GEOMETRY

YEAR 0

Teacher Booklet

Task 1

As I hold up a shape, work together to find the exact match.
Explain why the shapes are the same. Name the shape.

Teacher Notes

Before starting this task ensure that you have sorted the shapes required – either using foam shapes or printing the copy masters.
Note: if printing the copy master shapes, print these on two different colours. One colour for the teacher and one colour for the students.

Lay shapes out in front of each pair.

Select a shape and hold it up to the students, prompting with your buddy can you find a shape that is the same as mine.

Students may want to place their shape on top of yours to confirm selection.

Notice for groups that look at the size of the shape, number of sides and other geometrical language when selecting a shape.

Ask the students how they know that the shapes are the same.

Next ask the students to name the shape. If needed prompt the shape names from the students.

Shareback

After each new shape is held up, select groups to share back that can explain why their shape is the same.

Connect

Place one of each shape on the board or modelling book.

Generate a list of rules to identify each shape. Focusing on the shape name and one attribute.

This is a _____ because it has _____.
Eg. This is a circle because it has curved sides.

Note: Students may not yet be able to identify these shapes, that is okay. These identification rules will be built upon in task 3.

Suggested Learning Outcomes

Match and name circles, triangles, squares.

Independent Tasks

Match the shapes that are the same.
(Use copy masters or have shapes on a table for students to match).

Anticipations

Solutions, Misconceptions

Task 2

Is this shape a circle? Why or why not?

Teacher Notes

Before starting this task, ensure that you have the required shapes or copy masters for this task. You may like to draw these shapes on the board.

Draw/hold up each shape one at a time, asking the question – is this a circle? Followed by … Why or why not?

Expect the students to verbally or nonverbally (through gesture) describe why the shape is or is not a circle.

Shareback

After each shape, select students to share back that are able to justify why or why not the shape is a circle.

Connect

Discuss and refine a rule for a circle: A circle is a 2D shape, which only has one side and no corners.

Suggested Learning Outcomes

Explain the attributes of a circle.

Use geometrical language to compare shapes.

Independent Tasks

Is this a circle?

See Copy Masters

Anticipations

Solutions, Misconceptions

Task 3

Sort these shapes into different groups.
What do you notice?
How are the shapes the same?
How are the shapes different?

Teacher Notes

Before starting this task ensure that you have sorted the shapes required – either using foam shapes or printing the copy masters.

Have the students sort and re-sort until they are sorting the shapes by the number of sides.

Facilitate the students to notice that shapes can have a different number of sides and that their shapes have either 1, 3, 4 sides.

Monitor for students using vocabulary which is everyday maths language and revoice using the language of geometry.

For the independent task have a variety of shapes for the students to sort.

Shareback

Select students to share who are able to explain and justify their groupings of the shapes.

Connect

Draw upon the attributes and language used in task one to create shape names and rules.

Discuss if more attributes or rules need to be added to each shape.

Demonstrate/introduce the langauge of corners. Add this understanding to the shape rules.

Suggested Learning Outcomes

Sort shapes into different groups.

Use geometrical language to explain why shapes are similar or different.

Independent Tasks

Group these shapes
(Use copy masters or have shapes on a table for students to group).

Anticipations

Solutions, Misconceptions

Task 4

Make a shape train.

Take turns to add a carriage (shape) to the train. Each time a shape is added you must describe one attribute that is different.

Teacher Notes

Before starting this task ensure that you have sorted the shapes required – either using foam shapes or printing the copy masters from task one.

Have 2D shapes available to use and put them in the middle of the circle of students. Build the train across the floor each student taking a turn by naming the attributes that is different.

For example - if a rectangle is the first shape, you could put a square down after and say :a square is different to a rectangle because the sides are all the same length.

Monitor for students using vocabulary which is everyday maths language and revoice using the language of geometry.

For the independent task have a variety of materials: pipecleaners, playdough, popsicle sticks etc to make shapes. You may set up the stations around the classroom for the students to rotate around.

Shareback

Choose students to share back who can use the language of geometry to describe how the attributes are different and the same.

Connect

Choose a shape which has two attributes which are different from this shape. Be ready to explain and justify why they are different.

Big Ideas

*Two-and-three dimensional objects with or without curved surfaces can be described, classified, and analysed by their attributes.
Shapes have sides that are parallel, perpendicular, or neither.*

Shapes have line symmetry, rotational symmetry, or neither. Shapes are similar, congruent, or neither.

Curriculum Links

Identify, sort by one feature, and describe familiar 2D shapes.

Suggested Learning Outcomes

Sort shapes into different groups.

