Chapter 14: The Surajkund Fair

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Exercise 14.1 — Let Us Discuss — Fair Picture

Q1 What do you see in the picture?

SOLUTION

Look carefully at the fair picture showing decorated stalls, colourful flags, people, and various shops.

Describe what you observe: stalls with decorations, people shopping, patterns on the floor, colourful banners.

The picture shows a busy fair with decorated stalls, colourful flags and banners, people visiting, patterns on the floor tiles, and various shops. (Open observation — answers may vary.)

Q2 Spot things in the picture that look the same from the left and right side.

SOLUTION

Things that look the same from the left and right side are symmetrical.

In the fair picture, look for objects that have a matching left half and right half: decorated arches, flags, certain stall designs, faces, and floor tile patterns.

In the fair picture the decorated entrance arch (gate), the stall fronts with matching left-right patterns, and the colourful flags hanging symmetrically on either side of the stalls look the same from the left and right side. These are the symmetrical objects in the picture.

Exercise 14.2 — Let Us Do — Make Malas

Q1 Colour the beads in the strings using two colours to show the malas that you have made. (Make malas with 8 beads — 4 of one colour and 4 of another.)

SOLUTION

A mala has 8 beads: 4 of Colour A and 4 of Colour B.
Choose any two colours (e.g., red and blue).
Colour 4 beads red and 4 beads blue in any arrangement on each string.
Example arrangements: RRRRBBBB, RBRBRBRB, RRBBRRBB, RRBBRBB R.
Colour 4 beads in one colour and 4 beads in another colour on each string. (Activity — answers vary.)

Q2 On the previous page, tick the malas that are symmetrical.

SOLUTION

A mala is symmetrical if one half is the mirror image of the other half.
Fold the mala in the middle and check if both halves match exactly.
Tick only those malas where the left half and right half are identical.
Looking at the malas shown on the previous page (p. 178): a mala is symmetrical when its top half is the mirror image of its bottom half. The malas drawn by students in Activity Q1 must be checked individually — tick only the ones where bead 4 = bead 5, bead 3 = bead 6, bead 2 = bead 7, and bead 1 = bead 8 (i.e., pairs from the centre match in colour). (Activity — depends on the malas each student coloured.)

Q3 How many symmetrical malas can be made with 4 beads of one colour and 4 beads of another colour?

SOLUTION

A mala is a string of 8 beads. For it to be symmetrical, bead 1 = bead 8, bead 2 = bead 7, bead 3 = bead 6, bead 4 = bead 5.
This gives 4 pairs. Each pair is either both Colour A or both Colour B.
We need 4 A beads and 4 B beads in total, so we need exactly 2 pairs of A and 2 pairs of B.
Number of ways to choose which 2 pairs are colour A = C(4,2) = 6.
6 symmetrical malas can be made.

Q4 (a) Tick the malas that are symmetrical and cross the one(s) that are not symmetrical.

SOLUTION

For each mala shown, check if folding it in the middle makes both halves match.
If both halves match exactly → tick (symmetrical).
If the halves do not match → cross (not symmetrical).

Looking at the four malas shown on p. 179:

• Mala 1 (leftmost — coloured diamond shapes): The top half mirrors the bottom half exactly. TICK — symmetrical.

• Mala 2 (circles and star shapes): The top half mirrors the bottom half exactly. TICK — symmetrical.

• Mala 3 (mix of pentagon, star, triangle, rectangle shapes in varying colours): The top half does NOT match the bottom half. CROSS — not symmetrical.

• Mala 4 (rightmost — squares, diamonds, triangles): The top half mirrors the bottom half exactly. TICK — symmetrical.

Q5 (b) Use 6 beads of one colour and 2 beads of another colour to make symmetrical malas.

SOLUTION

A mala has 8 beads: 6 of Colour A and 2 of Colour B.

For symmetry: bead 1=bead 8, bead 2=bead 7, bead 3=bead 6, bead 4=bead 5.

