GEOMETRY

YEAR 1

Teacher Booklet

Task 1

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 number of sides.

Facilitate the students to notice that shapes can have a different number of sides. They also have different sized corners and that these can be sharp or blunt corners.

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

For the independent activity have shapes for the students to match.

Shareback

Select groups to share back that are able to describe an attribute of the group of shapes.

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.

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, describe, and sort familiar 2D and 3D shapes presented in different orientations, including triangles, circles, rectangles (including squares), cubes, cylinders, and spheres.

Suggested Learning Outcomes

Group similar shapes together and explain why they are similar using every day language and geometrical language.

Group different shapes together and explain why they are different using every day language and geometrical language.

Independent Tasks

Find the matching shapes.

Name the shapes.

Anticipations

Solutions, Misconceptions

Task 2

Is this shape a rectangle? Why, why not?

Is this shape a triangle? Why, 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.

Starter: draw or hold up the first circle image: asking the question – is this a circle? Followed by … Why or why not?
A circle is a 2D shape, which only has one side and no corners.

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

Task: Provide the students with the series of rectangles and ask them to group the rectangles and the ones that are not. Ask students to provide a justification each time a shape is presented.

Notice the students that are using clear geometric language to sort the shapes.

Shareback the reasoning around rectangles before repeating this task with the triangles.

Notice the students who may have misconceptions about triangles due to the orientation e.g. students who think this is not a triangle:

For the independent task have shapes avaliable for the students to sort.

Shareback

Select students who can justify why a shape is or is not a rectangle or triangle.

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, describe, and sort familiar 2D and 3D shapes presented in different orientations, including triangles, circles, rectangles (including squares), cubes, cylinders, and spheres.

Connect

Discuss and refine the rules for a rectangle and a triangle.

Rectangle: a 2D shape with four straight sides, two pairs of parallel sides, and four right angles.

Triangle is a 2d shape with three straight sides and three angles.

Suggested Learning Outcomes

Explain the attributes of a circle, triangle and rectangle.

Use geometrical language to compare shapes.

Independent Tasks

Group these shapes - what is the same what is different?

Anticipations

Solutions, Misconceptions

Task 3

Find these shapes in our classroom.
Find these shapes in our school.
(see copy masters)

Teacher Notes

Starter: 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.

This task could be done whole class.

Provide the students the Copy Masters table.

Ask the students what they notice in the 3D shapes.

Explain that they are going to look for objects that resemble these shapes in their classroom first and then the school filling in the table as they go.

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

For the independent task have a variety of 3D objects for the students.

Shareback

Select students to share who can make justifications for why their object resembles the 3d shape.

Connect

Make connections between 2D and 3D shapes.

Discuss the attributes of a cube, cylinder and sphere.
- Spheres are perfectly round and have one curved face.
- Cubes have 6 square-shaped faces, all edges are equal.
- Cylinders have two circular flat faces connected by one curved face.

Be explicit in the geometrical language used to descibe these shapes.

Suggested Learning Outcomes

Recognise shapes in their environment.

Discuss the attributes of 3D shapes.

Independent Tasks

Does it roll?

Test out these objects to see if these objects roll or stand still. What do you notice?

Anticipations

Solutions, Misconceptions

Task 4

What do you notice about the shape of these different things?

Sort them into groups which you think are the same.

Sort them into groups which you think are different.

Teacher Notes

Provide students in pairs with a collection of common objects from their environment and have them talk with each other about what they notice about them.

Then have the students sort the objects into groups that are the same and have them justify why they are the same. Repeat with how they are different.

Have available a large collection of common objects including some that are similar to cubes, cuboids, cylinders and spheres (e.g., boxes, dice, cans, balls, glad wrap roll, building blocks, Lego).

Facilitate the students to notice 3D aspects of the shapes including flat faces, curved faces, faces form an edge, corner, vertices when they come together, horizontal and vertical lines etc

Monitor for students using vocabulary related to 3D shape.

For the independent task, have available a wide collection of different 3D shapes.

Shareback

Select students to share who can explain and justify using everyday language and the language of geometry how the different objects are the same and/or different.

Connect

Use a set of different objects to explore different properties. Ask:
What objects are large?
What objects are small?
What objects are solid?
What objects are hollow?
What objects roll?
What objects have sharp edges?

