LESSON MAKER PRO

Pyramid Surface Quest

Find the area of every outside face.

GRADE 8 · 8.MG.2.a

8.MG.2.a "Determine the surface area of square-based pyramids by using concrete objects, nets, diagrams, and formulas."

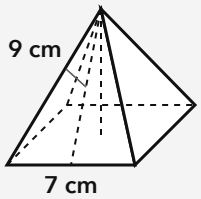
NAME _____ DATE _____

SURFACE AREA RULE

Every pyramid on this sheet is a regular square pyramid with four congruent triangular faces. If b is the base edge and s is a triangular face's altitude (slant height), its total surface area is $SA = b^2 + 2bs$.

WORKED EXAMPLE

Find the total surface area of the square-based pyramid shown. The base edge is 7 cm and the slant height (face altitude) is 9 cm.

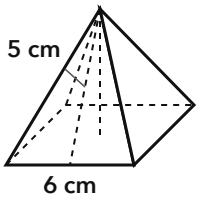


1. Square base area: $7 \times 7 = 49$ cm^2.
2. Area of all four triangular faces: $2 \times 7 \times 9 = 126$ cm^2.
3. Add the areas: $49 + 126 = 175$ cm^2.

Answer: 175 cm^2

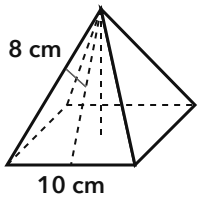
PRACTICE 6 problems

1 Find the total surface area of the square-based pyramid shown. The base edge is 6 cm and the slant height (face altitude) is 5 cm.



ANSWER _____

2 Find the total surface area of the square-based pyramid shown. The base edge is 10 cm and the slant height (face altitude) is 8 cm.



ANSWER _____

3 A square-based pyramid has a base edge of 4 cm and a slant height of 11 cm. Find its total surface area.

ANSWER _____

4 A square-based pyramid has a base edge of 12 cm and a slant height of 8 cm. Find the lateral surface area, not including the base.

ANSWER _____

5 A square-based pyramid has a base edge of 8 cm and a total surface area of 288 cm^2. Find its slant height.

ANSWER _____

6 A square-based pyramid has a slant height of 10 cm and a total surface area of 300 cm^2. Find the length of one base edge.

ANSWER _____

APPLY IT Show your work

1 A student club is making a square-pyramid display stand for a gaming tournament. The base edge is 15 cm, and the slant height of each triangular face is 13 cm. They will cover the base and all four triangular faces with paper. How much paper is needed?

WORK SPACE

ANSWER _____

2 A maker club builds a square-pyramid roof for a model snack stand. Each base edge is 18 cm, and the roof's slant height is 10 cm. Paint covers only the four triangular roof faces. What area will be painted?

WORK SPACE

ANSWER _____

CHALLENGE One step up

A square-based pyramid has a total surface area of 576 cm^2 and a base edge of 16 cm. Find the slant height. Then find the area of one triangular face.

WORK SPACE AND ANSWER

ANSWER KEY

Pyramid Surface Quest

GRADE 8 · 8.MG.2.a

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Find the total surface area of the square-based pyramid shown. The base edge is 6 cm and the slant height (face altitude) is 5 cm.	**96 cm^2**
2	Find the total surface area of the square-based pyramid shown. The base edge is 10 cm and the slant height (face altitude) is 8 cm.	**260 cm^2**
3	A square-based pyramid has a base edge of 4 cm and a slant height of 11 cm. Find its total surface area.	**104 cm^2**
4	A square-based pyramid has a base edge of 12 cm and a slant height of 8 cm. Find the lateral surface area, not including the base.	**192 cm^2**
5	A square-based pyramid has a base edge of 8 cm and a total surface area of 288 cm^2. Find its slant height.	**14 cm**
6	A square-based pyramid has a slant height of 10 cm and a total surface area of 300 cm^2. Find the length of one base edge.	**10 cm**

PART 2 · APPLY IT

1. **615 cm^2** Find the base area, 15 × 15 = 225 cm^2. Add the lateral area, 2 × 15 × 13 = 390 cm^2, for a total of 615 cm^2.
2. **360 cm^2** Use lateral area only: 2 × 18 × 10 = 360 cm^2. Do not include the square base.

CHALLENGE

Slant height: 10 cm; area of one triangular face: 80 cm^2

Accept equivalent calculations and correct square units. Slant height is the altitude of a triangular face, not the perpendicular height of the pyramid. For the challenge, require a slant height of 10 cm and a triangular-face area of 80 cm^2.