We have 4 pairs. Need 6 A and 2 B, so 3 AA pairs and 1 BB pair.

Choose which 1 pair is BB: 4 choices → 4 symmetrical malas.

Example: BB at positions (1,8), (2,7), (3,6), or (4,5).

4 symmetrical malas can be made with 6 beads of one colour and 2 beads of another.

Exercise 14.3 — Let Us Think — Rangolis

Q1 Observe the rangolis given below. Are all rangolis symmetrical?

SOLUTION

A rangoli is symmetrical if you can draw a line through it so that both halves are mirror images.
Look at each rangoli: if a line of symmetry can be drawn, it is symmetrical; if not, it is not symmetrical.
Looking at the three rangolis shown on p. 180:
• Rangoli 1 (red diamond-shaped kolam with circular petal pattern): Yes, it is symmetrical — a vertical line and a horizontal line both divide it into two identical halves.
• Rangoli 2 (red rectangular dot-grid kolam): Yes, it is symmetrical — it has both a vertical and a horizontal line of symmetry.
• Rangoli 3 (tall green side-border pattern): Yes, it is symmetrical — a vertical line down the centre divides it into two matching halves.
All three rangolis shown are symmetrical.

Q2 Trace these rangolis on a paper. Fold the tracing paper in such a way that one half of the rangoli lies exactly on the other half.

SOLUTION

Trace each rangoli carefully on tracing paper.
Fold the tracing paper along the line of symmetry.
If one half lies exactly on the other half when folded, the rangoli is symmetrical.
When folded along the line of symmetry, both halves of a symmetrical rangoli overlap exactly.
(Activity — try with tracing paper.)

Q3 Draw lines in the given rangolis that divide them into two identical halves.

SOLUTION

Find the centre of each rangoli.
Draw a vertical line, horizontal line, or diagonal line through the centre.
A rangoli may have more than one line of symmetry (e.g., a square has 4 lines of symmetry).
Draw all lines that divide the rangoli into two identical halves.
For the rangolis shown on p. 180:
• Rangoli 1 (diamond-shaped red kolam): Draw one vertical line and one horizontal line through the centre — it has at least 2 lines of symmetry (and likely 4, like a square rotated 45°).
• Rangoli 2 (rectangular red kolam): Draw one vertical line down the centre and one horizontal line across the centre — 2 lines of symmetry.
• Rangoli 3 (green border pattern): Draw one vertical line down the centre — 1 line of symmetry.
(Activity — draw these lines directly on the rangoli pictures.)

Q4 Look for other symmetrical things around you. Discuss.

SOLUTION

Look around the classroom or at home for symmetrical objects.

Examples: a butterfly (left and right wings match), a door (left and right halves match), a clock face, a leaf, a human face.

Symmetrical things around us include a butterfly, a leaf, a door, a window, a human face, and many more. (Open discussion.)

Exercise 14.4 — Let Us Do — Enjoy Making Rangolis

Q1 Draw and complete the symmetrical rangolis given below. (a), (b), and (c) — complete the other half of each rangoli.

SOLUTION

For each half-rangoli shown, identify the line of symmetry (the fold line).
Mirror every dot and line from the given half onto the other side.
The distance of each point from the line of symmetry must be the same on both sides.
For the three half-rangolis on the dot grid (p. 181):
(a) The line of symmetry is the diagonal line shown. Mirror every coloured triangle across that diagonal — copy each shape at the same distance on the other side to complete the rangoli.
(b) The line of symmetry is the vertical dashed line. Mirror every coloured block (the staircase pattern of squares) across the vertical line to complete the right half.
(c) The line of symmetry is the horizontal line in the centre of the dot grid. Mirror the step/zigzag line pattern shown in the top half down to the bottom half at the same distance below the line.
(Activity — draw the mirror image of each half on the dot grid.)

