

Chapter 3 Three Dimensional Objects and Nets

Teacher Guide and Diagnostic Answer Key

Teacher Guide

Teacher Chapter-at-a-Glance

A box/can/cone or printed nets are helpful
Pacing
Talk Prompt

Mastery Decision Guide

A missed Tripwire does not automatically mean “redo the chapter.” Confirm the likely misconception, reteach the smallest prerequisite or representation that addresses it, and then use a fresh item before moving on.

Missed Tripwire #1 → One shared feature (tapering to a point) is being used while the rest of the definition is ignored. Next move: Check whether the faces are flat polygons or one curved surface, not just whether the solid comes to a point.

Confirmation and Fresh Recheck

Confirm with: Ask the student to name the base shape and identify whether the side surfaces are flat or curved.

Fresh recheck: Classify a pentagonal prism, a cylinder, and one invalid cube-net description by defining features.

Decision rule: Move forward only when the fresh response is secure and the reasoning survives the changed representation or context.

Diagram Production Notes — Chapter 3

Use the diagram master IDs:

Ch14-D01 — Face, Edge, Vertex

Ch14-D02 — Cube vs Rectangular Prism

Ch14-D03 — Prism Bases

Ch14-D04 — Square Pyramid

Ch14-D05 — Cylinder Parts

Ch14-D06 — Cone Height vs Slant Height

Ch14-D07 — Circle vs Sphere

Ch14-D08 — Nets

Ch14-D09 — Invalid Cube Net

The face, edge, and vertex diagram should use a rectangular prism because the labels are clear. Curved solids must label “curved surface” separately from flat bases. The cone diagram must clearly separate vertical height from slant height. Net diagrams must be spacious enough that students can see how the faces fold.

Ready to Learn Check

Quick check before starting. A wrong response below points to a prerequisite worth confirming before the chapter builds on it.

1. Is a rectangle 2-D or 3-D?

Correct answer: 2-D

Likely wrong answer: 3-D

Possible misconception: Flat shapes and solids are being confused.

Next move: Compare a paper rectangle with a rectangular box.

2. Is a rectangular prism 2-D or 3-D?

Correct answer: 3-D

Likely wrong answer: 2-D

Possible misconception: A solid drawing is being treated as a flat shape.

Next move: Handle a box and identify length, width, and height.

3. What is the difference between a face and an edge?

Correct answer: A face is a flat surface; an edge is where two flat faces meet.

Likely wrong answer: Face and edge treated as the same thing.

Possible misconception: 3-D vocabulary is not secure.

Next move: Trace one face with a finger, then one edge.

4. Which solid has circular bases and a curved surface?

Correct answer: Cylinder.

Likely wrong answer: Prism.

Possible misconception: Matching bases alone are being used to classify a solid.

Next move: Check whether the bases are polygons and whether the side surface is flat or curved.

Ready-to-Learn item 1

Correct answer: 2-D

Likely wrong answer: 3-D

Misconception: Flat shapes and solids are being confused.

Next move: Compare a paper rectangle with a rectangular box.

Ready-to-Learn item 2

Correct answer: 3-D

Likely wrong answer: 2-D

Misconception: A solid drawing is being treated as a flat shape.

Next move: Handle a box and identify length, width, and height.

Ready-to-Learn item 3

Correct answer: A face is a flat surface; an edge is where two flat faces meet.

Likely wrong answer: Face and edge treated as the same thing.

Misconception: 3-D vocabulary is not secure.

Next move: Trace one face with a finger, then one edge.

Ready-to-Learn item 4

Correct answer: Cylinder.

Likely wrong answer: Prism.

Misconception: Matching bases alone are being used to classify a solid.

Next move: Check whether the bases are polygons and whether the side surface is flat or curved.

Practice

Assign the full set or select items for targeted review. Teacher solutions follow each question.

1. 6 equal square faces

Solution: 1. cube

2. 6 rectangular faces

Solution: 2. rectangular prism

3. 2 triangular bases and 3 rectangular side faces

Solution: 3. triangular prism

4. 2 circular bases and 1 curved surface

Solution: 4. cylinder

5. 1 circular base and 1 curved surface that tapers to a point

Solution: 5. cone

6. round in every direction

Solution: 6. sphere

7. square base and triangular faces meeting at an apex Write the correct word: face, edge, vertex, vertices, base, apex, net, curved surface.

Solution: 7. square pyramid

8. A flat surface on a solid is a _____.

Solution: 8. face

9. Where two flat faces meet is an _____.

Solution: 9. edge

10. A corner where edges meet is a _____.

Solution: 10. vertex

11. More than one vertex are called _____.

Solution: 11. vertices

12. The top point of a pyramid or cone is an _____.

Solution: 12. apex

13. A flat pattern that folds into a solid is a _____.

Solution: 13. net

14. The side of a cylinder is a _____.

Solution: 14. curved surface

15. How many faces does a rectangular prism have?

Solution: 15. 6 faces

16. How many edges does a rectangular prism have?

Solution: 16. 12 edges

17. How many vertices does a rectangular prism have?

Solution: 17. 8 vertices

18. How many faces does a cube have?

Solution: 18. 6 faces

19. How many flat faces does a triangular prism have?

Solution: 19. 5 flat faces

20. How many vertices does a square pyramid have?

Solution: 20. 5 vertices

21. What solid has a net made of 6 equal squares?

Solution: 21. cube

22. What solid has a net made of 2 circles and 1 rectangle?

Solution: 22. cylinder

23. What solid has a net made of 2 triangles and 3 rectangles?

Solution: 23. triangular prism

24. Explain why a flat pattern with 6 squares is not automatically a cube net.

Solution: 24. A cube net must fold into a cube without overlap. Some 6-square arrangements cannot fold into a cube.

