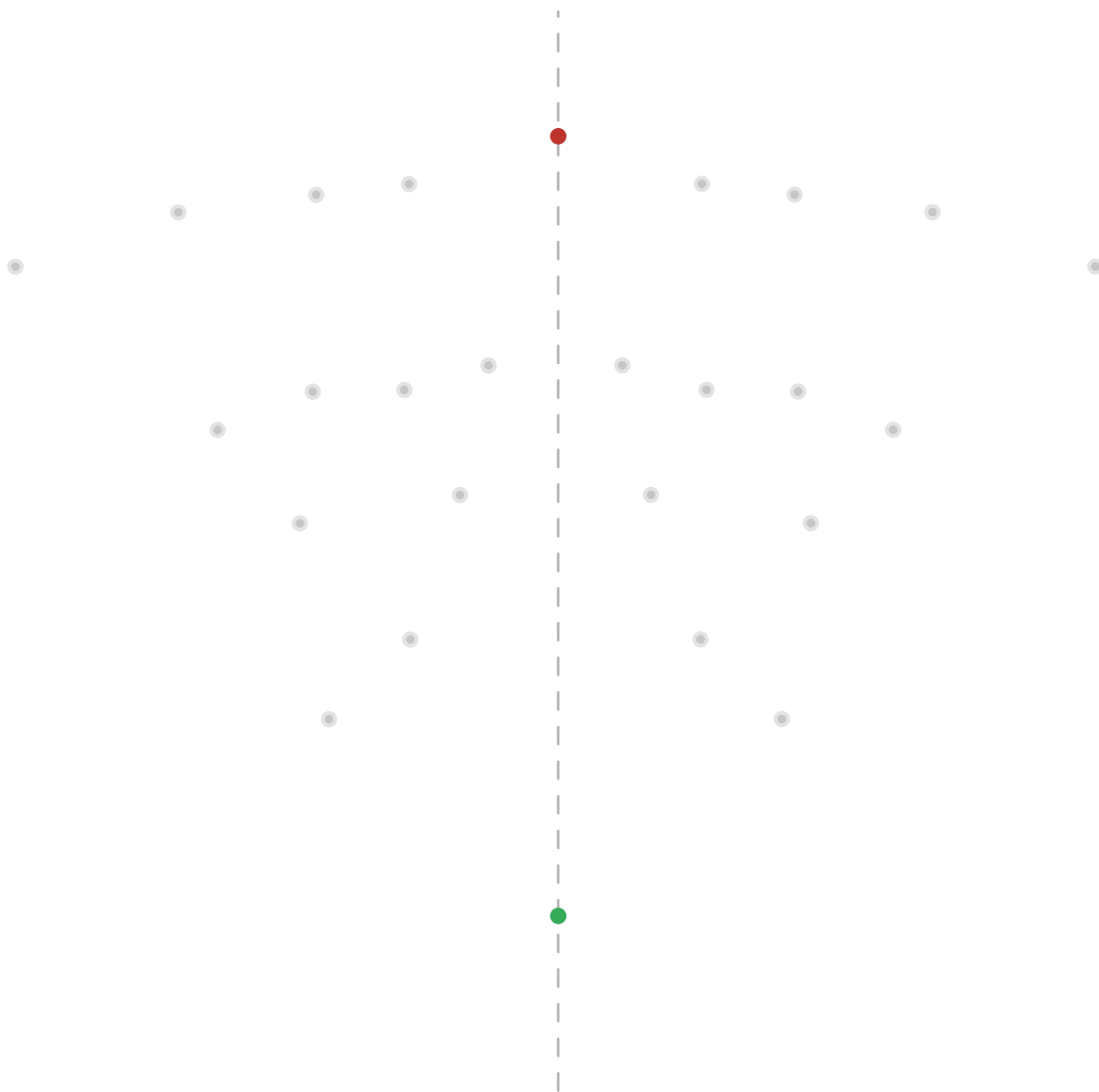


Right: Ancient Egyptian lotus cup made from faience (a glazed ceramic material) at The Met museum, New York



Ancient Egyptian floral frieze with lotus forms in faience at the Brooklyn Museum, New York

PHOTOCOPIABLE RESOURCE 1A



GEOMETRY ACTIVITY 2

ENQUIRY OF LEARNING How did the Ancient Egyptians live within the cycles of Nature?

LEARNING QUESTION How did the Ancient Egyptians use ropes to measure land?

The Ancient Egyptians used ropes with knots tied in them at regular intervals to measure things. They used this method of measurement in the construction of the pyramids and for dividing up land to grow their crops. The ropes themselves would have been made from materials such as flax or papyrus fibres and could be of varying lengths, depending on their use.

One interesting way the Ancient Egyptians used these ropes was to make perfectly square corners for their buildings. How can you make an accurate square with a flexible rope? They made a triangle with the rope by pulling it tight at knots that were three, four and five spaces apart – this created a perfect right-angled triangle, as this activity explores.

YOU WILL NEED

Ruler
HB pencil
Compass
Good-quality eraser
String
Felt-tip pen
Optional copies of Resource 2A or 2B



Harvest scenes from Tomb of Menna, 1400–1352 BC, The Met museum, New York



DID YOU KNOW?

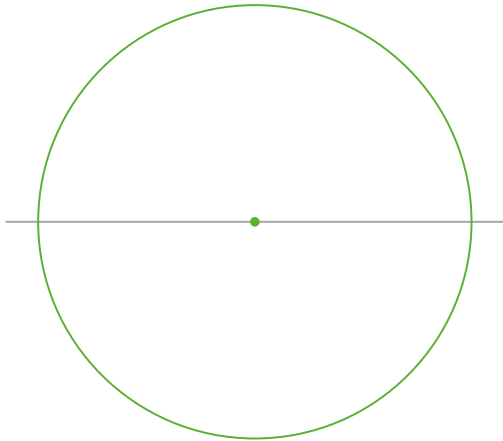
The yearly flooding of the River Nile left nutrient-rich silt along its banks. This fertile land was perfect for farming. The Ancient Egyptians relied on this natural cycle to grow crops such as wheat and barley. However, the flooding made it hard to see where one field ended and another began. Surveyors, or 'rope stretchers' as they were called, used knotted ropes to measure the land again after each flood. This helped make sure everyone knew which land was theirs and kept things fair.



ACTIVITY 2

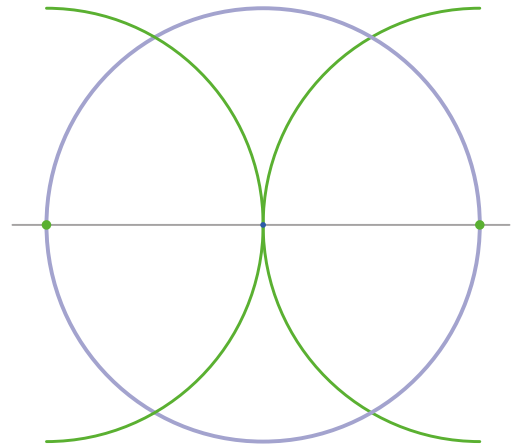
STEP 1 Draw a circle

Use a ruler to draw a horizontal line across the page. With the compass radius set to 8cm, place the compass needle at the centre point of the line and draw a circle. Alternatively, use the template in Resource 2A and start from Step 2, or use the template in Resource 2B and start from Step 5.



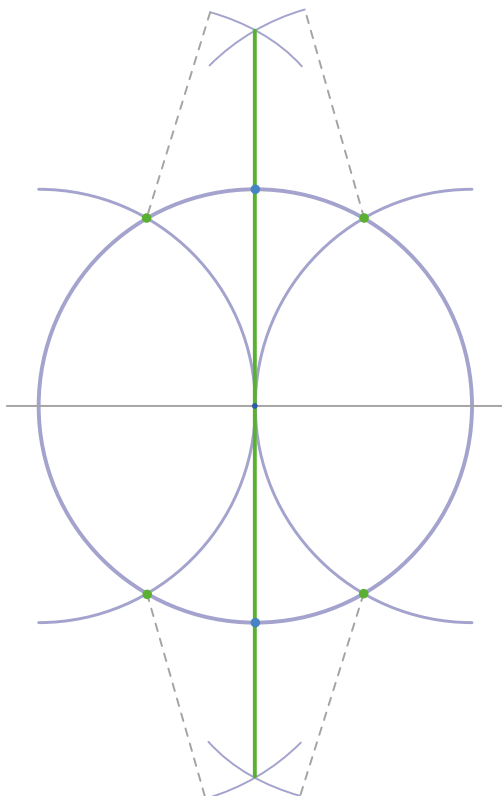
STEP 2 Draw two semi-circles

Use a dot to mark the points shown below where the horizontal line intersects the circumference of the circle. With the compass radius still set to 8cm, place the compass needle at each of these points in turn to draw two semi-circles.



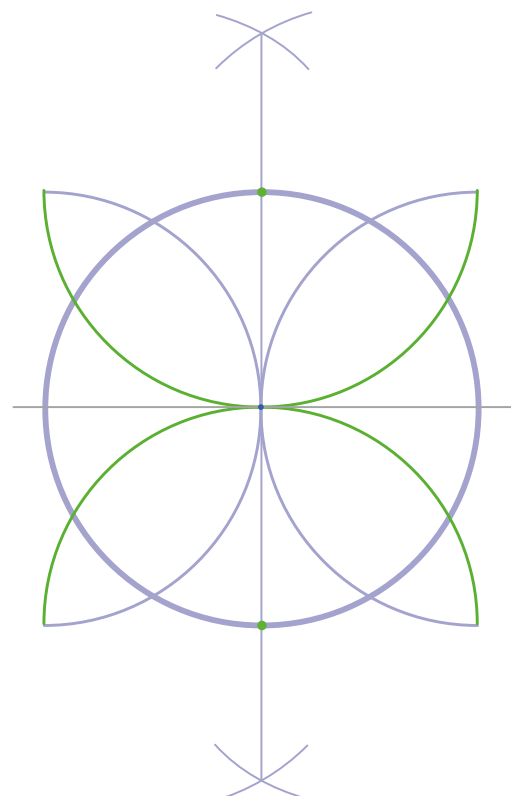
STEP 3 Add a vertical line

Mark the two points shown below where the top of the circle intersects the semi-circles. Place the compass needle on one of these dots and draw an arc at the top of the page. Do the same on the other side to form a cross. Repeat at the bottom of the drawing. Use a ruler to draw a vertical line joining the two crosses.



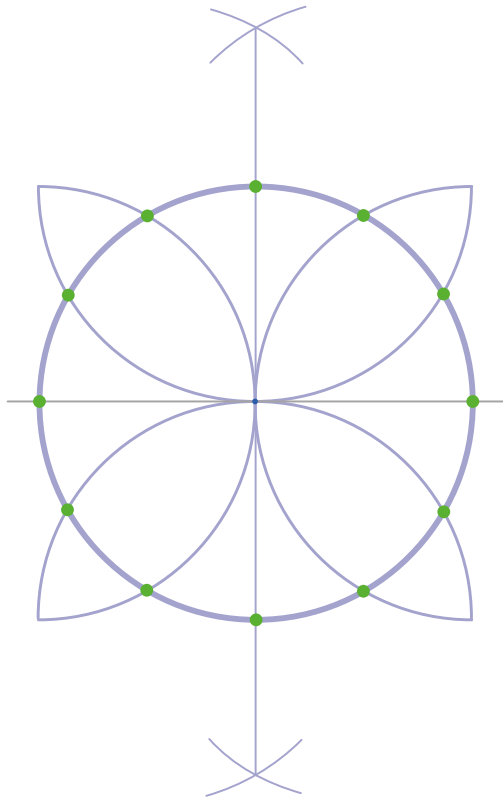
STEP 4 Draw four petals

Mark the points shown below where the vertical line intersects the circumference of the circle. With the compass radius still set to 8cm, draw two more semi-circles, as shown below, to create four petals.



