Chapter 5: Fun with Shapes

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Exercise 5.1 — Let us Do — Rangoli with Shapes

Q1 Make Amma's rangoli on the dots given below.

SOLUTION

Look at Amma's rangoli in the picture on the previous page.
It uses circles, squares, and triangles arranged symmetrically around a centre.
On the dot grid provided, copy each shape at the matching dot positions.
Start from the centre and work outward, repeating the pattern in all directions.
Activity — copy the rangoli pattern onto the dot grid following the shapes and positions shown in the textbook.

Q2 Name the shapes drawn in Amma's rangoli.

SOLUTION

Look at Amma's rangoli carefully.
Identify each type of shape present — round shapes (circles), four-sided shapes (squares/rectangles), and three-sided shapes (triangles).
Circles, squares, and triangles. (The rangoli uses: 4 blue circles, 4 orange squares, 4 green

triangles, and 1 yellow diamond at the centre.)

Q3 How many shapes are made with (a) Curved lines (b) Straight lines?

SOLUTION

Curved lines make circles (round shapes with no straight edges).
Straight lines make squares, rectangles, and triangles.
Count each type in the rangoli figure.
(a) Curved lines: 4 (b) Straight lines: 10

Q4 Use cut outs of shapes to make a rangoli design. Outline the object and colour.

SOLUTION

Take cut-out shapes (circles, squares, triangles) from the book.
Arrange them on paper in a repeating, symmetrical pattern.
Trace around the edges to outline each shape.
Colour the shapes with different colours to make the rangoli attractive.
Activity — create your own rangoli by tracing and colouring shape cut-outs arranged in a pattern.

Q5 Try to make the following objects using shape cutouts.

SOLUTION

Use the shape cut-outs provided (squares, rectangles, triangles, circles).
Combine the pieces like a puzzle to form each picture shown in the textbook.
Experiment with different arrangements until the picture matches.
Activity — arrange shape cut-outs to form the three objects shown (a boat/bird, a pinwheel, and a rocket). Each object is built from triangles, squares, rectangles, and circles.

Exercise 5.2 — Let us Do — Making a Box and Envelope

Q1 Collect some cardboard boxes and open them up carefully. What shapes do you see in the flattened boxes?

SOLUTION

When a box (cuboid) is flattened out, it becomes a flat net.
Each face of the box is a rectangle (or square if the box is a cube).
A flattened box shows all 6 faces — you will see rectangles of different sizes.
Rectangles (and sometimes squares) — the flat faces of the box.

Q2 Make an Envelope. Use a square piece of paper and fold it as shown in the picture.

SOLUTION

Take a square sheet of paper.
Follow the 4 folding steps shown in the picture: fold the bottom point up, fold the two side points in, then fold the top point down to close.
This creates a pocket-shaped envelope.
Activity — follow the 4 steps shown to fold a square sheet into an envelope.

Exercise 5.3 — Baking Biscuits — Rectangular Faces

Q1 Why did the two children get different shapes when tracing their boxes?

SOLUTION

A matchbox and a wooden box are different in size and shape.

A matchbox is a long thin cuboid — tracing its faces gives long thin rectangles.

A wooden box may be more cube-like — tracing its faces gives squares and squarish rectangles.

Different faces of a cuboid can have different dimensions, so tracing different faces gives different rectangles.

Because the two boxes are different sizes and shapes; different faces of a cuboid give different rectangles.

Q2 Name any three objects that have rectangular faces.

SOLUTION

Look around for box-shaped (cuboid) objects.

Any face of a cuboid is a rectangle.

Lunch box, matchbox, and pencil box. (Other valid answers: book, brick, eraser.)

Exercise 5.4 — Let us Do — Faces of a Cuboid

Q1 Trace all the faces of any cuboidal object (e.g. sharpener or eraser). (a) How many different faces did you get? (b) What shapes are these faces? (c) Did you get a square? (d) Can you get six different rectangles by tracing a cuboid? (e) Can a cuboid have a face like a triangle? (f) The faces of a cuboid are _____ or _____ in shape.

