GEOMETRY

ENQUIRY OF LEARNING Why are bees so brilliant?

LEARNING QUESTION How can I use reflective symmetry to draw a bee?

This activity is part of a Year 2 enquiry of learning linked to the principle of Interdependence. The wider enquiry allows students to explore the crucial role played by bees in the life cycle of flowering plants, and to discover how different types of bee within a hive contribute to the wellbeing of the colony. This activity leads into the learning about what bees need to be healthy in Week 2 of the enquiry, but would work equally well with students in other year groups as a standalone activity (see below for ideas on adapting this activity).

YOU WILL NEED

An HB pencil A soft or blunt pencil A fine, black pen A sheet of A4 paper Tracing paper A good quality eraser Bee images



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.

HOW CAN THIS ACTIVITY BE ADAPTED?

In these instructions and in the accompanying film, we have shown how to construct and use a grid to draw one half of a bee's body, before using tracing paper to create a mirror image. If you are working with younger children, or students who find this too challenging, the activity can be simplified in a number of ways.

The simplest approach is to photocopy the resource on page 6 of this pack, which shows half the illustrated bee. Students can use a hand mirror to explore what a symmetrical second half would look like, and can try to sketch this in. Alternatively, they can draw the vertical line in Step 1 and simply draw one half of the bee's body freehand without using the guide. With one half drawn, they can follow the instructions from Step 8 to create a mirror image using tracing paper.

Another option for students who are confident using the grid to sketch one half of the bee's body, but who might find constructing the grid itself too tricky, is to use the grid template provided on page 5. Using reflective symmetry to complete a bee drawing can be tricky. Students may need more than one go!



TEACHER TIP

An interesting starter activity is to ask students to draw a bee without any adult input; often younger children will draw a stripy blob with two, teardrop-shaped wings. From this starting point, students can be challenged to revise their initial drawing to recreate the different parts of a bee's body more accurately. It is useful before the students begin drawing again to discuss with them the parts of a bee's body and to look at a selection of bee images together in detail.

STEP 1 Draw the first three sections of the grid.

Start by drawing the grid that will act as a guide to help you draw the bee, using an HB pencil. The template on page 5 shows what the grid will look like when it's complete.

Use a ruler to draw a horizontal line across the page (landscape) approximately 4cm from the top edge. Then, draw a vertical line from the top edge to the bottom edge of the page roughly in the middle of the page (it should cross the first line you drew).

Next, measure 6cm down from the first horizontal line in two or three places, marking each of the measurements with a dot. Use a ruler to join the dots and draw a second horizontal line 6cm below the first horizontal line. Repeat this process to draw a third horizontal line 6cm below this one.

STEP 2 Divide the middle section into three parts.

Now, use a ruler to divide the middle section into three, 2cm-high rows.

STEP 3 Add two vertical lines.

To complete the grid, use a dot to mark a point 2cm to the left of the vertical line somewhere near the top of the line. Do the same near the bottom of the line. Use a ruler to join these two dots and draw a second vertical line that runs parallel to the first. Repeat this process, this time using dots to mark points 2cm to the right of the first vertical line then joining them with a ruler to draw a third vertical line.



STEP 4 Draw the outline of one half of the bee's body and one of its antennae.

Using the grid you created in Steps 1-3 as a guide, or using the template included on page 5 of this pack, draw one half of the bee's head, it's thorax, abdomen and one antenna, as shown left.



STEP 8 Use a fine, black pen to go over what you've drawn so far.

Use a fine, black pen to go over the pencil lines you have drawn. Wait for a few minutes for the ink to dry, then rub out the pencil lines using a good quality eraser. This will help you to see your drawing through the tracing paper in the next step.

STEP 9 Trace what you've drawn so far.

Place a sheet of tracing paper over your drawing; you should be able to see the outlines through the tracing paper. Carefully trace the first half of the bee you've drawn.



TOP TIP

If you find that the tracing paper moves while you're drawing on it, use a couple of small pieces of masking tape on two opposite corners of the sheet of tracing paper to stick it to the surface you are working on. Peel them off carefully at the end.

STEP 10 Pressing gently, add shading over the lines you've traced.

Without turning the tracing paper over, use a blunt, soft pencil to go over the outline you traced. Press very gently and keep going until the entire design is covered.

STEP 5 Draw one of the bee's eyes and three of its legs.

Next, add in one of the bee's eyes, paying particular attention to the size of the eye relative to the head. Then, draw three of its legs. It's helpful at this point to ask students to look carefully at the bee images so that they can recreate the sections of the bee's legs more accurately. You may also want to draw their attention to where each leg joins the body.

STEP 6 Draw two of the bee's wings.

Now add the outline of two of the bee's wings, both on the same half of the body that you have been working on up until now.

STEP 7 Add the bee's stripes and finish drawing its antenna.

Add in the position of the bee's stripes and outline its antenna.



DID YOU KNOW?

There are around 270 species of bee in Britain. The vast majority of them are solitary bees. Even though they don't live in a colony, they still play a very important role in pollination.

STEP 11 Turn the tracing paper over and trace the second half of the bee.

Turn the tracing paper over and line up the traced outline with the outline you drew on the A4 paper the two halves should now make up a complete bee!

Go over the outline on the tracing paper, pressing fairly hard. If you find it tricky to see which parts of the outline you've gone over and which you haven't, use a pen with a hard tip like a biro to complete this step.

Once you've gone over every line, remove the tracing paper. You should be able to see that the outlines you traced and went over have been transferred from the tracing paper onto the A4 paper as a mirror image.

STEP 12 Use a fine, black pen to go over the second half of the bee.

Now use a fine, black pen to go over the pencil lines you transferred to the paper when you traced the bee in Step 11. Wait for a few minutes for the ink to dry, then rub out the pencil lines using a good quality eraser.





STEP 13 Add the detail and colour.

Now for the really fun bit! Add in the detail of the hairs and other markings on the bee's body and add colour using coloured pens, pencils, watercolour paint or inks.



TEACHER TIP

Drawing a reflected image can be challenging for young children and they may need to have more than one attempt at this. Involving the students in giving each other feedback on their drawings can help to move the learning forward. This will need to be modelled by an adult first.

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TEMPLATE

As an alternative to constructing the grid in Steps 1-3, this template can be photocopied and given to students. The instructions can then be followed from Step 4 onwards.





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PHOTOCOPIABLE RESOURCE

To simplify this activity for younger students, or for students who would benefit from additional support, photocopy this resource. Using a hand mirror to help them, students can sketch a mirror image of this half of the bee to complete the picture.