25. A student says a sphere has one face because it is round. Explain the mistake.

Solution: 25. A sphere has a curved surface, not a flat face. In this book, a face means a flat surface.

26. A student says a cone and a pyramid are the same because both have an apex. Explain why that is not enough.

Solution: 26. Having an apex is not enough. A cone has a circular base and curved surface. A pyramid has a polygon base and triangular faces.

27. A student says slant height and vertical height are always the same. Explain the mistake.

Solution: 27. Slant height is along the outside surface. Vertical height goes straight from the apex to the base at a right angle. They are not always the same.

Chapter Answer Key

Tripwire Check

The student is not correct.

A pyramid has a polygon base and flat triangular faces meeting at a single apex.

A cone has one circular base and one curved surface that tapers to a point.

Sharing an apex does not make a cone a pyramid.

Worksheet 1: Guided Practice

1.

- a. 2-D
- b. 3-D
- c. 2-D
- d. 3-D
- e. 2-D
- f. 3-D

2.

- a. cube
- b. cylinder
- c. cone
- d. sphere
- e. square pyramid

3.

- a. face
- b. edge
- c. vertex
- d. net
- e. apex

4.

- a. 6
- b. 12
- c. 8

Worksheet 2: Independent Practice

1.

- a. rectangular prism

- b. cube
- c. cylinder
- d. cone
- e. sphere
- f. triangular prism
- g. square pyramid

2.

- a. polygon
- b. circular
- c. apex
- d. faces
- e. solid

3.

- a. True
- b. False
- c. True
- d. True
- e. False
- f. True

4.

- a. cube
- b. rectangular prism
- c. triangular prism
- d. cylinder

Worksheet 3: Mixed Practice & Application

1.

A cylinder has two matching circular bases, but a prism must have polygon bases and flat side faces. A cylinder has a curved surface, so it is not a prism.

2.

A circle is flat and 2-D. A sphere is 3-D and takes up space. They are not the same object.

3.

- a. The apex is the top point where the sides meet.
- b. A cone has a circular base and curved surface. A pyramid has a polygon base and triangular faces.

4.

A row of 6 squares may not fold so that all faces meet correctly. A valid cube net must fold into a cube without overlap or gaps.

5.

- a. cylinder
- b. rectangular prism
- c. sphere
- d. cone
- e. triangular prism

6.

- a. vertical height
- b. slant height
- c. Later formulas may use one height but not the other. Mixing them up gives the wrong measurement.

7.

Nets are useful because they show the outside faces of a solid laid flat, which helps when finding surface area.

Diagnostic Key — High-Leverage Items

Tripwire Check

Correct answer: No. A prism has polygon bases and flat side faces. A cylinder has circular bases and a curved surface.

Likely wrong answer: “Yes, because both bases match.”

Misconception: One property is being used while the full definition of prism is ignored.

Next move: Check the base shape and side surfaces, not just whether the two bases match.

Tripwire Diagnostic

Correct answer: No. A pyramid has a polygon base and flat triangular faces; a cone has a circular base and one curved surface. Sharing an apex does not make them the same solid family.

Likely wrong answer: “Yes, because both taper to a point.”

Misconception: One shared feature is being used while the rest of the definition is ignored.

Next move: Compare the base shape and side surfaces, not just whether the solid comes to a point.

Exit Ticket Diagnostic — High-Leverage Item

Correct answer: You must still check whether the arrangement folds into a cube without overlap.

Likely wrong answer: Any six squares automatically make a cube net.

Misconception: Face count is being treated as sufficient without checking spatial arrangement.

Next move: Use a paper model or mental folding test; look for overlap or a face that cannot close.

Variation Lab — Expected Ideas

1. A prism is named by its polygon base; flat side faces distinguish it from a cylinder.
2. Six squares are necessary for a cube net but not sufficient; the arrangement must fold without overlap.
3. Vertical height is perpendicular to the base; slant height lies along the outside surface.

Transfer Check — Suggested Responses

Familiar: cylinder; two circular bases and a curved surface. Altered: pentagonal prism. Non-routine: prism bases are polygons and side faces are flat; a cylinder has circular bases and a curved surface. Repair: a circle is 2-D; a sphere is 3-D.

Exit Ticket — Answers

1. cylinder
2. A prism has polygon bases and flat side faces; a cylinder has circular bases and a curved surface.
3. Check whether the six-square arrangement actually folds to a cube without overlap.