SOLUTION

A cuboid has 6 faces in 3 identical pairs: top=bottom, front=back, left side=right side.
So the number of DIFFERENT (distinct) faces = 3.
Each face is a rectangle. If all sides of the cuboid are equal, the faces are squares.
(c) A typical eraser or sharpener is not a cube, so its faces are rectangles, not squares.
(d) No — opposite faces are always the same size, so you get at most 3 different rectangles, not 6.
(e) No — a cuboid's faces are always rectangles (or squares); it cannot have a triangular face.
(f) The faces of a cuboid are rectangle or square in shape.
(a) 3 different faces (b) Rectangles (c) No (for a typical eraser/sharpener) (d) No — opposite faces are equal, so at most 3 different rectangles (e) No (f) rectangle or square

Q2 Construct the rectangles using the sides given below.

SOLUTION

Look at each pair of sides given in the picture.
A rectangle has 2 pairs of opposite sides that are equal.
Use the given lengths as the width and height to draw the rectangle on dot paper.
Activity — draw each rectangle on dot paper using the side lengths shown (a short-side stub and a long-side stub are given for each rectangle).

Q3 Draw 3 bigger rectangles around the given rectangle.

SOLUTION

Start with the small rectangle already drawn.
Draw a slightly larger rectangle around it (keeping it centred or aligned).
Draw a second, even larger rectangle around that.
Draw a third, largest rectangle around all of them.
All three outer rectangles must be larger than the one before.
Activity — draw three concentric rectangles of increasing size around the given rectangle.

Q4 Count and write the number of rectangles in the following picture.

SOLUTION

Count all rectangles of every size: individual small rectangles, pairs joined together, groups of three, and the whole big rectangle.

Include squares too, since a square is a special rectangle.

10 rectangles. (Individual cells: 5; pairs sharing a column or row: 4; larger 2-column or 2-row combinations: 1; the whole outer rectangle: 1 — giving 5 + 4 + 1 = 10.)

Q5 Look at the different rectangles given below and answer: (a) How many sides are there in a rectangle? (b) How many corners are there in a rectangle? (c) Are there any sides in a rectangle that are equal in length to each other? (d) What do you notice in a rectangle? Describe it in your own words.

SOLUTION

(a) Count the sides of any rectangle: top, bottom, left, right = 4 sides.

(b) Count the corners: top-left, top-right, bottom-left, bottom-right = 4 corners.

(c) Opposite sides of a rectangle are equal: top = bottom, left = right.

(d) A rectangle has 4 sides and 4 corners. The opposite sides are equal in length. All corners are square corners (right angles).

(a) 4 sides (b) 4 corners (c) Yes — opposite sides are equal in length (d) A rectangle has 4 sides and 4 corners; opposite sides are equal in length and all corners are square corners.

Exercise 5.5 — Same to Same — Square vs Rectangle

Q1 1. Both (square and rectangle) have _____ sides. 2. Both have _____ corners.

SOLUTION

A square has 4 sides and 4 corners.
A rectangle has 4 sides and 4 corners.
So they are the same in the number of sides and corners.
1. Both have 4 sides. 2. Both have 4 corners.

Q2 How many squares do you see in this drawing?

SOLUTION

Count squares of every size in the drawing — small unit squares, medium squares made of 4 unit squares, and any larger squares.
A square must have all four sides equal.
6 squares. (4 small unit squares in the 2×2 grid section + 1 medium 2×2 square + 1 large outer square = 6.)

Exercise 5.6 — Let us Do — Squares

Q1 Here is a square. Draw 2 bigger squares around this square.

SOLUTION

Start with the square given on the dot paper.
On the dot grid, draw a larger square that surrounds it, keeping the original square centred inside.
Then draw a third, even larger square around the second one.
Activity — draw two concentric squares of increasing size around the given square.

Q2 Use matchsticks to make a square so that it has squares on all its sides. How many squares did you get?

SOLUTION

Start with 1 square in the centre (4 matchsticks).
Build 1 square attached to each of its 4 sides — each new square shares one side with the centre square.
This creates a plus-shaped (+) arrangement.
Count: 1 centre square + 4 surrounding squares = 5 squares total.
5 squares.