Use geometrical language to explain why shapes are similar or different.

Independent Tasks

Make a triangle.

Make a square.

Make a rectangle.

Make a circle.

Sides, curved, circle, square, rectangle, triangle, smaller, bigger, corners.

Anticipations

Solutions, Misconceptions

Task 5

Look at this shape. What does it remind you of?

Use your shapes to make this shape.

Describe how you are make it and what you notice about it.

Teacher Notes

Have 2D squares and rectangles. These could be wooden blocks, carpet squares, floor tiles, foam tiles or cardboard or paper squares (See Copy Master booklet). Give each group 3 or 4 identical square shapes.

Present the students with a square made of four smaller squares (See Copy Master booklet). Discuss with them what it makes them think of (e.g., windows, lego blocks, ceiling, or floor tiles). Lead into how it might be called a 2 by 2 block in Lego and ask them why. Use this as an opportunity to count, subitise and see it as an array.

Facilitate the students to notice that the template of a rectangular shape made of two squares is made from two equal-sized squares and that they make a rectangle (See Copy Master booklet). Ensure that they notice that the shapes are same although the direction has changed.

Following immediately after this large group discussion and before the connect have the students place counters on the corners of their 2 by 2 square. Discuss how this has made a 3 by 3 array [see example below]
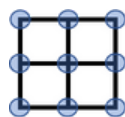
In the connect provide each child with a drawing of the larger square made of 4 smaller squares and have them draw it as many times as needed until they are able to get a close representation of it.

Facilitate the students to notice that all four squares are touching. Ensure that students can see that the larger square has 2 rows of 2 squares as well as 2 columns of 2 squares and that the vertical and horizontal lines divide it into 2 halves and that together they divide it into quarters.

For the independent task, have available small squares for the students.

Shareback

Select students to share who can explain in different ways how they made the larger square.

Connect

Provide the students with paper or whiteboard to practice drawing their shapes.

Remind the students the attributes of squares and redraw until they are accurate.

Suggested Learning Outcomes

Decompose and recompose shapes.

Use geometrical language to describe their shapes.

Independent Tasks

Construct these shapes using small squares.
(see copy masters)

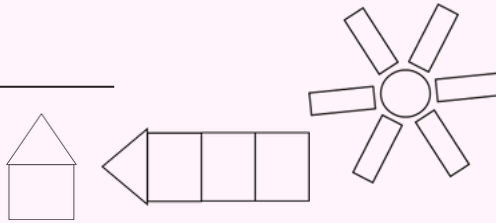# Anticipations

Solutions, Misconceptions

Task 6

Use your shapes to make the picture.

Explain how you made the picture.

Two-and-three dimensional objects with or without curved surfaces can be described, classified, and analysed by their attributes.
Shapes have sides that are parallel, perpendicular, or neither.

Shapes have line symmetry, rotational symmetry, or neither.
Shapes are similar, congruent, or neither.

Teacher Notes

Have shapes avalible for each group - either foam shapes or paper shapes from task one.

Present the students with the first picture to make. Have students take a moment to carefully observe the design and talk about what they see.

Ask the groups to recreate the design.

Notice the students that are discussing the strategies they used to recreate the design. Some students might notice what the image is as a whole (house, arrow, sun) while others might notice the individual shapes within the design.

For the second and third design - explain to the students you will display the image for only five seconds (adjust time if needed).

Show the new design and remind the students to look carefully and see what they notice. Then with their buddy, invite the students to recreate the design.

Encourage the students to look at each others and decide if they are happy with their final product.

Share back after creating each design, discussing how they composed the designs.

For the independent activity, have a selection of shapes for the students to create their own designs for their buddies to recreate.

Shareback

Select students to share who can explain how they recreated the design.

Draw the students attention to shapes that compose the bigger design.

Connect

Show the students this image:
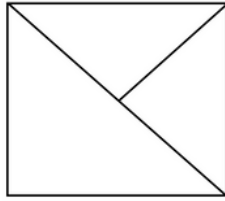
Ask- what other ways could we compose a square using the shapes we have. Generate squares using different shapes.

Suggested Learning Outcomes

Decompose and recompose shapes.

Use geometrical language to describe bigger designs.

Independent Tasks

Use the shapes to create different designs for your partner to copy.

Anticipations

Solutions, Misconceptions

Task 7

Put the halves back together to make the target shape.

Explain how you make each shape.

Teacher Notes

Have the copy masters available for students. You may want to have these cut out ready to the students to assemble.

Show them circle halves and ask which shape these pieces would make when you slide the halves together.

