Chapter 2: Toy Joy

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Exercise 2.1 — Let us Do — Shapes in a Rocket and Toy Engine

Q1 Jaya is building a rocket with different shapes. What shapes has she used? How many of each? Cube: ___ Cuboid: ___ Cone: ___ Cylinder: ___

SOLUTION

This question requires counting the shapes visible in the illustration of Jaya's rocket.
Look at the rocket picture carefully and count each type of 3D shape.
Typical rocket construction: a pointed top = cone, middle body = cylinder or cuboid, base sections = cuboid or cube.
Count each shape type in the picture and fill in the blanks.
Cube: 1, Cuboid: 4, Cone: 1, Cylinder: 1. (From the illustration: pink cone at top, orange cylinder in the middle, one cube-shaped purple block below the cone, and four rectangular cuboids — yellow, green, red, and blue/teal — forming the body and base of the rocket.)

Q2 Which shape is between the red cuboid and yellow cuboid?

SOLUTION

Look at the rocket picture to find the red cuboid and yellow cuboid.
Identify the shape that is placed between them.
Cylinder. (The orange cylinder sits between the red cuboid and the yellow cuboid in the assembled rocket.)

Q3 Which shape is on the top of the orange cylinder?

SOLUTION

Find the orange cylinder in the rocket picture.
Look at what shape sits on top of it.
Cuboid (blue/teal). (The blue rectangular cuboid sits directly on top of the orange cylinder in the rocket.)

Q4 Which shape is under the pink cone?

SOLUTION

Find the pink cone in the rocket picture.
Look at what shape is directly below it.
Cuboid (purple). (The purple/violet cuboid is directly under the pink cone at the top of the rocket.)

Q5 Devika went to a shop and bought a toy engine. Count and fill: ___ red cylinder(s), ___ yellow cone(s), ___ grey cuboid(s), ___ blue cube(s).

SOLUTION

This question requires counting the coloured shapes in the illustration of Devika's toy engine.
Look at the toy engine picture carefully.
Count each coloured shape: red cylinders, yellow cones, grey cuboids, and blue cubes.
Write the count in each blank.
1 red cylinder, 2 yellow cones, 1 grey cuboid, 1 blue cube. (From the toy engine illustration: the boiler is a horizontal red cylinder; two inverted yellow cone funnels sit on top of it; the flat base/platform is a grey cuboid; the rear cabin is a blue cube-shaped box.)

Exercise 2.2 — Let us Do — Identifying and Describing Shapes

Q1 Find the shapes in the classroom that look like: Cylinder, Sphere, Cube, Cuboid, Cone. Fill in a table with their names. (a) Name the shape you find the most. (b) Name the shape you find the least. (c) Name the objects made up of more than one shape.

SOLUTION

Walk around the classroom and look for objects that match each 3D shape.
Examples — Cylinder: chalk, water bottle, pen; Sphere: ball, globe; Cube: dice, square box; Cuboid: book, brick, eraser, duster; Cone: birthday cap, ice cream cone (if available).
(a) The shape found most is usually Cuboid, because books, boxes, and bricks are all cuboids.
(b) The shape found least is usually Cone or Sphere, as they are less common in a classroom.
(c) Objects made of more than one shape: a pencil (cylinder + cone), a water bottle with a cap (cylinder + cylinder/cone).
(a) Cuboid is usually the most common shape in a classroom. (b) Cone or Sphere is usually the least common. (c) Sample objects with more than one shape: pencil (cylinder + cone), decorated bottle (cylinder + cone).

Q2 Look at these shapes and follow the instructions: Circle the cubes. Put a tick against the cones. Put a cross against the cylinders. Draw a box around the cuboids.

SOLUTION

This question requires working directly on the illustration of shapes in the textbook.
Identify each shape in the picture.
Cube: a box shape with all equal square faces — circle it.
Cone: a pointed shape with a circular base — put a tick mark on it.
Cylinder: a shape with two circular flat ends and a curved surface — put a cross on it.
Cuboid: a box shape with rectangular faces — draw a box around it.
From the illustration: the picture shows a mix of cubes (small equal-sided boxes), cones (pointed), cylinders (round tube shapes), and cuboids (flat rectangular blocks). Circle each cube, tick each cone, cross each cylinder, and draw a box around each cuboid as per the instructions.

Q3 Name the shapes: (a) with no edges. (b) with only flat faces. (c) with only curved faces. (d) with both straight and curved edges. (e) with both flat and curved faces.

SOLUTION

(a) No edges: A Sphere has no edges at all — its surface is entirely curved.
(b) Only flat faces: A Cube has 6 flat square faces; a Cuboid has 6 flat rectangular faces. Both have only flat faces.
(c) Only curved faces: A Sphere has only one curved surface — no flat face.
(d) Both straight and curved edges: A Cylinder has 2 circular (curved) edges where the flat circles meet the curved surface. A Cone has 1 circular (curved) edge at the base.

(e) Both flat and curved faces: A Cylinder has 2 flat circular faces and 1 curved surface. A Cone has 1 flat circular face and 1 curved surface.
(a) Sphere. (b) Cube and Cuboid. (c) Sphere. (d) Cylinder and Cone. (e) Cylinder and Cone.

Q4 Which shapes can you build (using clay and sticks)?

SOLUTION

With clay balls (for corners/vertices) and sticks (for edges), you can build shapes that have straight edges:
Cube: needs 8 clay balls and 12 equal-length sticks.
Cuboid: needs 8 clay balls and 12 sticks (4 short + 4 medium + 4 long).
Sphere and Cylinder cannot be built with sticks and balls because they have curved surfaces.
You can build a Cube (8 balls, 12 equal sticks) and a Cuboid (8 balls, 12 sticks of different lengths) using clay and sticks. Sphere, Cylinder, and Cone cannot be built this way.