Q3 Complete the squares using the sides given below.

SOLUTION

Look at each incomplete shape — one or more sides of a square are already drawn.
A square has 4 equal sides and 4 square corners.
Add the missing sides to complete each square.
Activity — complete each square by drawing the missing equal sides using the given partial sides as a guide.

Q4 Use the square cutouts from the book to do this activity. How many different shapes can you make by joining (a) 2 squares (b) 3 squares (c) 4 squares?

SOLUTION

(a) 2 squares: Place them side-by-side along a full edge — only 1 unique shape (a rectangle).
(b) 3 squares: Arrange in a straight row or in an L-shape — 2 different shapes.
(c) 4 squares: Straight row, L-shape, S/Z-shape, T-shape, 2×2 square — 5 different shapes (tetrominoes).
Show each shape by outlining the squares on a dot grid.
(a) 1 shape (b) 2 shapes (c) 5 shapes (tetrominoes). Show each arrangement on the dot grid.

Exercise 5.7 — Let us Explore — Rectangles and Squares

Q1 Tick the shapes that are rectangles. Which figures are not rectangles? Explain why.

SOLUTION

A rectangle must have 4 straight sides and 4 square (right-angle) corners.
Opposite sides must be equal in length.
Any shape that is tilted, has unequal opposite sides, or has non-square corners is NOT a rectangle.
Tick every shape that satisfies all these conditions.
Tick the shapes that have 4 straight sides, 4 right-angle (square) corners, and equal opposite sides. The shapes that are NOT rectangles include tilted parallelograms (sides not at right angles), triangles, and any shape with non-right-angle corners — tick only the true rectangles.

Q2 Can you fold all the corners of a square sheet in such a way that the number of corners remains the same?

SOLUTION

A square sheet has 4 corners.
If you fold each corner inward (fold the tip toward the centre), the folded tip creates a new edge but the overall shape still has corners.
If you fold all 4 corners so each fold is parallel to the opposite side, the shape becomes an octagon with 8 corners — which is MORE corners.
However, if you fold each corner to meet the centre point, you create a smaller square — still 4 corners.
So yes, fold each corner's tip exactly to the centre: the result is a square, still 4 corners.
Yes. Fold each corner of the square inward to meet the centre — the result is a smaller square, which still has 4 corners.

Q3 Make a square on cardboard and cut along the dotted lines to get 4 triangles. (i) Make as many different shapes as possible by joining three triangles together. How many shapes can you make? (ii) Now, try with four triangles together.

SOLUTION

When a square is cut along both diagonals, you get 4 right-angled triangles, all equal in size.
(i) With 3 triangles, arrange them edge-to-edge in different ways. You can make about 4 different shapes (a large triangle, a right trapezoid in two orientations, and an irregular quadrilateral).
(ii) With all 4 triangles, you can reassemble them into the original square, or rearrange into a parallelogram, a larger triangle, or a rectangle — giving about 4 different shapes.
(i) About 4 different shapes can be made with 3 triangles. (ii) About 4 different shapes can be made with 4 triangles (including the original square).

Exercise 5.8 — Square Corners

Q1 Are the corners of a square the same? Are the corners of a rectangle the same? Are the corners of the square and a rectangle the same?

SOLUTION

Pile up several squares on top of each other and align them — every corner matches perfectly, so all corners of a square are the same type: square corners (right angles).

Pile up several rectangles — every corner also matches, so all corners of a rectangle are square corners too.

Place a corner of a square on a corner of a rectangle — they match exactly.

Conclusion: all corners of both shapes are square corners (right angles = 90°).

Yes — all corners of a square are the same (square corners). Yes — all corners of a rectangle are the same (square corners). Yes — the corners of a square and a rectangle are the same type: both are square corners.

Exercise 5.9 — Let us Do — Square Corners Activity

Q1 Mark the square corners in these shapes.