Encourage the students to recompose the other shapes using their halves.

Notice the students who are rotating and flipping the halves as needed to compose the complete shape.

Shareback

Select students to share who can explain how they composed the shapes using the two halves.

Connect

Draw a circle on the board and ask the students "how could we decompose this shape into halves?"

Expect the students to say "draw a line in the middle" using gestures or holding up their halves.

Repeat for a square, rectangle and other shapes.

Suggested Learning Outcomes

Decompose and recompose shapes using halves.

Use geometrical language to describe recomposing shapes.

Independent Tasks

Draw the missing halves of the shapes.
(see copy masters)

Draw lines onto these shapes to make smaller shapes.

Anticipations

Solutions, Misconceptions

Task 8

Use the small shapes to fill in the puzzle.

Teacher Notes

Have the copy masters available for students (you may need to adjust the printing settings depending on the required size of each puzzle).

Have smaller 2d shapes for the students to use to compose the picture blocks (fill the puzzle).

If needed encourage the students to match their shapes to the outlines on the puzzles.

Notice the students who are rotating and flipping the halves as needed to compose the complete shape.

It is important to allow children to use trial and error to complete the puzzle.

For the independent activity, have a series of shapes and puzzles avaliable for the students to complete.

Shareback

Select students to share who can explain how they completed their puzzles. Notice students that flipped or rotated their shapes and prompt those students to explain those specific moments e.g. We had to turn the triangle around.

Connect

Expose the students to geometric specific language "slide, flip, turn, rotate".

Model moving the shapes and using the language.

Suggested Learning Outcomes

Decompose and recompose shape puzzles.

Use geometrical language to describe completing a puzzle.

Independent Tasks

Complete the shape puzzle.

Using the shapes create your own puzzle to share with a buddy.

Mathematical Language

Sides, curved, circle, square, rectangle, triangle, smaller, bigger, corners, decompose, construct.

Anticipations

Solutions, Misconceptions

Task 9

Follow instructions to find an object within the room.

Teacher Notes

During the launch, have the students line up across the front of the classroom, facing the front. Have them put their right arm up to point and show where the front of the classroom is. Then without moving (except their arm) have them point left, right and back.

Play the Robot Game using commands which require the students to walk forwards and backwards. For example:
Face the front then walk one step forward.
Face the front then walk 3 steps backwards.
Face the left then walk one step forwards.

Facilitate the students to notice that Face the left and walk one step forward is the same if you were to face the right then step one step backwards.

Have an object or target item within the classroom. Give the students a set of directions to get to the target item.

Repeat again, using different instructions to get the the target.

Notice students who recognise right, left, front back. Use labels on walls to support students who have difficulty with these terms.

Shareback

Select students to share who can explain how they could reach the same place with a different set of directions.

Connect

Compare the different sets of directions.

Why are some directions shorter or longer than others? Make the generalisation to driving somewhere, would you prefer to go the longer way or the shorter way? Why/why not?

Big Ideas

Shapes can be described in terms of their location in a plane or space.

Coordinate systems can be used to describe these locations precisely.

The coordinate view of shape offers another way to understand certain properties of shapes.

Curriculum Links

Follow instructions to move to a familiar location or locate an object.

Suggested Learning Outcomes

Follow simple instructions.

Independent Tasks

Hide an object in the classroom for a friend to find.

Draw a set of arrows to give your friend directions to the object.

See if your friend can use the arrows to find the object.

Mathematical Language

forward, backwards, right, left, front, back, clockwise, anticlockwise, full turn, half turn, quarter turn.

Anticipations

Solutions, Misconceptions

Task 10

Pretend to be a robot and follow the instructions.

Teacher Notes

During the warmup facilitate discussion with the students about their common experiences of turning (for example, playground roundabout, being spun by their arms).

Tell all the students that they are robots and have to follow each command. Use commands like:
Face the front, then turn to the right.
Face the front then turn half way around.
Face the left, then turn to your right.

Ensure that the students understand the turn commands. For example have them point to their right and then turn in that direction. To turn all the way around to the left they turn to the left until they are back at the starting position but to turn half way around they face the opposite direction.

Notice students who confuse the direction they face with the direction they turn. Ensure that they understand that face the right is different from turn to your right.

Provide the students with a series of instructions to move around the room in varying complexity.

Note: you may do this task whole class, followed by the independent task whole class.

Shareback

Select students to share who are able to explain which direction they are facing after they have turned.

Connect

Stand and face the front. Turn all the way around to the left. What do you notice about which direction you are facing? Why?

Suggested Learning Outcomes

Follow simple instructions.