Q5 Try to make these shapes using cubes.

SOLUTION

Look at the shapes shown in the textbook illustration.
Arrange small unit cubes to match each shape shown.
This is a hands-on activity — place cubes next to, on top of, or in front of each other to recreate the shown structures.
Left shape (teal): a T-shaped or plus-shaped arrangement of 7 unit cubes — 4 cubes in a row at the base with 2 cubes rising from the center and 1 extending sideways. Right shape (pink): a stair-step arrangement of 4 unit cubes — 2 cubes wide at the bottom, 1 cube wide stepping back, and 1 cube on top. Arrange your unit cubes to match each shape shown.

Q6 In what ways are these shapes the same? In what ways are they different?

SOLUTION

This question refers to a pair of shapes shown in the illustration.
General approach — same ways: both shapes may have the same number of faces, or both may have flat faces, or both may have the same type of surface.
Different ways: they may differ in the number of edges, corners, or in the shape of their faces.
Example: A cube and a cuboid are the same in having 6 faces, 12 edges, 8 corners, and all flat faces. They differ in that a cube has all square faces while a cuboid has rectangular faces.
The five shapes shown are: cylinder (yellow), cube (teal/blue), cone (pink), cuboid (purple/flat), and sphere (green circle). Same: the cube and cuboid both have only flat faces; the cone and cylinder both have one circular base. Different: the sphere has no edges or corners; the cone has one circular base and comes to a point; the cylinder has two circular flat faces and a curved surface; the cube has 6 equal square faces; the cuboid has 6 rectangular faces of different sizes.

Q7 Look at a die. The faces have 1 to 6 dots. What number is on: (a) the face opposite number 1? (b) the face opposite number 2? (c) the face opposite number 3? (d) What pattern do you notice?

SOLUTION

A standard die (cube) has opposite faces that always add up to 7.
(a) Opposite of 1: 7 - 1 = 6
(b) Opposite of 2: 7 - 2 = 5
(c) Opposite of 3: 7 - 3 = 4
(d) Pattern: On a standard die, the numbers on opposite faces always add up to 7.
(a) 6. (b) 5. (c) 4. (d) The two opposite faces on a die always add up to 7.

Q8 In what order is this model built?

SOLUTION

Look at the model in the illustration.
To describe the order of building, start from the bottom shape and work upward.
Example order: Place the largest/base shape first (usually a cuboid or cube), then add the next shape on top, and finally place the topmost shape (often a cone or small cube).
Describe using position words: bottom, middle, top; or 'first, then, finally'.
Build order (from the figure — a table-like model): (1) First place the large flat cuboid base on the ground. (2) Place four short cylinders upright on the base as legs. (3) Place a second large flat cuboid on top of the cylinders (the tabletop). (4) Finally place four blue cones on top of the tabletop, one near each corner. (Note: three pink/red small cuboid steps are shown beside the base — these are placed as a side step after the main table is built.)

Q9 What shape do you get if you join a cube and a cuboid? How many cubes are used to make this shape? In how many different ways can you join 3 cubes? What possible shapes do you get if you join 3 cubes?

SOLUTION

Joining a cube and a cuboid: Since a cube is a special type of cuboid (all sides equal), joining them gives a larger cuboid.
Number of cubes in the shape: Count the cubes in the illustration.
Ways to join 3 cubes: You can join 3 cubes in a straight line (1x1x3), in an L-shape, or in a stair/step shape. These give different arrangements.
Possible shapes from 3 cubes: straight bar (1×1×3), L-shape, stair-step. All arrangements are cuboids or irregular assemblies.
Joining a cube and a cuboid gives a larger cuboid. The multi-coloured shape on the table uses 27 cubes (a 3×3×3 arrangement, like a Rubik's cube).

Q10 Name the shapes used in these models. Describe how the shapes are arranged. (a), (b), (c), (d)

SOLUTION

Look at each model (a), (b), (c), (d) in the illustration.
For each model, identify every 3D shape used: cube, cuboid, cylinder, cone, or sphere.
Then describe their arrangement using position words: on top of, below, beside, between.
Example: 'In model (a), a cylinder is at the bottom and a cone is on top of it.'
Model (a): made of cuboids only — two long flat green cuboids crossed at right angles with a smaller red cuboid placed on top at the center, and one orange cuboid at the base underneath. All shapes are cuboids; the long ones are placed flat and perpendicular to each other. Model (b): made of cuboids only — multiple flat rectangular cuboids (orange and pink/red alternating) stacked vertically in a tower, with one green cuboid placed on top as a cap. Model (c): made of cuboids only — flat orange and pink/red cuboids stacked in a straight rectangular tower, alternating colors, with no cap. Model (d): made of cuboids only — flat cuboids (yellow, orange, pink, green) arranged in a stair-step/staircase pattern, each layer stepping back slightly.

Q11 Use six dice to make the following shapes: (a) a cuboid, (b) a tower, (c) any other shape of your choice.

SOLUTION

Six dice are six identical cubes. You can arrange them in different ways.
(a) Cuboid: Arrange all 6 dice in a single row (1×1×6), or in a 2×3 flat rectangle, or a 2×1×3 block — each forms a cuboid.
(b) Tower: Stack all 6 dice one on top of the other in a vertical column (1×1×6 standing up). This makes a tall tower.
(c) Any other shape: Arrange them in an L-shape (e.g. 4 in a row + 2 extending sideways), or a T-shape, or a 2×2×1 flat with 2 on top. Describe your arrangement.
(a) Cuboid: arrange 6 dice in a 2×3 flat rectangle or a 1×1×6 line. (b) Tower: stack all 6 dice in a vertical column. (c) Your choice — try an L-shape or a T-shape with 6 cubes.