SOLUTION

A square corner is a right angle (like the corner of a square or rectangle).
Use two paper strips joined at a right angle as a tester.
Place the tester at each corner of each shape.
Mark (with a small square symbol) every corner where the strips align perfectly — those are square corners.
Activity — mark a small square symbol (⌐) at every right-angle corner. From the figure: the green square has 4 square corners; the yellow kite has 0 square corners; the blue diamond has 0 square corners; the purple pentagon has 0 square corners; the blue rhombus has 0 square corners; the pink rectangle has 4 square corners.

Q2 Connect the dots to make some squares. How many different squares did you get?

SOLUTION

On the dot grid, connect dots to form squares of different sizes and positions.
Remember: all 4 sides of a square must be equal, and all corners must be square corners.
Try squares tilted at an angle too (not just axis-aligned).
Count each distinct square you can draw.
Activity — connect dots on the 2×2 dot grid to form squares. On a 2×2 dot grid you can draw: 1 small unit square from the given dots. (The number of distinct squares depends on the dot-grid size provided; count each distinct square you can draw.)

Q3 Look at the picture given below and answer: (a) Count and write the number of corners. (b) Circle the square corners.

SOLUTION

(a) Count every point where two sides meet in the shape — each such point is a corner.
(b) Test each corner with a right-angle tester (paper strips); circle the ones that are exactly 90°.
(a) 17 corners total. (Flag triangle: 3 corners; yellow mast rectangle: 4 corners; pink sail triangle: 3 corners; blue sail triangle: 3 corners; brown hull trapezoid: 4 corners = 17 total.) (b) Square corners to circle: the 4 corners of the yellow rectangular mast; the right-angle corner at the base of the pink sail triangle (where it meets the mast); the right-angle corner at the base of the blue sail triangle (where it meets the mast); and the 2 top corners of the brown hull where it meets the base of the mast = 8 square corners.

Q4 Use two matchsticks to make two square corners and then four square corners. Draw and show it in the space given below.

SOLUTION

Two matchsticks placed end-to-end at a right angle make ONE square corner (like the letter L).
To make TWO square corners: arrange two matchsticks in a Z or S shape, or in a T with the cross being right angles — e.g. two L-shapes sharing a stick.
Four square corners: arrange 4 matchsticks in a square (each corner is a square corner).
Draw the arrangement in the space provided.
Two matchsticks at a right angle (L-shape) make 1 square corner. For 2 square corners: add a third stick to extend the L into a Z/step shape. For 4 square corners: use 4 matchsticks arranged as a square.

Q5 Murugan made three squares with 10 matchsticks. How many squares can you make with 12 matchsticks?

SOLUTION

Murugan's method: 3 squares in a row sharing sides uses 3×3 + 1 = 10 matchsticks. Verify: 4 + 3 + 3 = 10 ✓
With 12 matchsticks, arrange 4 unit squares in a 2×2 grid:
A 2×2 grid needs: 3 horizontal lines × 2 sticks + 3 vertical lines × 2 sticks = 6 + 6 = 12 matchsticks. ✓
This gives 4 unit squares (plus 1 large square = 5 squares total, but the primary count is 4 unit squares).
4 squares (arranged in a 2×2 grid using 12 matchsticks).

Exercise 5.10 — Triangle — Triangle … So Many Triangles

Q1 Describe a Triangle: Triangles have _____ sides. They have _____ corners.

SOLUTION

Count the sides of any triangle: three straight sides.
Count the corners (vertices): three corners.
Triangles have 3 sides. They have 3 corners.

Q2 Draw and name some triangular objects that you see around yourself, in your notebook.

SOLUTION

Look around for objects with triangular faces or triangular shapes.
Examples: a sandwich cut diagonally, a yield/warning road sign, the roof of a house, a slice of pizza, a set square.
Activity — draw at least 3 triangular objects (e.g. road sign, sandwich slice, roof of a house) and label each.

Q3 Count the number of triangles in the given rangoli. (a) ___ (b) ___

SOLUTION

Count ALL triangles of every size: small individual ones and larger ones formed by combining smaller ones.
Be careful not to count the same triangle twice.
(a) 8 triangles in the small diamond-star rangoli (4 pointing outward + 4 pointing inward). (b) 16 triangles in the larger colourful rangoli.