Independent Tasks

Work together with a buddy playing the robot game. Give directions to each other oto move around the room.

Anticipations

Solutions, Misconceptions

Task 11

We are going on a bear hunt!

Explain where you are.

Teacher Notes

Starter: Dance the Hokey Pokey.

Put your right arm in, take your right arm out. Put your right arm in, and you shake it all about. Do the Hokey Pokey and you turn yourself around, that's what it's all about!
Repeat with; left arm, right foot, left foot, whole self.

Read the book We're Going on a Bear Hunt by Michael Rosen and Helen Oxenbury to the class.

When reading use gestures to demonstrate the meaning of words like "over," "under," and "through."

Reinact the book in the classroom or outside.

Set the scene for example:
- "The grass will be over here, beside the cupboards."
- "The river will be between the red table and the carpet."
- "The mud will be under artwork in the library center.
- "The trees are the red tables, we have to walk between the tables"
- "The snowstorm will be over here next to the _____.
- "The cave will be over here beside_____.
- "Remember, once we get to the end, we'll have to follow the route back home to get away from the bear!"

For the independent activity encourage the student to give instructions like "put the bear under the table".

Shareback

Select students to share back to explain their positionality within the classroom.

Big Ideas

Shapes can be described in terms of their location in a plane or space.

Coordinate systems can be used to describe these locations precisely.

The coordinate view of shape offers another way to understand certain properties of shapes.

Curriculum Links

Follow instructions to move to a familiar location or locate an object.

Connect

Re-emphasise the spatial orientation vocabulary.

On the whiteboard draw a circle next to a line. Prompt the students to explain the circle is <u>next</u> to the line.

Repeat for over, under, between etc.

Suggested Learning Outcomes

Follow simple instructions and spatial orientation.

Independent Tasks

Give instructions for your buddy to find an object.

Anticipations

Solutions, Misconceptions

Task 12

1. Hide an object for your group.
2. Give instructions so your group can find the item.

Teacher Notes

Starter: Either draw or have an item to move around. Prompt the students to make a statement about the object e.g. the teddy is above the whiteboard. Continue to move the item around providing opportunities for the students to explore spatial vocabulary (in front of, behind, left, right, on top of, under etc).

The objective of this task is to practice giving instructions and using spatial vocabulary.

Provide each group with an object to hide within the class. Then prompt the group to give a simple instruction to find the item. Such as "it is on the shelf".

Once the students have had a few turns hiding an item, prompt the students to use two parts in their instructions - such as "it is under the table next to the shelf".

Notice the students that are using accurate language to locate an object.

Shareback

Select students to share back their instructions that have different spatial vocbulary. Highlight the language to the class.

Connect

If an item is next to the red chair but also under the table can it be in located at the same place?

Generalise having different instructions to find the same item.

Suggested Learning Outcomes

Follow simple instructions and spatial orientation.

Give simple instructions.

Independent Tasks

Asssessment Tasks -
One: Sort Shapes
Two: Describe the playground - NOTE: you may want to use a photo of your own playground or items.

forward, backwards, right, left, front, back, clockwise, anticlockwise, full turn, half turn, quarter turn.
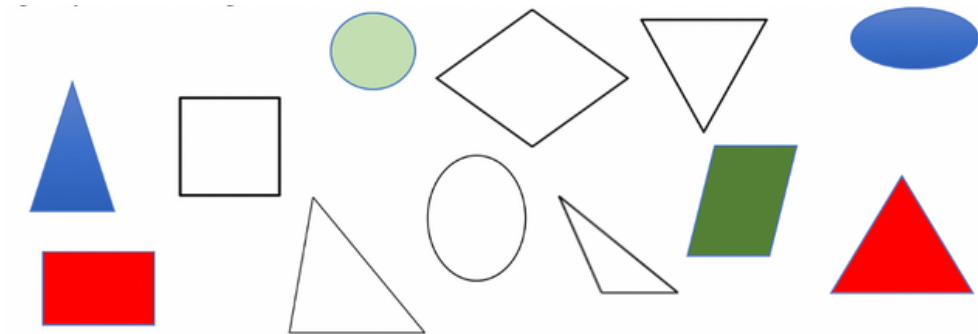
Anticipations

Solutions, Misconceptions

Assessment Task 1 - Shape - Year 0

GEOMETRY: SHAPE:

Here is a set of shapes. Sort them into groups and explain why you have grouped them together

Teacher note: Could use attribute shapes or randomly coloured, laminated pre-cut shapes.

GEOMETRY:
Describe the playground using spatial language.
e.g. the slide is next to...