Suggested Learning Outcomes

Recognise shapes in their environment.

Identify and sort objects in a variety of ways.

Group and classify similar shapes together and explain and justify why they are similar using non-geometrical and geometrical language.

Independent Tasks

Sort the objects into sets.
How are they the same?
How are they different?

Draw pictures of each different shape.

Choose a new set of objects and repeat the activity.

Anticipations

Solutions, Misconceptions

Task 5

Choose a big shape.
What smaller shape will make the bigger shape?
Use the smaller shapes to check whether they will make the bigger shape.

Choose another big shape.
What smaller shape will make the bigger shape?
Use the smaller shapes to check whether they will make the bigger shape.

Choose another big shape.
What smaller shape will make the bigger shape?
Use the smaller shapes to check whether they will make the bigger shape.

Teacher Notes

To launch the task, have sets of pattern blocks and ask the students to experiment with making shapes out of the pattern blocks.

Have large shapes in and smaller shapes from either pattern blocks or cut out from the Copy Masters booklet (note large shapes are provided, use smaller shapes from previous lessons).

Ask students to predict what smaller shapes they can use to make the larger shape first.

Notice students who use the language of geometry when predicting and making the shapes.

For the independent task, have a range of larger shapes and smaller shapes available.

Shareback

Select students to share who can explain in different ways how they constructed bigger shapes using the smaller shapes and can describe the attributes they notice.

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

Anticipate which smaller shapes might be used to compose a target shape, and then check by making the shape.

Connect

Show large shapes on the whiteboard and ask students to predict what smaller shape and how many they would need to make the larger shape. Test their predictions.

Suggested Learning Outcomes

Decompose and recompose shapes.

Use geometrical language to describe their shapes.

Independent Tasks

Choose a big shape.
What smaller shape will make the bigger shape?
Use the smaller shapes to check whether they will make the bigger shape.

Choose another big shape.
What smaller shape will make the bigger shape?
Use the smaller shapes to check whether they will make the bigger shape.

Choose another big shape.
What smaller shape will make the bigger shape?
Use the smaller shapes to check whether they will make the bigger shape.

Mathematical Language

Square, rectangle, attribute, 2-dimensional, 3-dimensional, shape, sort, describe, side, equal, size, colour, big, small, bigger than, smaller than, straight, congruent, half, corners, angles, sides, vertical, horizontal, symmetrical, halves, quarters, column, row, array

Anticipations

Solutions, Misconceptions

Task 6

Make an animal with the pattern blocks.
Copy the animal so that you have a pair.
Describe the shapes that you used for each part of the animal.
Draw the animal that you made with the pattern blocks.

Make a different animal with the pattern blocks.
Copy the animal so that you have a pair.
Describe the shapes that you used for each part of the animal.
Draw the animal that you made with the pattern blocks.

Make a different animal with the pattern blocks.
Copy the animal so that you have a pair.
Describe the shapes that you used for each part of the animal.
Draw the animal that you made with the pattern blocks.

Teacher Notes

Have pattern blocks available and give students identical sets of pattern blocks.

Choose a theme that is appropriate to your class, this could be animals but also space-ships, houses, flowers.

Ask students to duplicate what they have made multiple times.

For the independent task, have pattern blocks available.

Shareback

Select students to share who can explain using geometrical language the shapes that they used to make the animals.

Connect

Ask students to use the pattern blocks to recreate other students' animal creations. Challenge them to use different shapes to make a shape (e.g., triangles to make a square).

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

Anticipate which smaller shapes might be used to compose a target shape, and then check by making the shape.

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Suggested Learning Outcomes

Connect and decompose shapes to make other shapes or images.

Independent Tasks

Make a house with the pattern blocks.
Copy the house so that you have a pair.
Describe the shapes that you used for each part of the house.
Draw the house that you made with the pattern blocks.

Make a flower with the pattern blocks.
Copy the flower so that you have a pair.
Describe the shapes that you used for each part of the flower.
Draw the flower that you made with the pattern blocks.

Make a spaceship with the pattern blocks.
Copy the spaceship so that you have a pair.
Describe the shapes that you used for each part of the spaceship.
Draw the spaceship that you made with the pattern blocks.

Anticipations

Solutions, Misconceptions

Task 7

Look at the shapes.

Copy the new shape. What do you notice?