Q4 How many different triangles can be made using the dots on this circle?

SOLUTION

Choose any 3 dots on the circle and connect them to form a triangle.
Count how many different sets of 3 dots you can pick.
The number depends on how many dots are on the circle.
4 different triangles. (There are 4 dots on the circle; any 3 dots form a triangle; C(4,3) = 4 different triangles.)

Q5 Move two matchsticks to turn the one triangle into two triangles.

SOLUTION

Start with 1 triangle made of 3 matchsticks.
To get 2 triangles with only a 2-move change: add 2 matchsticks extending from one side to form a point on the opposite side, creating a shared side — but you may move (not add) sticks.

One solution: move 2 sticks to create a diamond (rhombus) split by a diagonal — this forms 2 triangles sharing the diagonal.

Move 2 matchsticks to create two triangles sharing a common side. Starting from the single triangle, move one matchstick from the bottom to form a diagonal inside, and move another to close the second triangle — creating two triangles that share one side (a diamond/rhombus shape divided by a diagonal).

Exercise 5.11 — Circus with Circles — Let us Discuss

Q1 Have you been to a circus?

SOLUTION

This is a personal discussion question.

Yes / No — personal experience. (Discussion question.)

Q2 What does a circle look like? How is a circle different from a rectangle?

SOLUTION

A circle is a perfectly round shape with no straight sides and no corners.

A rectangle has 4 straight sides and 4 square corners.

Key differences: circle — curved boundary, 0 corners, no sides; rectangle — straight boundary, 4 corners, 4 sides.

A circle is perfectly round with no straight edges and no corners. A rectangle has 4 straight sides and 4 corners. The circle has a curved boundary; the rectangle has straight sides.

Exercise 5.12 — Let us Do — Circles

Q1 Name some objects that are like circles.

SOLUTION

Think of flat round objects around you.

Examples: coin, bangle, bottle cap, clock face, ring, full moon, wheel (seen from the front), biscuit.

Coin, bangle, bottle cap, clock face, ring, wheel.

Q2 Draw colourful circles to complete the circus scene.

SOLUTION

Look at the circus scene and identify where circles are needed (e.g. rings, balls, wheels).

Draw circles of appropriate sizes in the correct positions.

Colour them with bright, cheerful colours.

Activity — complete the circus picture by drawing and colouring circles in the spaces provided.

Q3 Draw circles by tracing bottle caps, bangles, and rings in your notebook.

SOLUTION

Place the bottle cap / bangle / ring flat on paper.

Hold it steady and trace around the outside edge with a pencil.

The traced outline is a circle.

Repeat with different sizes to draw several circles.

Activity — trace around circular objects (bottle cap, bangle, ring) to draw circles of different sizes.

Exercise 5.13 — Let us Do — Comparing Shapes

Q1 Look at these two shapes (square and triangle) and discuss their similarities and differences. (a) Their corners are: same / different. (b) Number of sides is: same / different.

SOLUTION

A square has 4 corners; a triangle has 3 corners — so the number of corners is DIFFERENT.
A square has 4 sides; a triangle has 3 sides — so the number of sides is DIFFERENT.
Both have straight (not curved) edges — that is a similarity.
(a) Their corners are: different (b) Number of sides is: different

Q2 Choose any pair of shapes. Share the similarities and differences in these shapes with your friends.

SOLUTION

Pick any two shapes (e.g. circle and square).
Circle: curved boundary, no corners, no straight sides.
Square: 4 straight sides, 4 corners, all sides equal.
Similarity: both are closed shapes. Differences: circle has no corners or straight sides; square has 4 of each.
Activity — discuss one pair of shapes. Example: circle vs square — both are closed shapes, but a circle has no corners or straight sides while a square has 4 equal sides and 4 square corners.

Q3 Find the largest rectangle in these shapes.