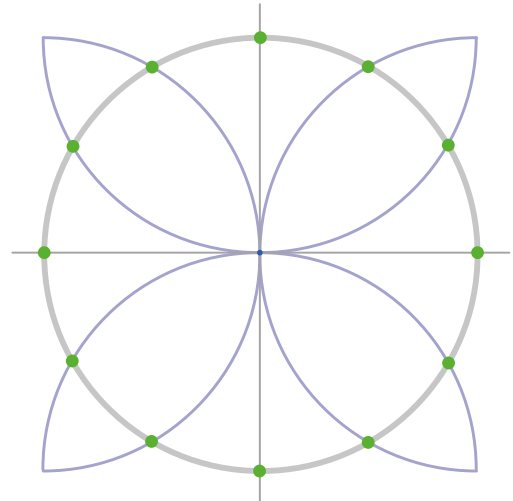
STEP 5 Mark 12 points around the circle

Mark the 12 points shown below where the petals and horizontal and vertical lines intersect the circumference of the circle at regular intervals.



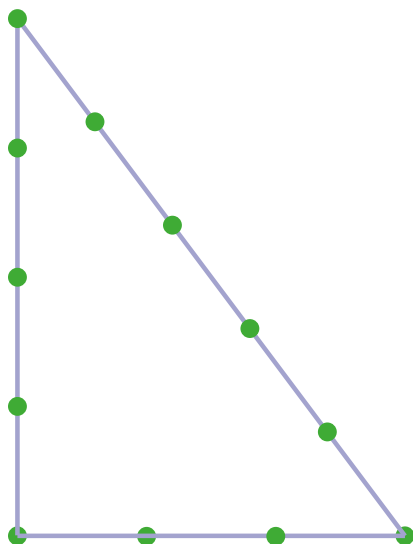
STEP 6 Mark the points on the string

Lay the string along the circumference of the circle and use a felt-tip pen to mark each of the 12 points on the string. Mark or knot a 13th point on the string and either use tape or a knot to attach the 1st point to the 13th, creating a loop.

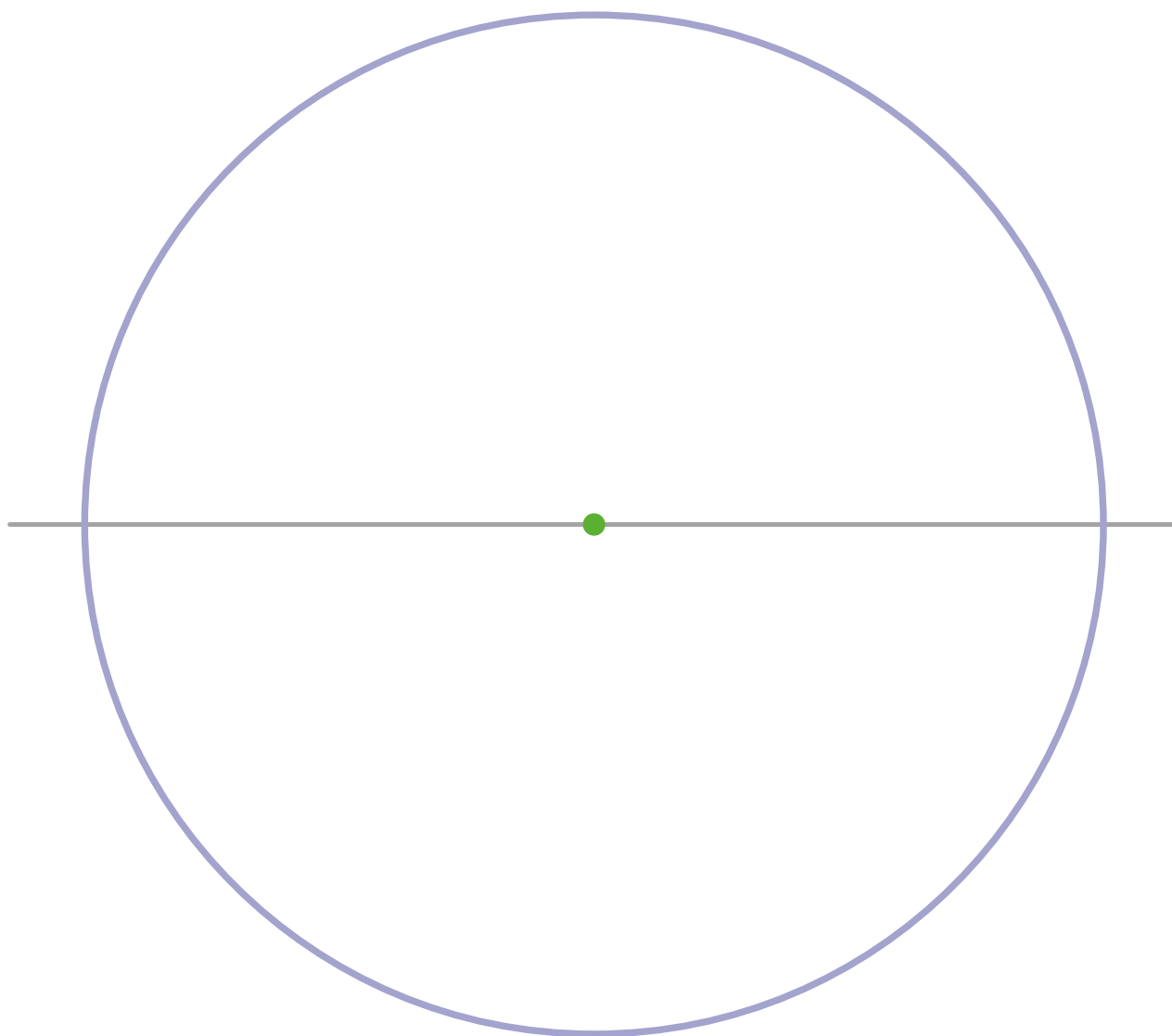


STEP 7 Create a triangle

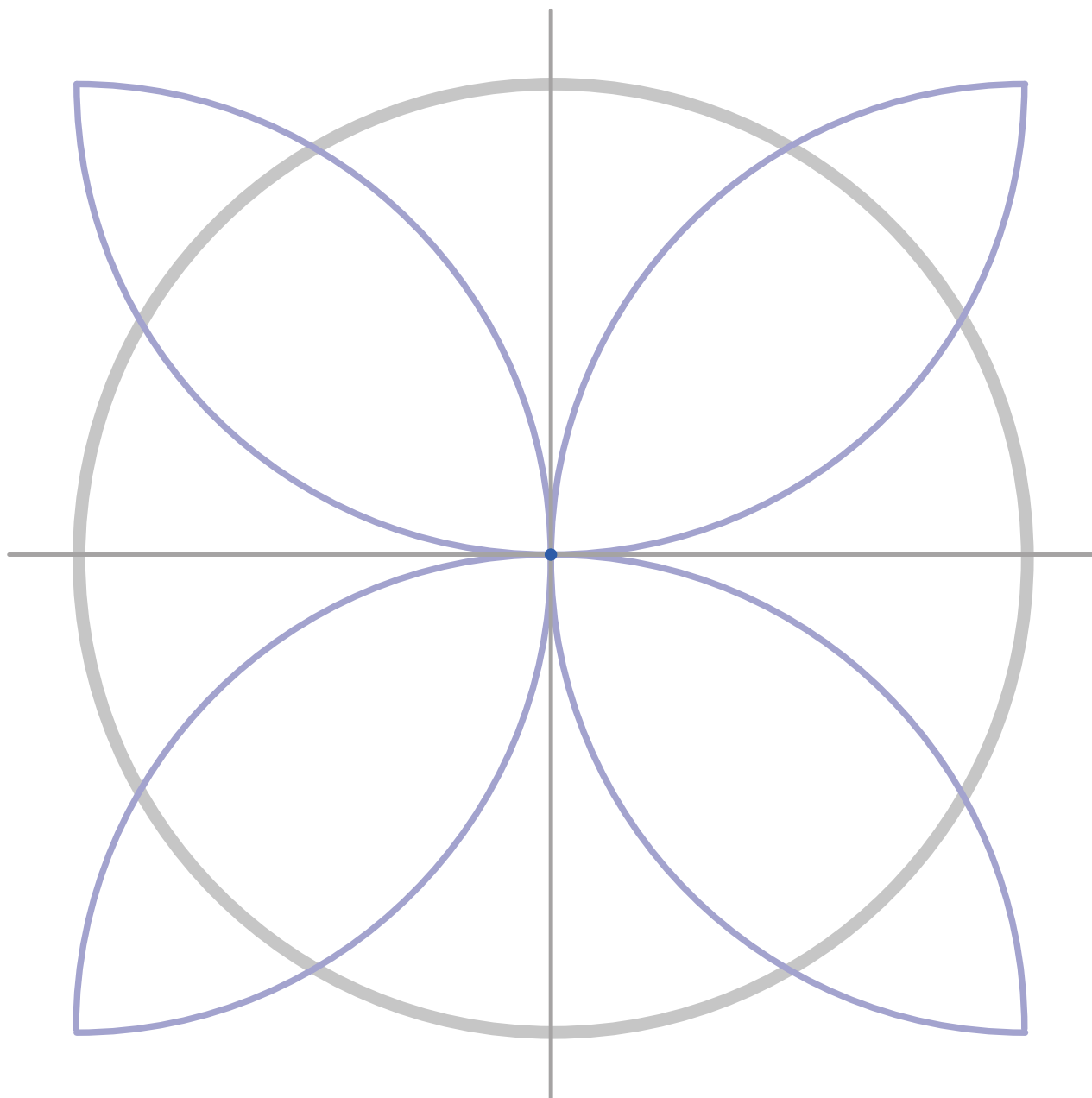
Use the string to create a right-angled triangle by counting three, four and five sections between the knots, as shown below. Stakes can be used outdoors to mark a triangle of land, as shown right.



PHOTOCOPIABLE RESOURCE 2A



PHOTOCOPIABLE RESOURCE 2B



GEOMETRY ACTIVITY 3

ENQUIRY OF LEARNING How did the Ancient Egyptians live within the cycles of Nature?

LEARNING QUESTION How did the Ancient Egyptians build their pyramids?

The square-based pyramid is one of the most recognisable symbols of Ancient Egyptian civilization. These amazing buildings were originally used as tombs for the pharaohs and their queens.

When a pharaoh died, their body was placed in the pyramid along with possessions that the Ancient Egyptians believed they would need in the afterlife. The pyramids were also surrounded by other smaller buildings and temples where special ceremonies took place.

In this activity, students use the geometry of a circle to help them create a model of a square-based pyramid. The activity can be simplified by using the template in Resource 3A and following the instructions from Step 2, or by using four copies of Resource 3B per child (or per pair of children working together) to create the net shown in Step 7 by sticking together the tabs.

YOU WILL NEED

Ruler
HB pencil
Compass
Good-quality eraser
Coloured pencils
Glue or tape
Piece of card
Optional: copies of Resource 3A or 3B



DID YOU KNOW?

