

Surface Area Studio

Find lateral and total area on 3D solids.

GRADE 8 • TEKS 8.7.B

8.7.B "use previous knowledge of surface area to make connections to the formulas for lateral and total surface area and determine solutions for problems involving rectangular prisms, triangular prisms, and cylinders;"

NAME _____

DATE _____

BUILD THE SURFACE AREA

Choose the two matching faces as bases. For any prism, multiply the perimeter of one base by the prism height to find lateral surface area, then add the areas of both bases for total surface area. For a cylinder, use $2\pi rh$ for lateral surface area and $2\pi rh + 2\pi r^2$ for total surface area.

WORKED EXAMPLE

A rectangular prism has a 9 cm by 4 cm base and a height of 6 cm. Find its total surface area.

1. Base area = $9 \times 4 = 36 \text{ cm}^2$.
2. Base perimeter = $2(9 + 4) = 26 \text{ cm}$.
3. Lateral surface area = $26 \times 6 = 156 \text{ cm}^2$.
4. Total surface area = $156 + 2(36) = 228 \text{ cm}^2$.

Answer: 228 cm^2

PRACTICE 6 problems

- 1** A rectangular prism has a 7 cm by 3 cm base and a height of 5 cm. Find its lateral surface area.

ANSWER _____

- 2** A rectangular prism is 8 cm long, 2 cm wide, and 11 cm high. Find its total surface area.

ANSWER _____

- 3** A triangular prism has a triangular base with side lengths 5 cm, 12 cm, and 13 cm. The prism is 7 cm long. Find its lateral surface area.

ANSWER _____

- 4** A triangular prism has a right-triangle base with legs 8 cm and 15 cm and a hypotenuse of 17 cm. The prism is 10 cm long. Find its total surface area.

ANSWER _____

- 5** A cylinder has a radius of 3 cm and a height of 12 cm. Find its lateral surface area in terms of π .

ANSWER _____

- 6** A cylinder has a radius of 5 cm and a height of 8 cm. Find its total surface area in terms of π .

ANSWER _____

APPLY IT Show your work

- 1** The student council is covering a rectangular prize box that is 14 cm long, 5 cm wide, and 3 cm high. The cover must wrap all six faces. How many square centimeters of material are needed?

WORK SPACE

ANSWER _____

- 2** A reusable water-bottle sleeve wraps only around the curved side of a cylindrical bottle. The bottle has a radius of 7 cm and a height of 15 cm. How much fabric is needed in terms of π ?

WORK SPACE

ANSWER _____

CHALLENGE One step up

A triangular prism has a right-triangle base with legs 7 cm and 24 cm and a hypotenuse of 25 cm. Its total surface area is 616 cm^2 . What is the prism length x ? Show your reasoning.

WORK SPACE AND ANSWER

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	A rectangular prism has a 7 cm by 3 cm base and a height of 5 cm. Find its lateral surface area.	100 cm²
2	A rectangular prism is 8 cm long, 2 cm wide, and 11 cm high. Find its total surface area.	252 cm²
3	A triangular prism has a triangular base with side lengths 5 cm, 12 cm, and 13 cm. The prism is 7 cm long. Find its lateral surface area.	210 cm²
4	A triangular prism has a right-triangle base with legs 8 cm and 15 cm and a hypotenuse of 17 cm. The prism is 10 cm long. Find its total surface area.	520 cm²
5	A cylinder has a radius of 3 cm and a height of 12 cm. Find its lateral surface area in terms of n .	72n cm²
6	A cylinder has a radius of 5 cm and a height of 8 cm. Find its total surface area in terms of n .	130n cm²

PART 2 • APPLY IT

1. **254 cm²** Use total surface area: $2(14 \times 5 + 14 \times 3 + 5 \times 3) = 254 \text{ cm}^2$.
2. **210n cm²** Use lateral surface area: $2n(7)(15) = 210n \text{ cm}^2$.

CHALLENGE

8 cm; the base perimeter is 56 cm and the two bases have area 168 cm², so $56x + 168 = 616$ and $x = 8$.

Accept equivalent expressions and calculations. For cylinder answers, keep n exact rather than using a decimal approximation.