Q2 Draw some more rangolis in your notebook that are symmetrical.

SOLUTION

Start by drawing a line of symmetry in the centre of your page.
Draw any design on one side.
Mirror it exactly on the other side.
You can make rangolis inspired by Pookalam (Kerala) or Aipan (Uttarakhand) styles.
Draw any rangoli with at least one line of symmetry. (Open activity — answers vary.)

Exercise 14.5 — Let Us Think — The Mirror Game (Painter Trick)

Q1 What is the trick the painter is playing? Find things for the painter to draw so that he can no longer play the trick. Draw three such things here.

SOLUTION

The painter draws only half the picture and claims the other half is identical (mirror image), so the painting is 'complete'.

Similarly, he accepts only half the money saying the other half is the same.

This trick only works on symmetrical things — the two halves must be exactly the same.

To stop the trick, ask the painter to draw something that is NOT symmetrical — where the left and right halves are different.

Examples of non-symmetrical things: a hand (left hand looks different from its mirror), the letter 'R', a running person, a car (steering wheel on one side).

The painter tricks by drawing only half of a symmetrical image. To stop him, ask him to draw non-symmetrical things like a hand, the letter R, or a running person — things where both halves are NOT identical.

Exercise 14.6 — Let Us Explore — Mirror Game Puzzles

Q1 Pick the odd one out and give reasons.

SOLUTION

Look at the set of shapes or figures shown.
Three of them will share a common property (e.g., all symmetrical, all have the same number of sides).
The one that does not share that property is the odd one out.
Give a reason: e.g., 'This shape is not symmetrical while the others are.'
Looking at the four groups of shapes on p. 185: each group shows a pair of arrow-triangles (pointing left and right) with yellow dots.
• Groups 1, 2, and 3: the yellow dots are placed INSIDE the arrow triangles.
• Group 4 (rightmost — two separate diamond/square shapes with dots): the dots appear outside or between the shapes, and the arrangement is a different shape (square/diamond outline rather than arrow-triangles).
The odd one out is Group 4, because it is the only group where the shapes are not arrow-triangles pointing in opposite directions (or the dots are not inside the arrows). Reason: the other three groups all show two arrow-triangles pointing left and right with dots inside them; group 4 is a different shape.

Q2 Fill 4 boxes with red colour and 3 with blue colour in such a way that one side is the mirror image of the other. In how many ways can you fill it?

SOLUTION

The grid shown has 7 boxes arranged so that one side must mirror the other.
For mirror symmetry, the left half must be the mirror image of the right half.
The centre box (if any) can be either colour.
Try different arrangements: start with the centre box red or blue, then fill the pairs symmetrically.
Count each distinct arrangement that uses exactly 4 red and 3 blue boxes.
The grid shown has a dashed line dividing it into a left half and a right half. To have mirror symmetry, each cell on the left must match the corresponding cell on the right.
With 4 red boxes and 3 blue boxes to fill one side (7 boxes on one side), the other side is its mirror. Each row on the left mirrors the same row on the right.
Possible symmetric arrangements (treating each row of the left half):
• Try placing colours in the left half rows and reflect them. The number of ways depends on which rows get red and which get blue while keeping 4 red and 3 blue total across the whole grid in the filled half.
• There are multiple valid arrangements — experiment by filling the left side with 4 red and 3 blue cells in different row combinations, each time the right side mirrors it exactly. Think, think!

Q3 Make Micy's side the same as that of Catty's side. You can rearrange only three balls in Micy's side.

SOLUTION

Look at Catty's side to see the pattern of balls.
Compare with Micy's side and find which balls are in the wrong position.
Move exactly 3 balls in Micy's side to make it match Catty's side.
Looking at the figure on p. 185:
• Catty's side (right): the balls are arranged in a neat triangle/pyramid — 4 balls in the bottom row, 3 in the next, 2 above that, and 1 at the top (a staircase-triangle of 10 balls).
• Micy's side (left): the balls are scattered in a rough triangle but with 3 balls out of place compared to Catty's neat triangle arrangement.
Move the 3 balls that are not in the correct pyramid position on Micy's side to their correct spots to match Catty's neat 4-3-2-1 triangle. (Identify the 3 misplaced balls by comparing Micy's arrangement row by row with Catty's.)