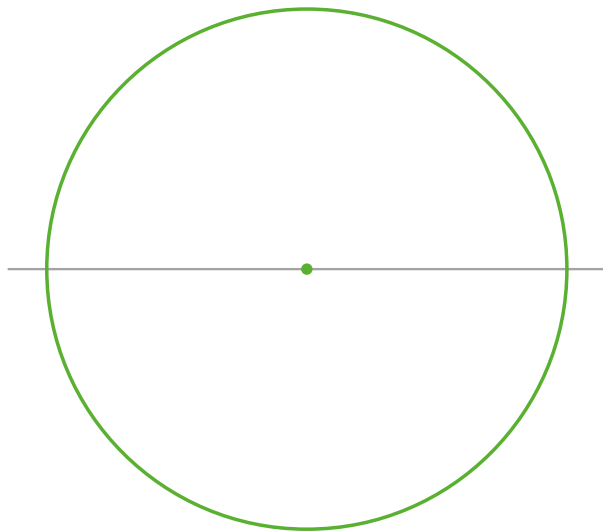
The Great Pyramid of Giza, the largest and most famous of all Egyptian pyramids, was constructed around 2580-2560 BCE for the Pharaoh Khufu (also known as Cheops). It originally stood at 146.6 metres tall and was the tallest human-made structure in the world for nearly 4,000 years.



ACTIVITY 3

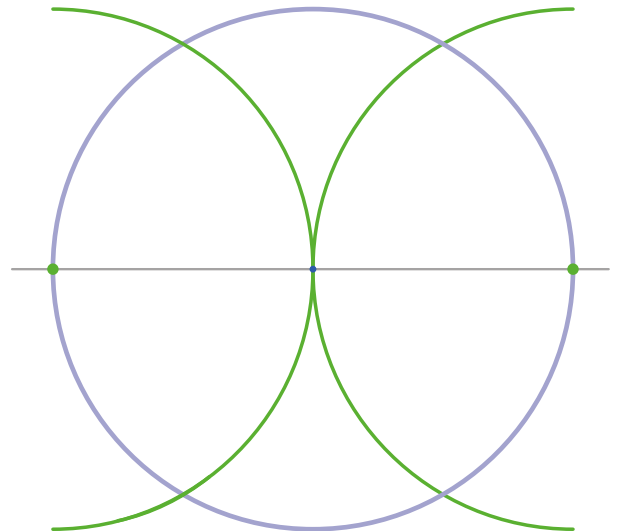
STEP 1 Draw a circle

Use a ruler to draw a horizontal line across the page. With the compass radius set to 8cm, place the compass needle at the centre point of the line and draw a circle. Alternatively, use the template in Resource 3A and start from Step 2.



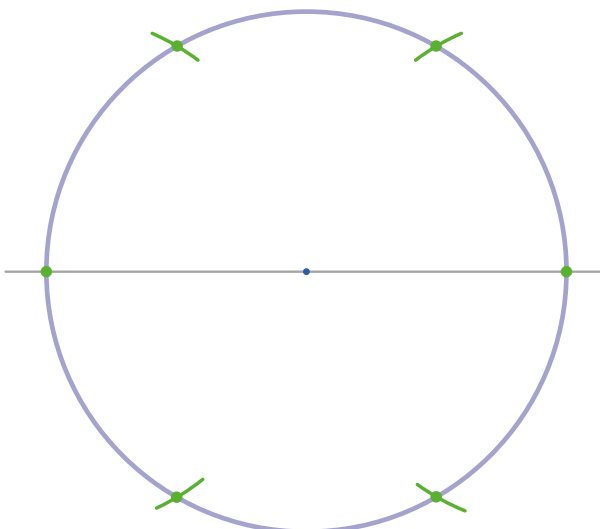
STEP 2 Draw two semi-circles

Use a dot to mark the points shown below where the horizontal line intersects the circumference of the circle. With the compass radius still set to 8cm, place the compass needle at each of these points in turn to draw two semi-circles.



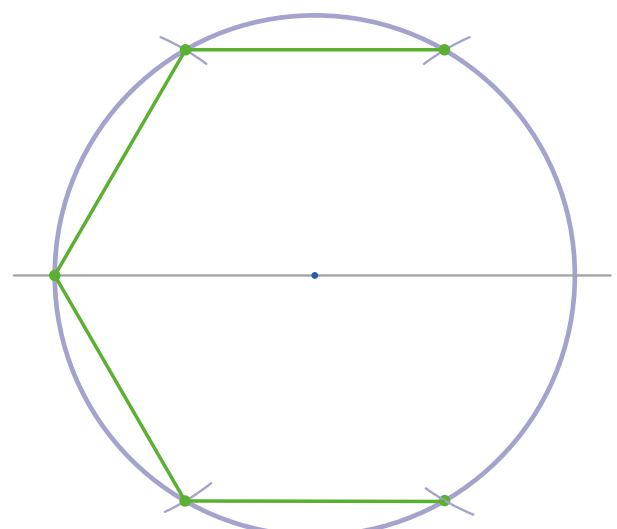
STEP 3 Mark six points

Mark the six points shown below where the horizontal line and two semi-circles intersect the circumference of the circle, then carefully erase the semi-circles.



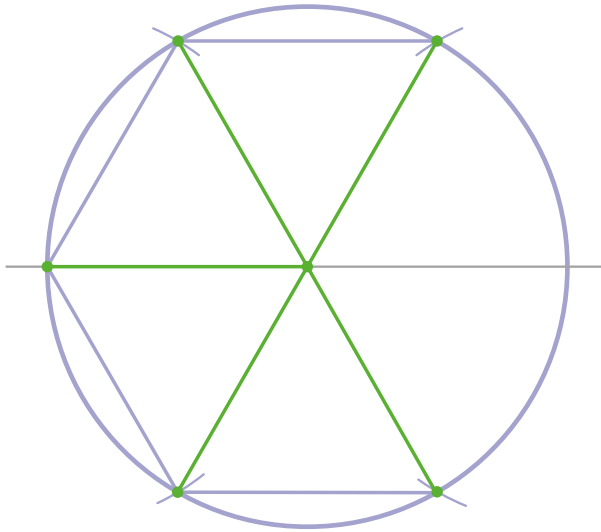
STEP 4 Connect five points

Use a ruler to draw lines connecting five of the points, as shown below, to create a shape like a hexagon with two sides missing.



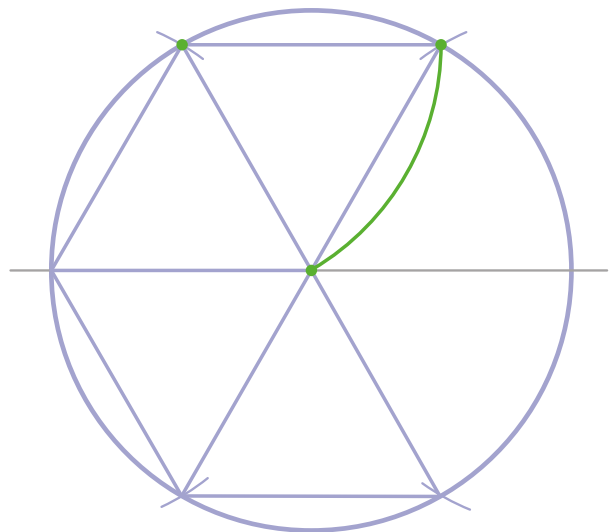
STEP 5 Create four triangles

Use a ruler to draw two diagonal lines connecting the top two points with the bottom two, as shown below. Each line should pass through the central point of the circle to form a cross. There should now be four triangles with the circle.



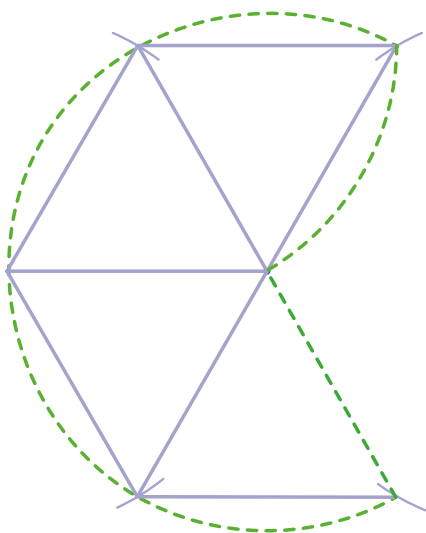
STEP 6 Draw an arc

Set the radius of the compass to the side length of the triangles. Place the compass needle on the top left dot and draw an arc, as shown below in green, to create a tab.



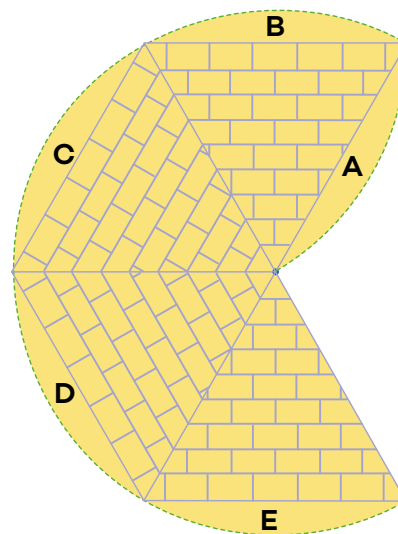
STEP 7 Cut out the template

Cut out the shape you have drawn, following the lines shown below in green, including the tab you drew in Step 6.



STEP 8 Draw brick shapes

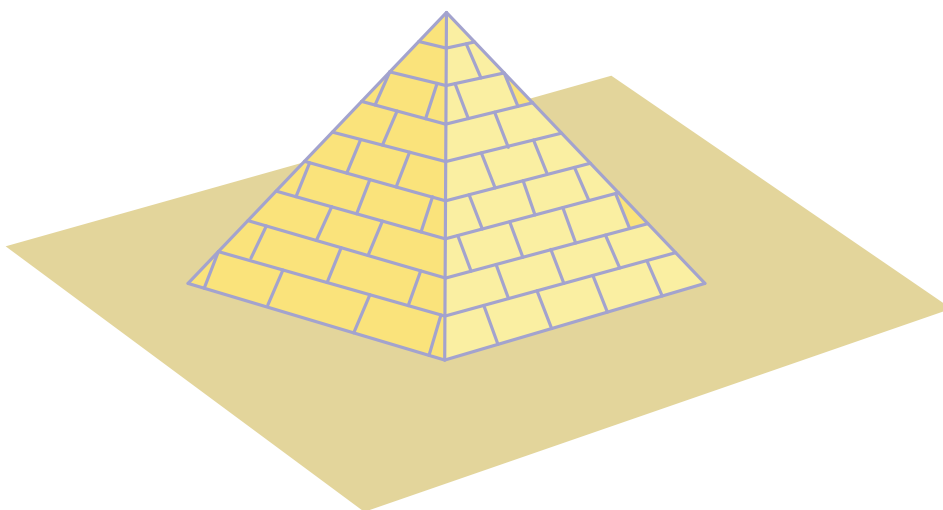
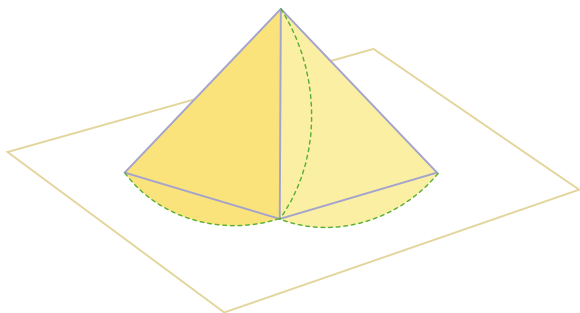
Lay the template out flat again and use a ruler to draw on brick shapes, as shown below. Colour the pyramid a sandy shade of yellow.