SOLUTION

Examine all the rectangles shown in the picture.
Compare their sizes (area or dimensions).
The largest rectangle is the one with the greatest area.
The largest rectangle is the widest/tallest yellow shape among the four figures shown (the one that occupies the most area). Identify it by comparing the overall size of each yellow rectangle in the grid patterns.

Q4 I made one triangle. Then I made another row of triangles. How many triangles are there in the second figure? If I make one more row, how many triangles will there be in the third figure?

SOLUTION

A triangular pattern grows as rows are added.
Row 1 (1 triangle): 1 triangle.
Row 2 adds 3 more triangles (the new row + the upward-pointing ones between them): total = 1 + 3 = 4.

Row 3 adds 5 more: total = 4 + 5 = 9.
Pattern: row n has n^2 total triangles.
Second figure: 4 triangles. Third figure: 9 triangles.

Q5 Here are some rectangles that are torn. How many square pieces have been torn from each shape?

SOLUTION

Look at each torn rectangle in the picture.
Compare the missing piece with the square cutouts.
Count how many squares fit into the torn portion.
From the figure (top row, left to right then bottom row): Shape 1 — 1 square piece torn; Shape 2 — 2 square pieces torn; Shape 3 — 2 square pieces torn; Shape 4 — 4 square pieces torn; Shape 5 — 1 square piece torn.

Q6 Each of these shapes can be the odd one out. How is each one odd? Discuss.

SOLUTION

Look at the group of shapes.
Each shape can be 'odd' based on a different property: number of sides, number of corners, type of corners, curved vs straight, size, etc.
For each shape, find a property that ONLY that shape has in the group.
Each shape is odd for a different reason: (1) Red square with circle — odd because it is the only shape with a curved part (circle) inside it; (2) Orange square — odd because it is the only solid shape with no other shape inside and is the smallest; (3) Blue triangle — odd because it is the only shape with 3 sides and no square corners; (4) Green square — odd because it is the only shape that is just a plain solid square (no circle inside, largest pure square).

Q7 To complete the rectangle, tick the appropriate shapes from the left side to fill the gaps in the shape on the right side.

SOLUTION

Look at the incomplete rectangle on the right.
Identify what shape(s) are missing (the gaps).
From the options on the left, find the piece(s) that exactly fit the gaps.
Tick the correct piece(s).
Tick the small squares/rectangles from the left options that exactly fill the white gap regions in the stepped blue-red rectangle on the right. (The gaps are rectangular; tick the plain rectangle/square pieces — not triangles, circles, or diamonds.)

Q8 Draw two lines to split the shape into three triangles.

SOLUTION

Look at the shape given (it appears to be a rectangle or quadrilateral).

Draw one diagonal line across it, then draw another line from one corner to the midpoint — creating 3 non-overlapping triangles that together fill the whole shape.

Activity — draw two lines inside the house-shaped pentagon to split it into 3 triangles: draw one line from the bottom-left corner of the square base to the top point of the roof (the apex), and one line from the bottom-right corner of the base to the same apex. This divides the shape into 3 triangles (left roof triangle, right roof triangle, and the base triangle).

Q9 Draw one line to split the shape into 3 triangles.

SOLUTION

To split a shape into 3 triangles with only 1 line, the shape must already be partially divided.

Look at the given shape — it likely has an existing line, and adding one more creates 3 triangles.

Find a single straight line that divides the shape into exactly 3 triangular regions.

Activity — draw one diagonal line inside the L-shaped figure from the inner top-right corner to the bottom-left outer corner. This single line splits the L-shape into exactly 3 triangles.

Q10 Make the following shapes with different sizes and orientations in your notebook: (a) Triangle (b) Rectangle (c) Circle (d) Any other shape of your choice.

SOLUTION

(a) Draw at least 3 triangles: small, big, tall/thin, wide/flat, tilted.

(b) Draw at least 3 rectangles: long and thin, nearly square, tilted.

(c) Draw at least 3 circles: small, medium, large — use round objects to trace.

(d) Choose your own shape (e.g. hexagon, oval) and draw it in different sizes.

Activity — fill a notebook page with triangles, rectangles, and circles of varying sizes and orientations, plus one shape of your choice.