Draw your own shape.

Transform your shape,

Teacher Notes

Have the copy masters available for students or model the transformation of the shape.

Show them the first shape. Ask the students what they notice.

Show the students the second shape. Get the groups to copy the second shape and talk about what they notice.

Share back after each shape transformation.

Note: First triangles demonstrate: turn, Second row of triangles: flip, Third triangles: slide.

Notice students who use every day langauge or gesture to explain the transformation of the shape.

Shareback

Select students who can explain how the shape has transformed.

Connect

Explicitly discuss each transformation:
- flip - a flip produces a mirror image of the original shape or object.
- slide - moving a shape/object from one position to another without the shape/object changing orientation.
- turn - moving a shape/object around a point in a clockwise or anticlockwise direction.

Provide the students with the formal language and explanations.

Suggested Learning Outcomes

Explain transformation as a way of moving a shape.

Copy the transformation of a shape.

Independent Tasks

Continue the transformations on these shapes.
(see copy masters).

*Flip, slide, turn,
shapes, pattern,*

Anticipations

Solutions, Misconceptions

Task 8

Use the two strips of the same repeating pattern to find out how many times you can slide one strip along the length of the other so that it matches in different places?

Now make your own simple repeating pattern on a strip of paper. Now imagine you have another identical strip. Draw what the same repeating pattern would look like alongside the first repeating pattern you drew

Teacher Notes

For the first part of the task, provide two strips and have the students slide along the other to notice when it matches. Notice the students that make connections between the number of shapes and the times it matches.

Provide students with 2 long strips of squared paper and have them design 2 identical repeating pattern strips with patterns of no more than 4 (in copy masters).

Facilitate the students to notice that in mirror symmetry a shape matches itself when it is reflected in a specific mirror line but in slide symmetry the shape matches itself when it is slid in a particular direction by a particular distance. This is translational symmetry.

For the independent activity have available strips of squared paper, squares of coloured paper, sets of pictures of objects.

Shareback

Select students to share who can explain how their shapes have transformed.

Connect

Connect the informal vocabulary of flip, slide, and turn with the formal vocabulary of reflect, translate, and rotate.

Generalise by using other shapes or objects within the classroom to develop this geometric language.

Big Ideas

A transformation is a way of moving a shape, and a shape that remains unchanged under a transformation is said to have symmetry.

Transformations provide a significant way to think about the ways properties change or do not change when a shape is moved on a plane.

Curriculum Links

Flip, slide, and turn 2D shapes to make a pattern.

Suggested Learning Outcomes

Explain transformation as a way of moving a shape

Independent Tasks

Create your own pattern strips.

Include shapes that slide, turn and flip.

Anticipations

Solutions, Misconceptions

Task 9

Follow the instructions to move around the classroom.

What do you notice about how you have placed your counters?
What about when you changed direction?

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.

Give each student a big counter or similar object. Have them place first counter on floor as beginning marker. Have them walk 5 steps in one direction placing a counter at each position. Discuss what they notice.

Repeat in a different direction and again have them discuss what they notice.

Have an object or target item within the classroom - have the students follow instructions to get to the object. Marking their positions along the way.

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. Model these on a grid (see copy masters). Show how you can use arrows to represent the direction you move.

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?

Suggested Learning Outcomes

Follow simple instructions.

Represent simple instructions using materials.

Independent Tasks

Create different pathways for a robot to move around the classroom. Work with a buddy and test out whether your pathways work.

Anticipations

Solutions, Misconceptions

Task 10

Give your buddy instructions to move around the classroom.

Represent your pathway.

Teacher Notes

Starter: Robot Game. 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. It might help to have left and right label in your classroom.

For the task: Students are to practice giving each other instructions to move around the classroom. Student A= instructor B= mover and then swap.

Provide the students with multiple opportunities to be the instructor and the mover.

Then provide students with a gride to have a go at marking their instructions. Remind students of the use of arrows from the previous lesson connect.

Shareback

Select students to share who are able to explain (either)
- clearly the instructions they gave their partner,
- which direction they are facing after they have turned,
- their representation of their instructions.

Connect

If students need more support using representations, using one groups instructions, represent the students instructions/movements using arrows and number of steps on a grid.

Give the students a chance to consolidate/practice what these representations could look like.