STEP 9 Fold and stick the pyramid

Fold along the sides of the triangles and use glue or tape to stick tab A, shown in Step 8, to the side of the adjacent triangle, as shown below.

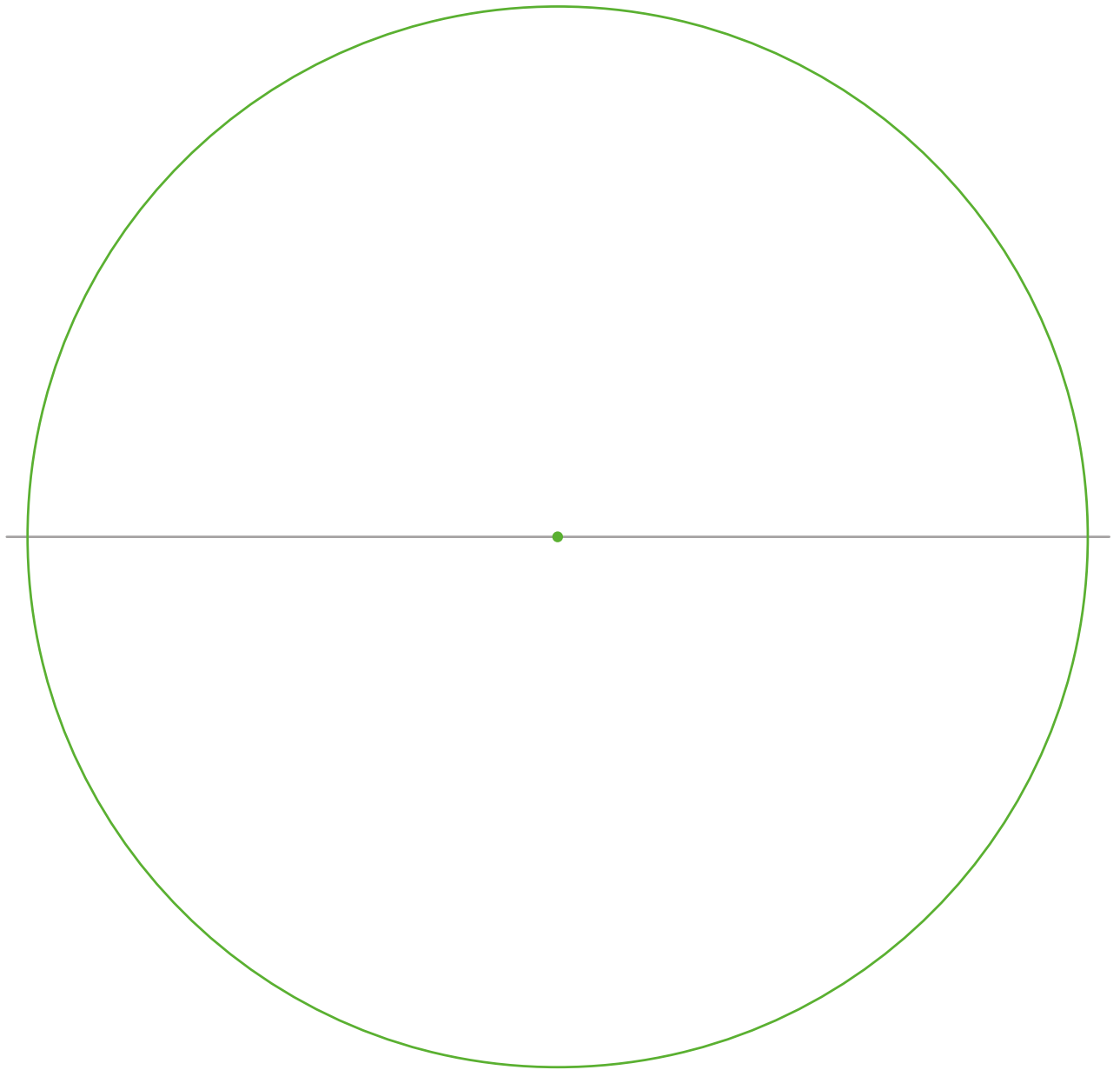
Use glue or tape to stick the remaining tabs B, C, D and E, shown in step 8, to a piece of card to complete your pyramid model.

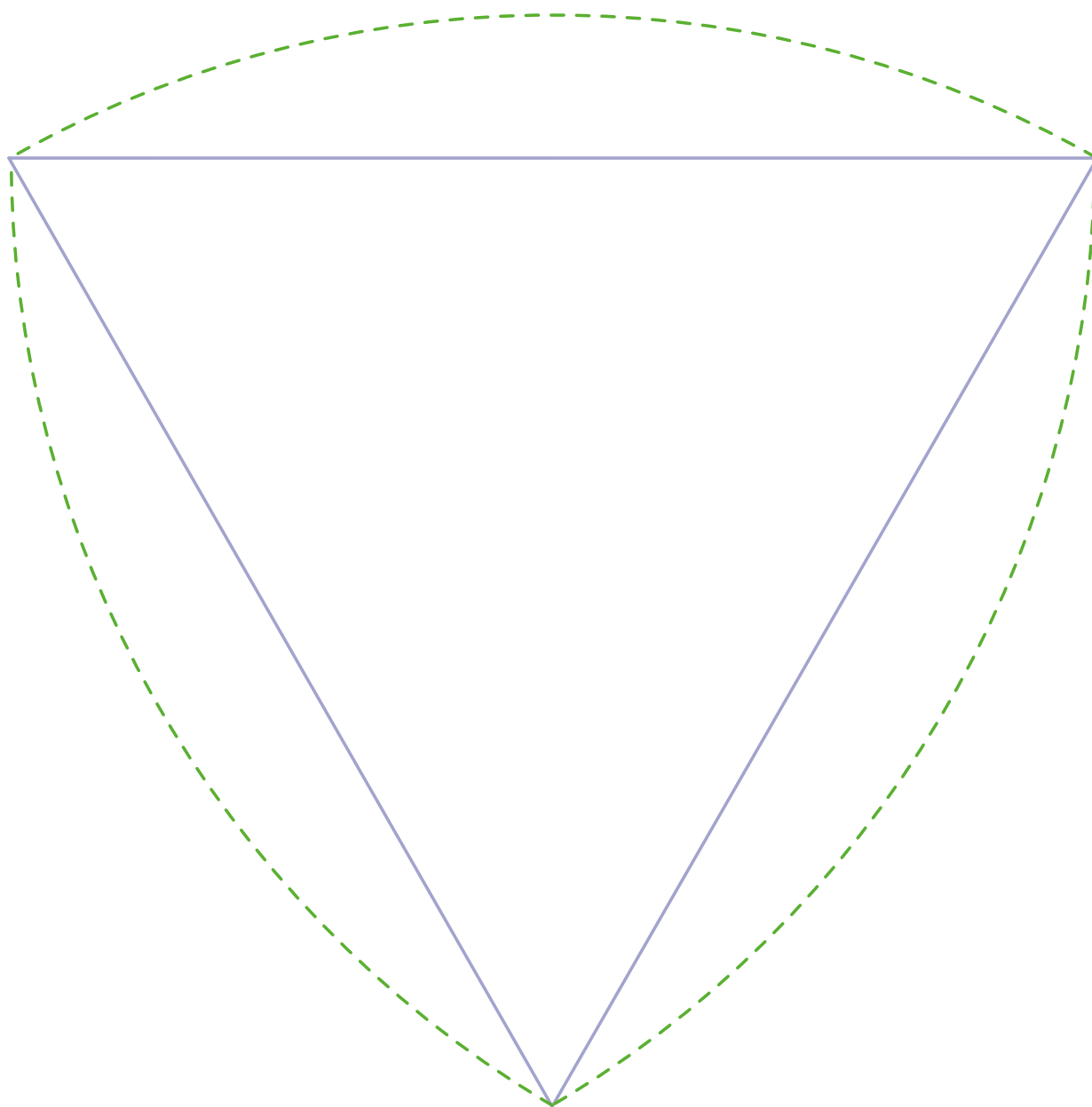


Your finished pyramid model should look like this.



PHOTOCOPIABLE RESOURCE 3A





GEOMETRY ACTIVITY 4

ENQUIRY OF LEARNING How did the Ancient Egyptians live within the cycles of Nature?

LEARNING QUESTION How can I recreate an Ancient Egyptian wall pattern?

Ancient Egyptian tombs had beautiful paintings and patterns on their walls. The patterns often consisted of geometric shapes such as squares, triangles and circles, as well as zigzags and lines. These elements were repeated to create interesting and balanced designs, and some of the patterns had special meanings, such as protection or good luck.

Artists in Ancient Egypt used bright colours and made their own paint from crushed rocks, plants and minerals. Some of the most common paint colours they used were red, blue, green, yellow and white.

The paintings and patterns in Ancient Egyptian tombs can teach us a lot about how people lived a long time ago. They have lasted such a long time because they have been protected from the effects of sunlight and weather, which is why they still exist thousands of years later.

In this activity, students use the geometry of a circle to create a wall pattern.

YOU WILL NEED
Copies of Resource 4A
Ruler
HB pencil
Compass
Good-quality eraser
Colouring pencils
White gel pen



DID YOU KNOW?

In Ancient Egypt, artists made colours from things found in Nature. They used a green rock called malachite to make green paint, a type of soil called ochre for red and yellow paint, and they crushed a blue stone named lapis lazuli for blue paint. This is how they made their paintings so bright and colourful.

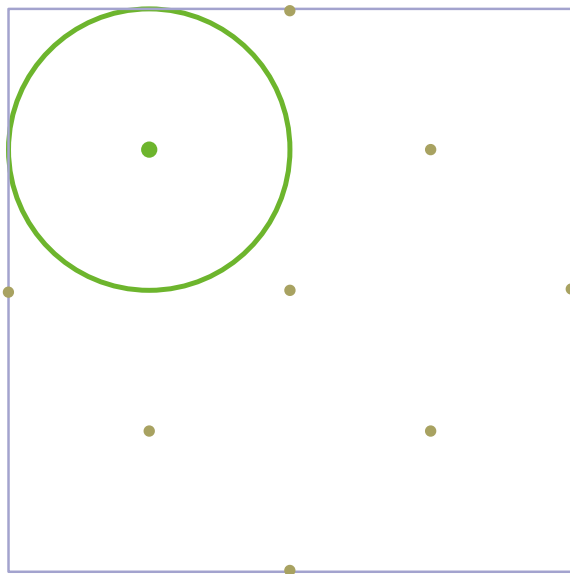


Ceiling pattern in the tomb of Neferserkheru at Luxor

ACTIVITY 4

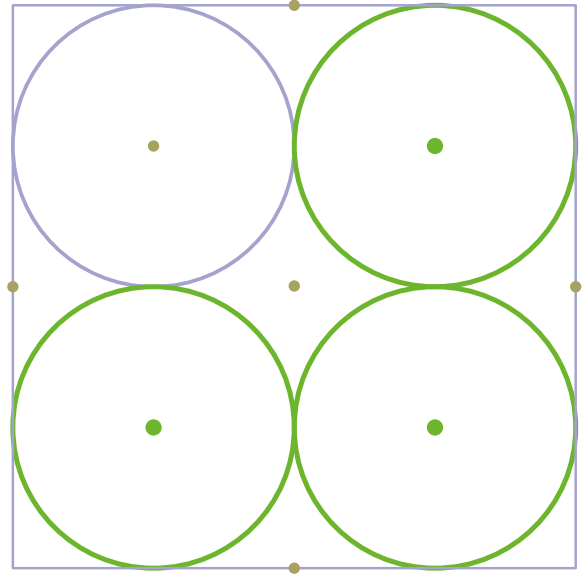
STEP 1 Draw a circle

Start with a printout of Resource 4A. Place the compass needle on the top left dot, shown below in green, and expand the arm so that it reaches the enclosing purple square. Draw a circle, as shown below; the radius will be roughly 4cm. Alternatively, use Resource 4B and start from Step 6.