Q4 Which shape cutouts would fit in the given shape without overlapping and gaps?

SOLUTION

Look at the outline shape given.
Try placing each cutout option inside the outline.
Check if the chosen cutout(s) fill the entire outline with no gaps and no overlaps.
The correct answer is the cutout(s) that match the outline exactly when combined.
The shape shown on p. 185 is a regular hexagon. The cutout shapes that would fit inside a regular hexagon with no gaps or overlaps are equilateral triangles — 6 equilateral triangles of the right size fit together perfectly to fill a regular hexagon. (Alternatively, 3 rhombuses or 2 trapezoids of the matching size also work.) Among the rangometry shapes, choose the equilateral triangle cutout.

Exercise 14.7 — Let Us Do — Tiling the Paths

Q1 Use rangometry shapes to fill the shapes with no gaps and overlaps.

SOLUTION

Rangometry shapes are flat geometric pieces (triangles, squares, hexagons, etc.).
Place the shapes inside the given outline so that they fit together perfectly.
No shape should stick out beyond the border, and no space should be left empty.
Try rotating or flipping the shapes to make them fit.
Use rangometry shapes (triangles, squares, hexagons, rhombuses) to fill each of the three outlines shown on p. 186 — two rectangles and one hexagon — with no gaps or overlaps.
• For the rectangles: use square and/or right-triangle rangometry pieces that fit the rectangular outline exactly.
• For the hexagon: use 6 equilateral triangles or 3 rhombuses to fill it completely.
(Hands-on activity — place the shapes, rotate if needed, until the outline is covered perfectly.)

Exercise 14.8 — Let Us Do — Making Tiles, Creating Paths

Q1 Use two or more rangometry shapes to create your tiles. Now, trace the tiles to create different paths.

SOLUTION

Pick two or more rangometry shapes and combine them to make a tile.
Trace this tile repeatedly, placing it without gaps or overlaps, to create a path from Start to End.
The path should be continuous and completely covered by your tile pattern.
Create a tile from two or more shapes, then tile the path from Start to End with no gaps. (Activity — answers vary.)

Q2 Try making these paths.

SOLUTION

Look at each path outline given.
Select appropriate rangometry shapes that can tile that path.
Cover the path from start to end with no gaps or overlaps.
Looking at the three tiling path patterns shown on p. 187:
• Path 1 (grey/white triangle tessellation): Use right-angled triangle rangometry pieces arranged alternately to cover the square path.
• Path 2 (blue star/square tessellation): Use square and small triangle rangometry pieces combined to make the repeating unit that tiles this path.
• Path 3 (yellow spiky/star tessellation): Use triangle rangometry pieces in a pinwheel arrangement to tile this path.
For each path, find the repeating tile unit and trace it repeatedly from start to finish with no gaps. (Activity — answers vary.)

Exercise 14.9 — Let Us Do — Read the Map

Q1 Help Soni and Avi read the map, and find the following:
(a) Which place does the [Parking sign] show?
(b) Circle the picture in the map that shows the play area.
(c) Which place does the [Restaurant sign] show?
(d) How many exit routes are there in the fair?

SOLUTION

(a) The parking sign shows the Parking area.
(b) Look for the picture labelled 'Play area' on the map and circle it.
(c) The restaurant sign shows the Restaurant.
(d) Count the exits marked on the map. There are 2 exits.
Reading the map on p. 189 carefully:
(a) The hut/house sign (building icon with a flag) shows the Handicraft Stalls (the Teacher's Note on p. 189 says 'the picture of the hut shows the handicraft stalls').
(b) The play area on the map is shown by the see-saw/playground picture — circle it on the map (it is in the lower-right area of the fair).
(c) The [P] sign (Parking symbol) shows the Parking area (top-left corner of the map).
(d) There are 2 exit routes in the fair — one Exit is at the top of the map and one Exit is on the right side of the map.