Discuss: What happens if you take two steps forwards and then two steps backwards?
What about if you took one step left how could you slide back to the same place you started?

Suggested Learning Outcomes

Give and follow simple instructions.

Represent your instructions using a grid or arrows.

Independent Tasks

Work together with a buddy playing the robot game. Give directions to each other of turns you want them to make.

1. Walk 3 steps forward and then 2 steps backwards.
2. Walk 1 step forward and then 2 steps backwards.
3. Walk 3 steps backwards and then 1 step forwards.
4. Walk 3 steps backwards and then 4 steps forwards.
5. Walk 4 steps forwards and then 4 steps backwards. What do you notice?

Anticipations

Solutions, Misconceptions

Task 11

Place an object for another group to find.

With your partner, represent a pathway/instructions for another group to follow.

Make changes to your instructions if needed and try again!

Teacher Notes

Starter: Dance the Hokey Pokey - to consolidate left and right.

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.

This task could be done inside or outside.

Provide each group with an object to place within the classroom or outside in the playground.

Provide each group with grid paper and pens to map out the route.

Remind students that they need to be clear about a starting point to ensure that their pathways work.

Notice students who are able to accurately represent their instructions using arrows and number of steps.

Encourage the use of left and right terminology.

Shareback

Select students who can explain their instructions/have clear representations.

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 and give instructions to move to a familiar location or locate an object.

Use pictures, diagrams, or stories to describe the positions of objects and places.

Connect

Discuss the different pathways/representations.

What was easy to follow, what was tricky when giving directions.

Get the students to stand and discuss the following:
Stand and face the front. Turn all the way around to the left. What do you notice about which direction you are facing? Why?

Stand and face the front. Take one step foward and then one step back. What do you notice?

Suggested Learning Outcomes

Give simple instructions.

Follow simple instructions.

Represent instructions.

Independent Tasks

Give instructions for your partner to find an object.

Anticipations

Solutions, Misconceptions

Task 12

You are pirates!

Give instructions for your pirate crew to find the treasure.

Teacher Notes

Starter: Reinforce left and right, up, down as well as the use of arrows to represent a pathway.

The objective of this task is to practice giving and following instructions.

Provide each student with a treasure map. Have the buddies sit face to face with a barrier between them so they can not see each others treasure maps.

Partner A is to mark a route from start to finish on their treasure map. Giving clear instructions - the number of steps and what direction to go. Explain that partner B has to listen carefully to the instructions and then draw the path on their map. Once partner A has given all the instructions compare and see if their maps are the same.

Repeat this so student B can have a turn at giving directions.

Notice the students that are using directionality vocabulary when giving directions.

Shareback

Select students who are able to eplain the directions and follow the instructions.

Connect

Oh no, now there rocks on the island in the way (choose places on the map to add these obstacles).

How will that change your instructions?

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 and give instructions to move to a familiar location or locate an object.

Use pictures, diagrams, or stories to describe the positions of objects and places.

Suggested Learning Outcomes

Follow simple instructions using a grid.

Give simple instructions using a grid.

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.
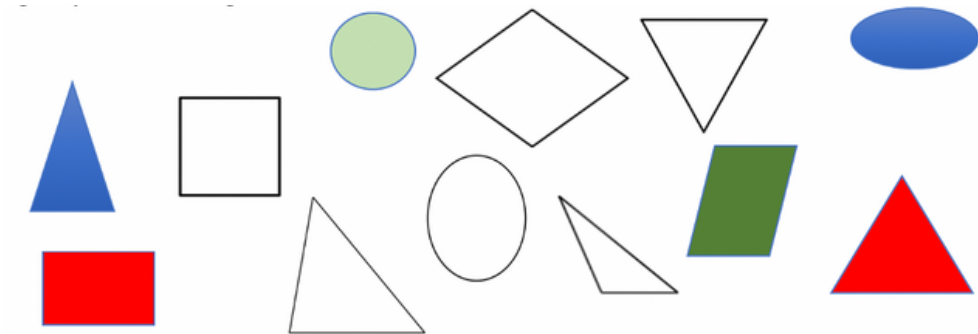
Anticipations

Solutions, Misconceptions

Assessment Task 1 - Shape - Year 1

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.

Assessment Task 2 - Position and Orientation - Year 1

GEOMETRY:
Describe how to get around the playground