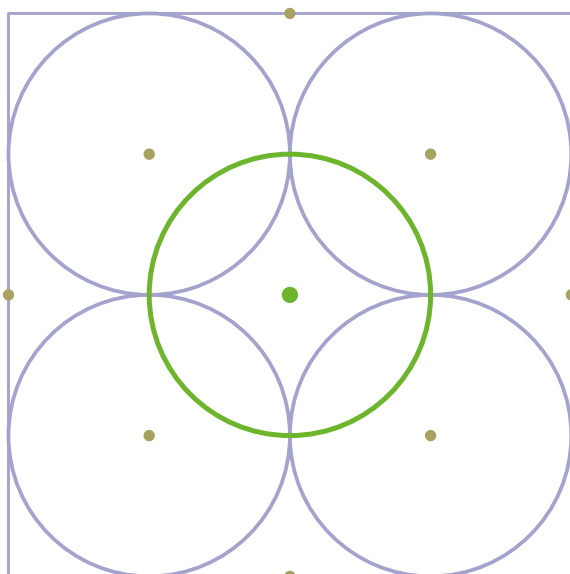
STEP 2 Draw three more circles

Repeat the process outlined in Step 1 to draw three more circles from the points marked in green, as shown below.



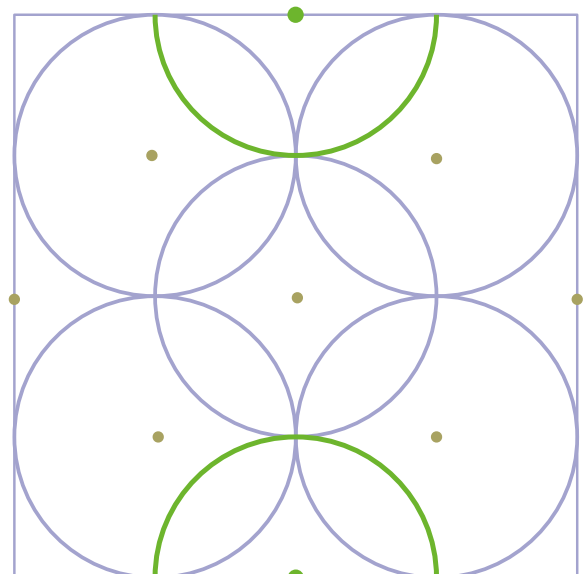
STEP 3 Draw a central circle

Keeping the radius of the compass the same, place the compass needle on the central dot, shown below in green, and draw a fifth circle to create an overlapping pattern.



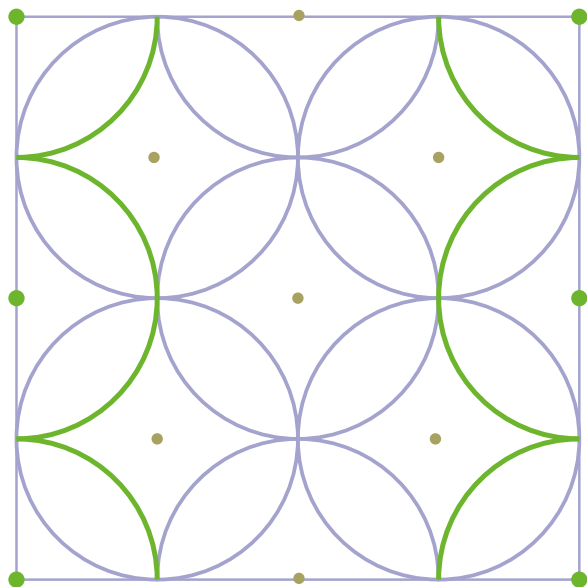
STEP 4 Draw two semi-circles

Place the compass needle on the marks shown below in green at the top and bottom of the enclosing square, and draw two semi-circles.



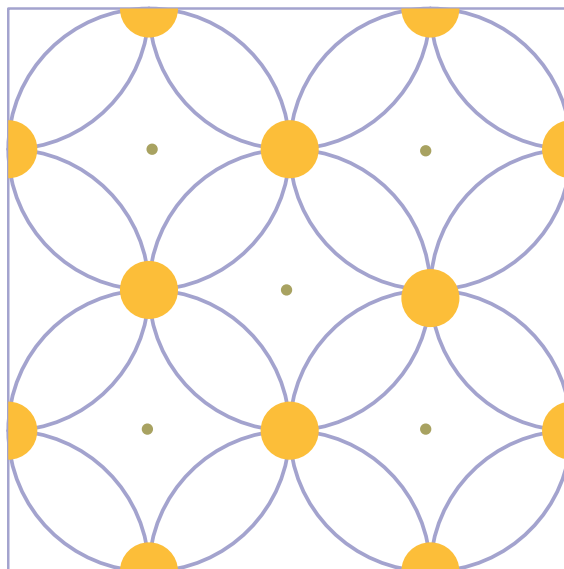
STEP 5 Complete the pattern

Repeat Step 4 to draw two more semi-circles on the left- and right-hand sides, as shown below. Complete the pattern by drawing quarter circles at each corner of the template, placing the compass needle on the corners of the square.



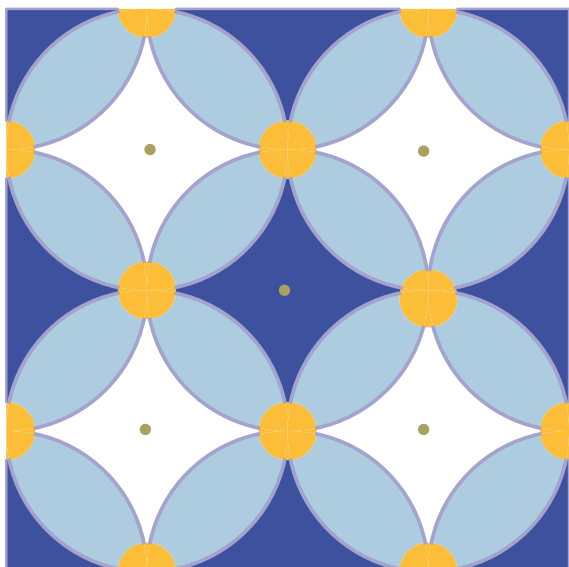
STEP 6 Draw small circles

Use a sandy-coloured yellow pencil to draw small circles at the points where the petal shapes meet, as shown below.



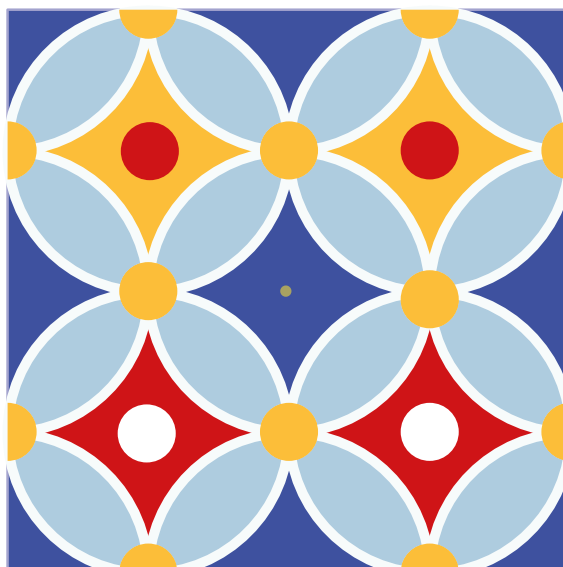
STEP 7 Colour the background

Colour the background and petal shapes in shades of blue, as shown below.