Q2 Follow the path that Avi and Soni are following:
(a) Walk on the blue lane.
(b) Turn right on the green lane.
(c) You will see a restaurant on your right. Don't sit there.
(d) Take a left towards the red lane.
(e) Take the first left turn towards the golden lane. Stalls will be seen on the way.
(f) Pass the stalls to find the chaupal, and meet Dada and Dadi.

SOLUTION

Start at the Entry of the fair.
(a) Walk along the blue lane heading into the fair.
(b) At the junction, turn right onto the green lane.
(c) Continue — you will pass the Restaurant on your right. Keep going.
(d) Take a left turn to go towards the red lane.
(e) Take the first left turn onto the golden lane; stalls will be on the way.
(f) Pass the stalls and you will reach the Chaupal where Dada and Dadi are waiting.
Tracing the route on the map (p. 189) from the Entry (bottom-centre):
(a) Enter and walk on the blue lane (going up from Entry).
(b) At the junction, turn right onto the green lane.
(c) The Restaurant is on your right along the green lane — keep walking, do not stop.
(d) Turn left onto the red lane.

(e) Take the first left turn onto the golden lane — you will see stalls (handicraft stalls) along the way.
(f) Pass the stalls and you reach the Chaupal — Dada and Dadi are waiting there.

Q3 An uncle asks Dada ji the way to the ATM. Tell him the way to the ATM from the chaupal.

SOLUTION

Locate the Chaupal on the map — it is near the Play area.
Locate the ATM on the map — it is near the entrance/exit area.
Describe a route: from the Chaupal, go towards the main path, pass the giant wheel or pond, and reach the ATM near the parking/entry.
Use direction words: go straight, turn left/right, pass the [landmark].
From the Chaupal (lower-left area of the map), to reach the ATM (near the Parking area, top-left):
From the Chaupal, go back along the golden lane towards the red lane. Turn right on the red lane. Walk along the red lane towards the top of the map. Turn left towards the Parking area. The ATM is next to the Parking area near the top-left corner of the fair. (Route: Chaupal → golden lane → red lane → left towards Parking → ATM.)

Exercise 14.10 — Let Us Do — The Maze

Q1 There are two ways to go out of the Surajkund fair — one seems to be a maze and the other goes straight. Follow the maze with Soni and Avi to exit the fair.

SOLUTION

Look at the maze carefully from the entry point.
Trace a path with your finger, trying different routes.
When you reach a dead end, go back and try another path.
Continue until you find the route that leads to the exit.
Tracing the maze on p. 191 (entry = top-left where the fair building picture is; exit = right side where Dada, Dadi, Soni and Avi are standing):
From the entry, go right along the top corridor, then turn down, navigate through the middle passages avoiding dead ends (the snake path and the pineapple path are dead ends), work towards the right side of the maze, and exit through the opening on the right side. (Activity — trace the route with your finger on the maze.)

Q2 Share the way you went through the maze. Write the things you found on the way.

SOLUTION

After tracing the maze, recall the landmarks or pictures you passed on the correct route.
Write down each thing in order: e.g., 'I passed a tree, then a shop, then a fountain.'
Your route description should match the path through the maze.
On the correct path through the maze (p. 191), you pass: a bag of coins/money (upper area), a kite/diamond shape (upper-right area), and a cat (middle area). The snake (cobra) and the pineapple are on dead-end branches, so you do not pass them on the correct exit route.
Write in order: First I saw the bag of coins, then the kite, then the cat, and then I found the exit. (Answers may vary slightly based on the exact path traced.)