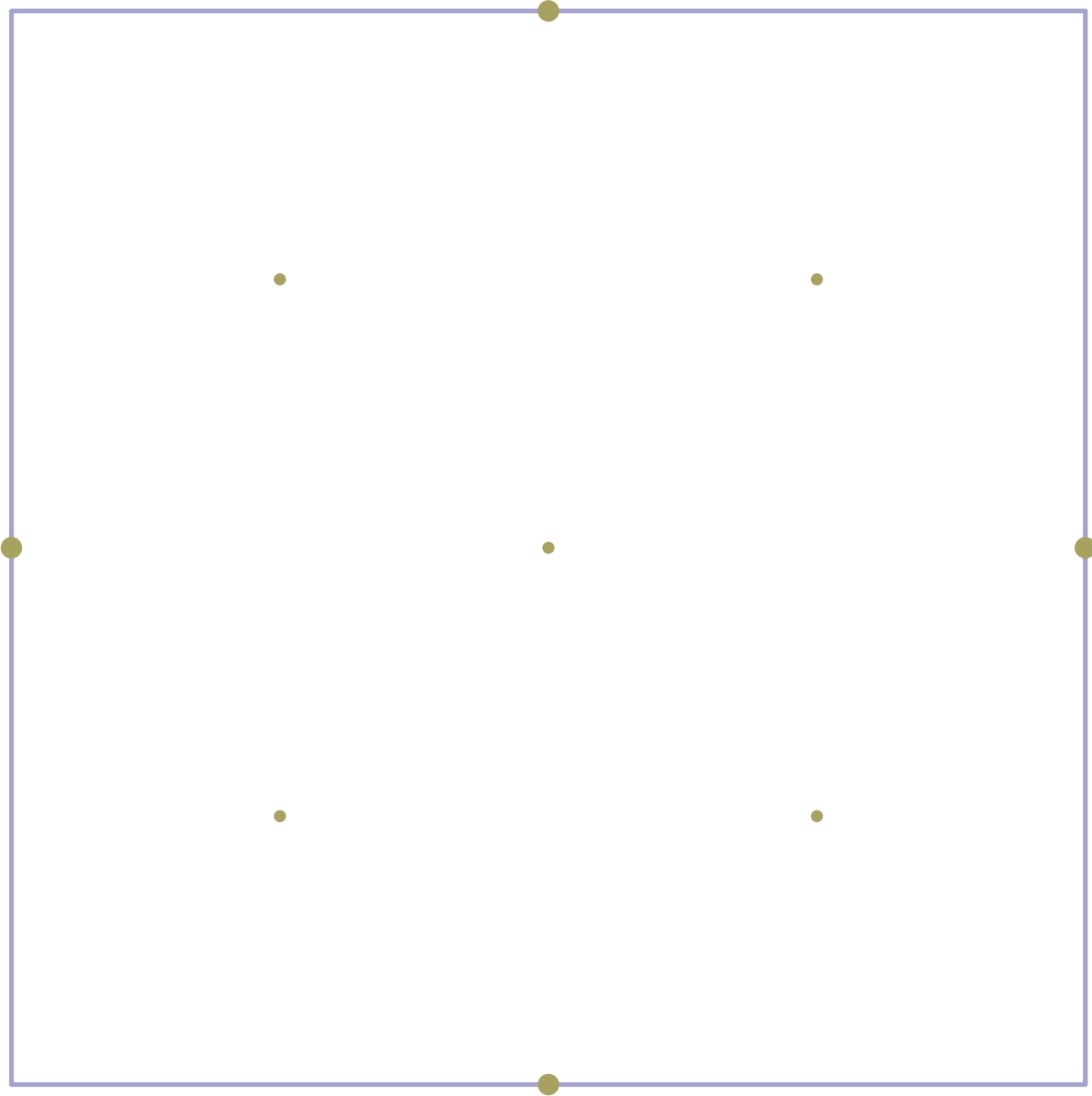


STEP 8 Colour the diamonds

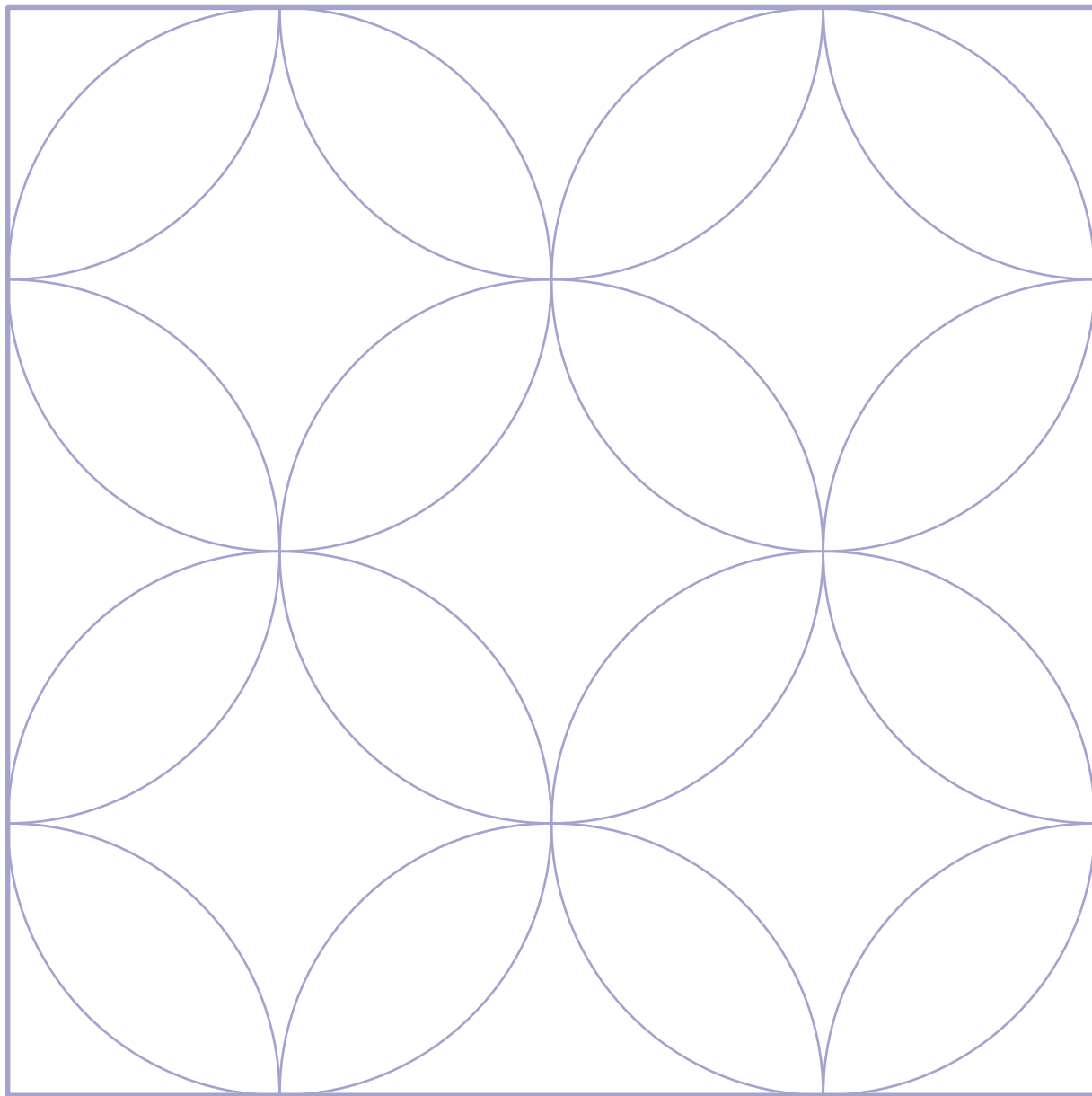
Use yellow and red pencils to colour the diamond shapes – these two shades complement the blue background and are used in the original painting. Go over the outlines either in a darker shade or with a white gel pen, as shown below.



PHOTOCOPIABLE RESOURCE 4A



PHOTOCOPIABLE RESOURCE 4B



GEOMETRY ACTIVITY 5

ENQUIRY OF LEARNING How did the Ancient Egyptians live within the cycles of Nature?

LEARNING QUESTION How did the Ancient Egyptians live their spiritual life?

The Ancient Egyptians used a symbol-based writing system called hieroglyphs. A cartouche (hieroglyphs contained within an oval shape with a line at one end) was used in Ancient Egyptian art and writing to surround the name of a pharaoh or other important person. The cartouche was believed to provide magical protection to the person whose name was written inside it.

Cartouches can be found on Egyptian statues, temples and tombs. They were often used in combination with other hieroglyphs and images to tell stories or provide information about the person whose name was enclosed in the cartouche.

In this activity, students use the geometry of a circle to create a cartouche. These can be cut out and displayed as a collaborative class artwork.

YOU WILL NEED

Ruler
HB pencil
Compass
Good-quality eraser
Coloured pencils
Tracing paper
Optional copies of Resource 5A or 5B



Cartouche inscribed at the top of an Ancient Egyptian stone pillar



DID YOU KNOW?

Ancient Egyptian soldiers wore cartouche-shaped amulets (small charms often inscribed with the names of pharaohs) as a form of protection in battle. They believed these amulets, made from materials such as glazed pottery or semi-precious stones, connected them to the pharaoh's power, granting them strength and safety.

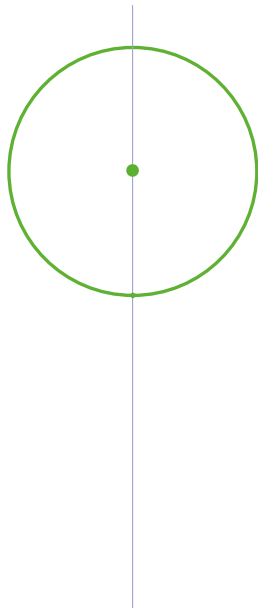


Cartouche and hieroglyphs carved in Ancient Egyptian stonework

ACTIVITY 5

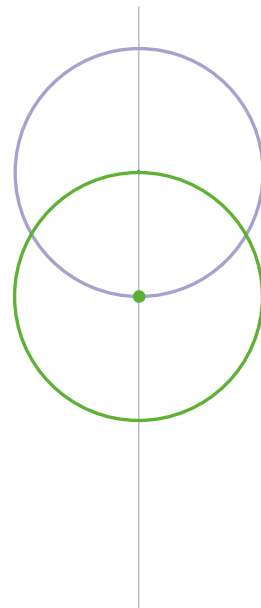
STEP 1 Draw a circle

Use a ruler to draw a vertical line down the centre of the page. With the compass radius set to 4cm, place the compass needle on this line near the top of the page and draw a circle, as shown below. Alternatively, use the template in Resource 5A and start from Step 2, or use the template in Resource 5B and start from Step 7.



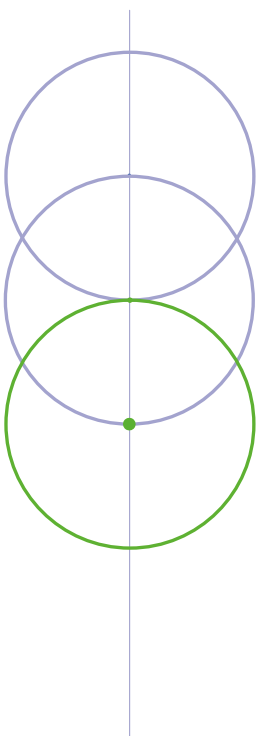
STEP 2 Draw a second circle

With the compass radius still set to 4cm, place the compass needle on the dot shown below in green, where the vertical line intersects the bottom of the circumference of the first circle, and draw a second circle.



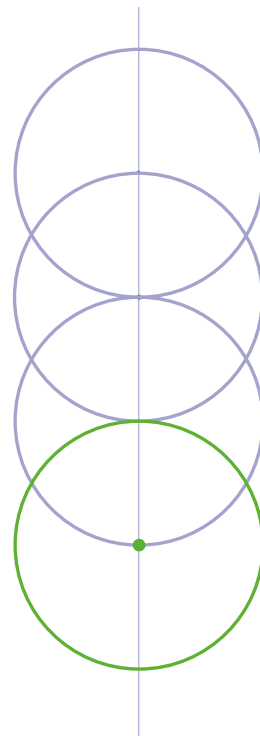
STEP 3 Draw a third circle

With the compass radius still set to 4cm, place the compass needle on the dot shown below in green, where the vertical line intersects the bottom of the second circle, and draw a third circle.



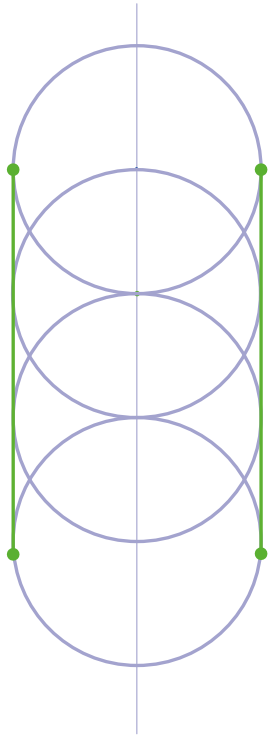
STEP 4 Draw a fourth circle

With the compass radius still set to 4cm, place the compass needle on the dot shown below in green, where the vertical line intersects the bottom of the third circle, and draw a fourth circle.



STEP 5 Draw the sides of the cartouche

Mark the four points shown below in green, on either side of the top and bottom circles. Use a ruler to draw a line joining the two left-hand dots and do the same with the right-hand dots, as shown below.



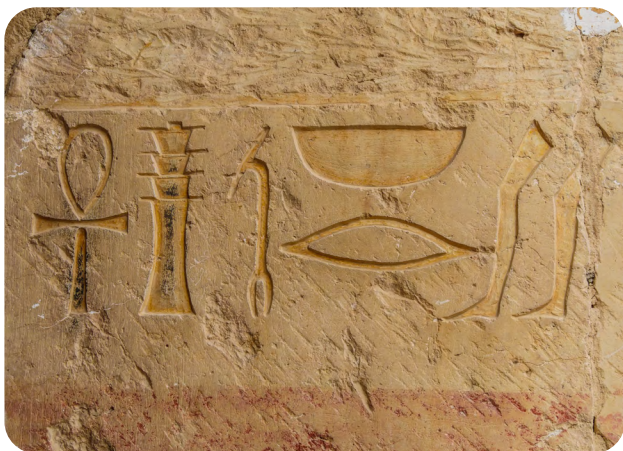
STEP 6 Trace the outline

Either trace the outline of the cartouche and transfer it to a fresh piece of paper, or rub out the construction lines to leave the outline shown below.

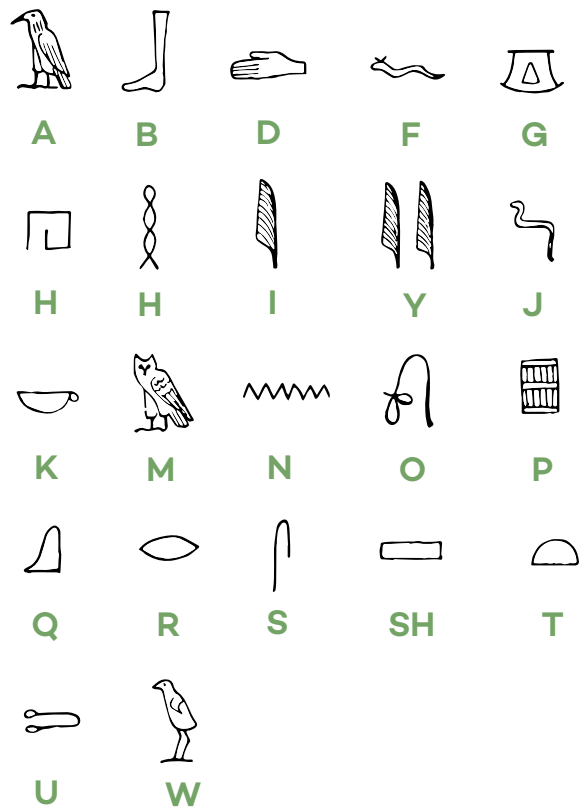


STEP 7 Add hieroglyphs

Complete the cartouche by drawing hieroglyphs to write some of the letters from your name. These can be drawn freehand or traced from Resource 5C.

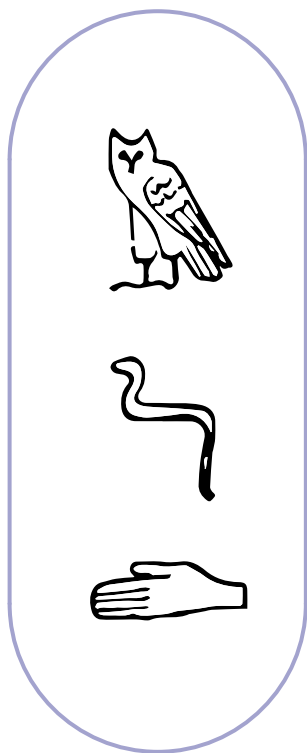


Ancient Egyptian hieroglyphs carved in stone

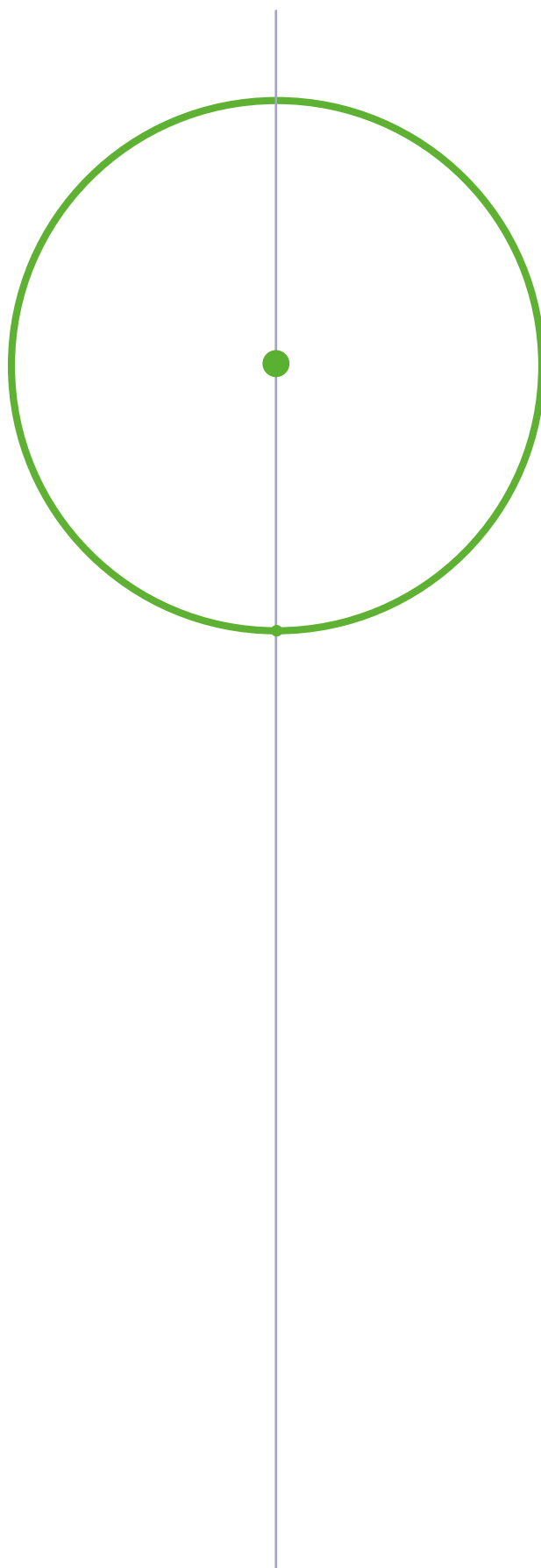


STEP 8 Add shading

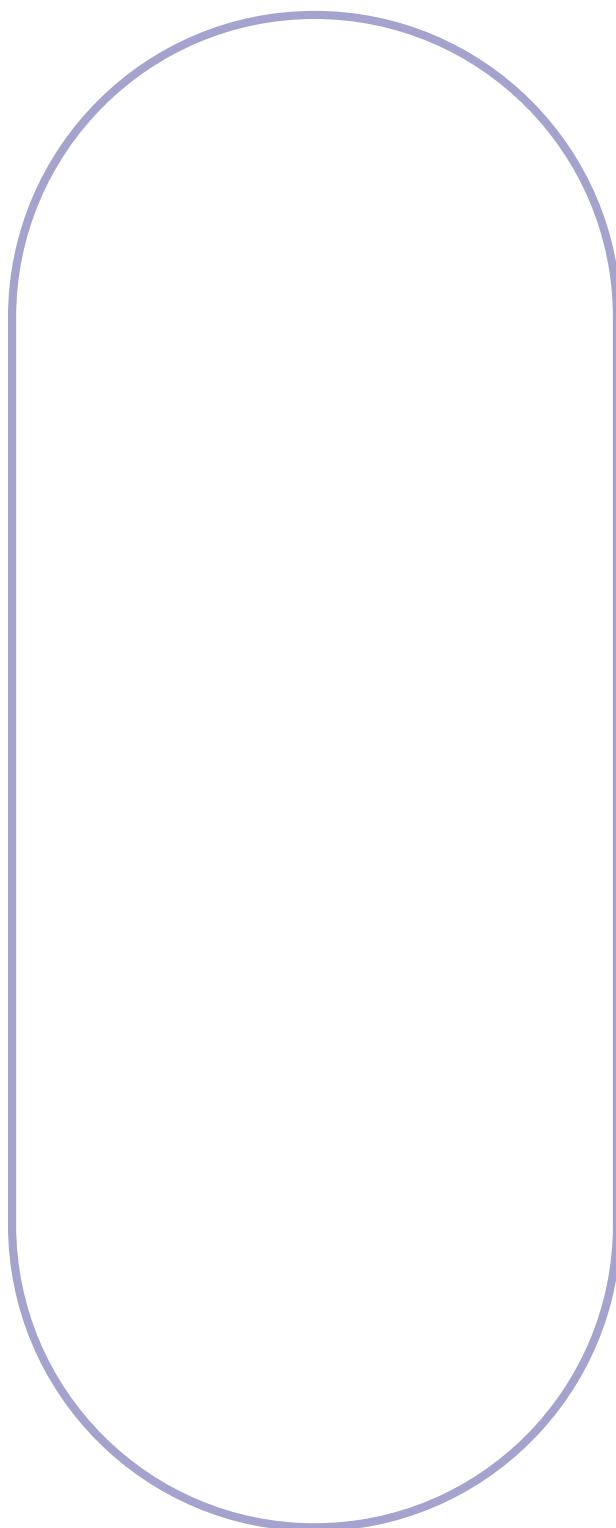
Use light and dark brown coloured pencils to add shading that looks like stone.



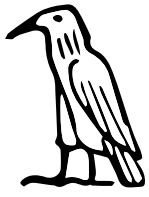
PHOTOCOPIABLE RESOURCE 5A



PHOTOCOPIABLE RESOURCE 5B



PHOTOCOPIABLE RESOURCE 5C



A



B



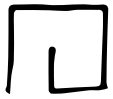
D



F



G



H



H



I



Y



J



K



M



N



O



P



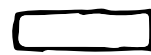
Q



R



S



SH



T



U



W

GEOMETRY ACTIVITY 6

ENQUIRY OF LEARNING How did the Ancient Egyptians live within the cycles of Nature?

LEARNING QUESTION How can I use geometry to design a lotus flower bowl?

Ancient Egyptian bowls came in a wide variety of shapes, sizes and materials, and they were used for many different activities in daily life. Pottery was the most common material used for making bowls in Ancient Egypt, as there was a plentiful supply of Nile clay with which to make them.

Bowls were sometimes beautifully decorated with designs, patterns or images, and lotus-decorated bowls were popular throughout Ancient Egyptian history.

In this activity, students use rotational symmetry and the template on Resource 6A to draw a lotus flower bowl. The students' completed designs can be placed together in one large, striking class display.

YOU WILL NEED

Copies of Resource 6A
Ruler
HB pencil
Compass
Good-quality eraser
Coloured pencils
Tracing paper

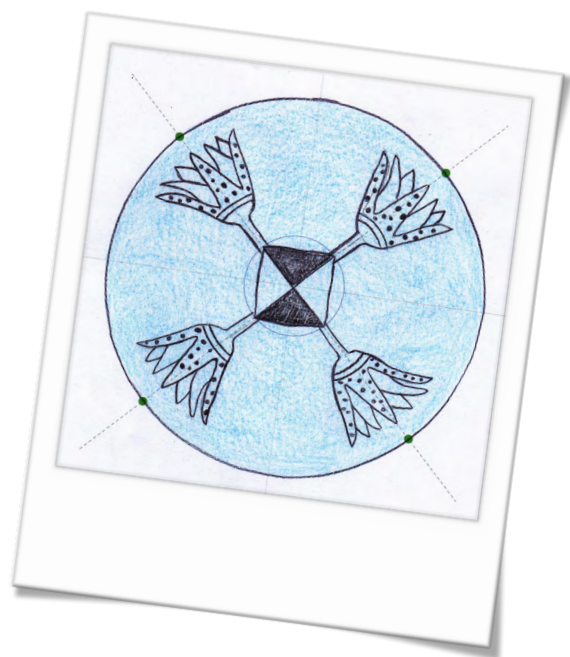


Ancient Egyptian blue faience lotus bowl



DID YOU KNOW?

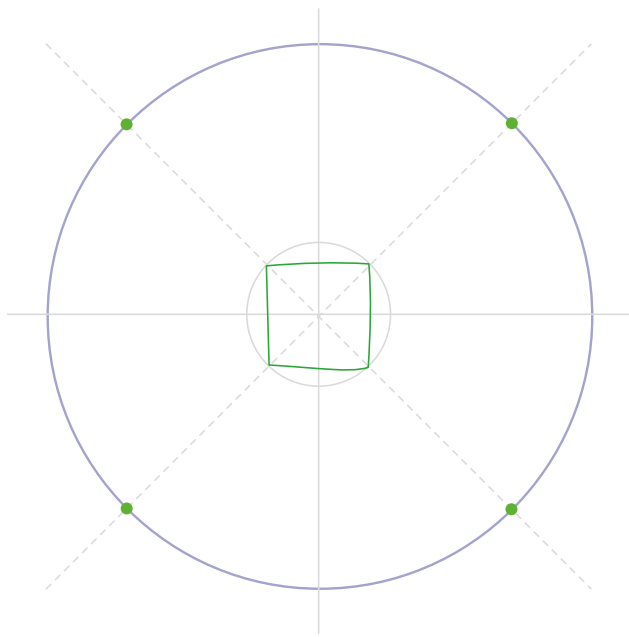
Ancient Egyptians made a special kind of pottery that is called 'Egyptian blue'. The colour was one of the earliest artificial pigments. They mixed limestone and sand with green or blue minerals called malachite and azurite, and heated them at a high temperature. The result was a beautiful, bright blue pottery.



ACTIVITY 6

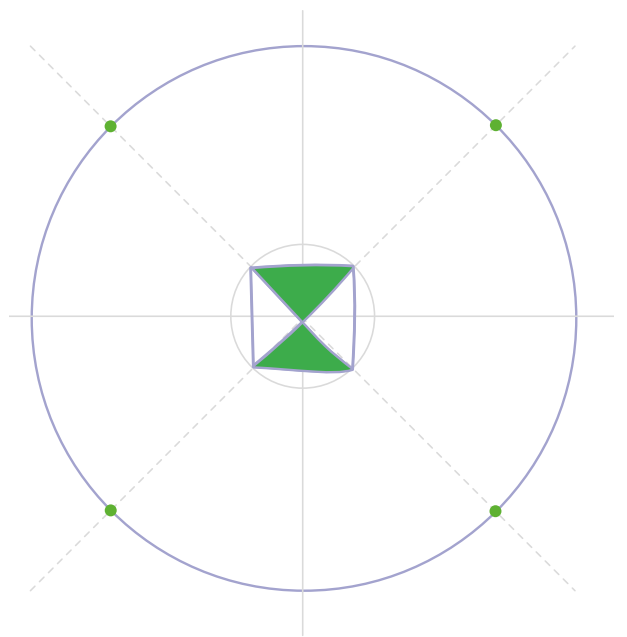
STEP 1 Draw a central square

Start with a printout of Resource 6A. Draw a small central square as shown below, where the circumference of the smaller inner circle intersects the diagonal lines.



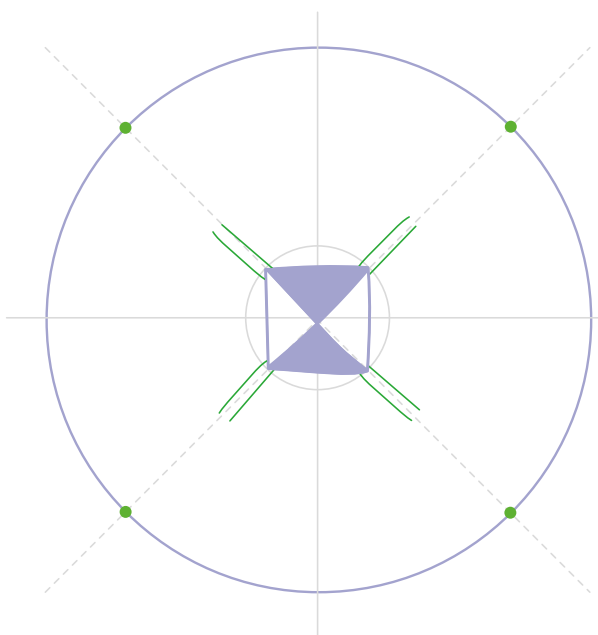
STEP 2 Add colour to the square

Use a dark brown, blue or black pencil to colour opposite triangular sections of the square, as shown below.



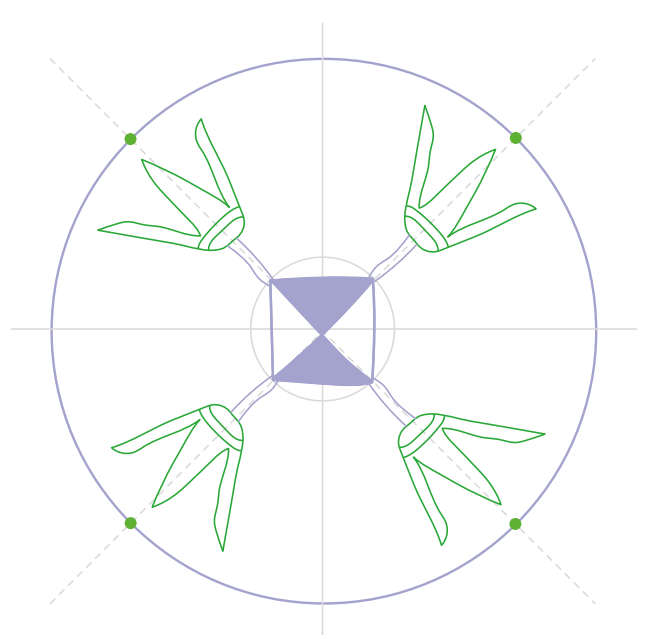
STEP 3 Draw the lotus stems

From each corner of the square, draw a short stem along the diagonal lines. These will connect to the lotus flower head.



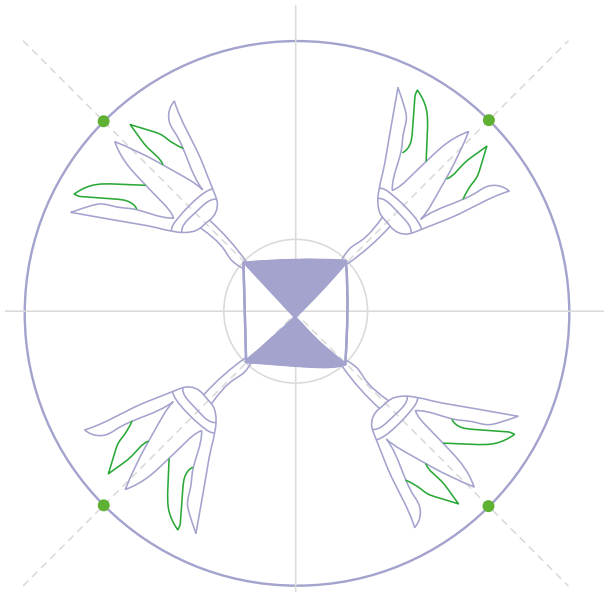
STEP 4 Draw the flower heads

Draw the three outer sepals of the lotus flower heads, as shown below. All four can be drawn freehand. Alternatively, use tracing paper to copy and repeat the first flower head.



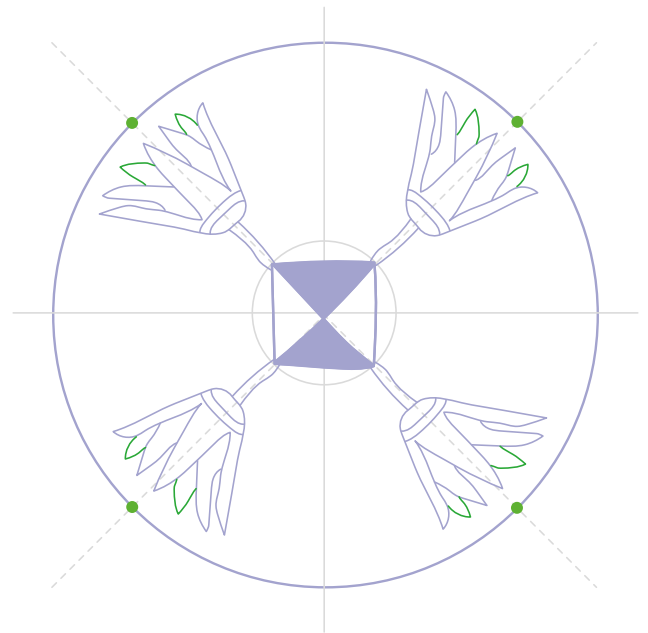
STEP 5 Draw the inner petals

Draw two petals between the three sepals, one either side of the diagonal lines, as shown below.



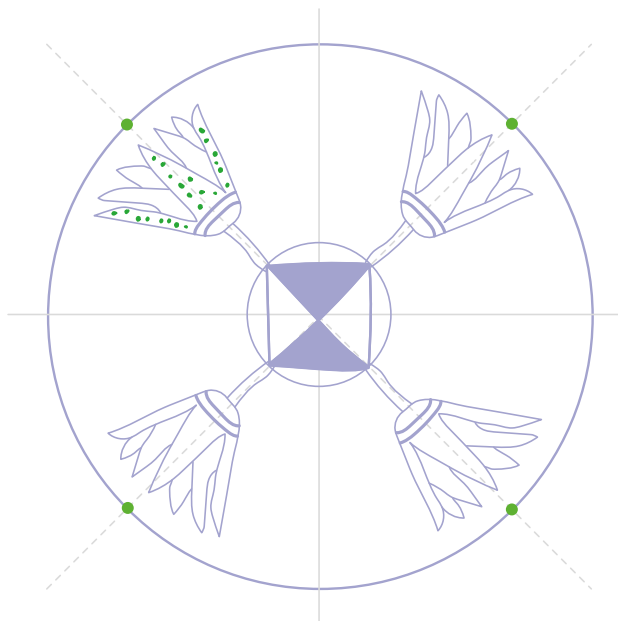
STEP 6 Add more petals

Add two more petals in the gaps between the sepals and petals.



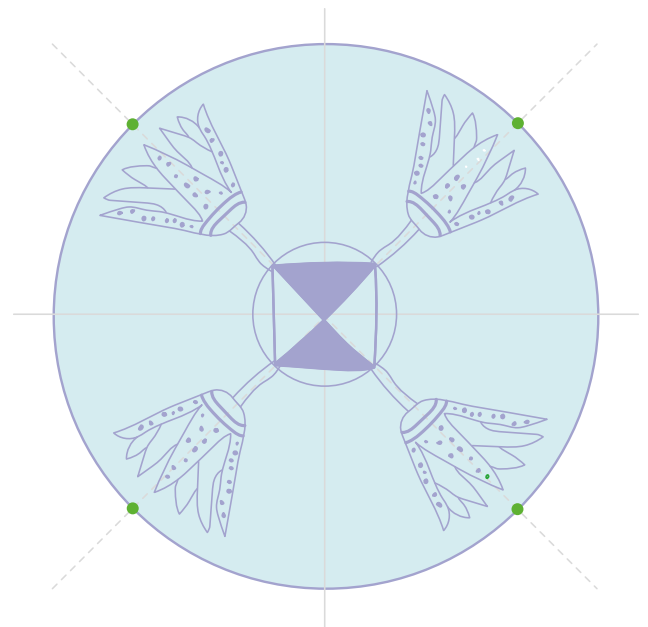
STEP 7 Decorate the sepals

Add dots on the sepals to create variation between the sepals and petals, as per the original design shown on page 31.



STEP 8 Add colour

Use a light blue pencil to colour in the bowl. Go over the outlines using the same colour chosen for the triangular sections in Step 2.



PHOTOCOPIABLE RESOURCE 6A

