Surface Area of Three-Dimensional Objects

Spot mistakes, reason, and work backward

Name _____ **Date** _____ **Score** _____ / 6

QUICK REVIEW

Surface area adds areas of exposed faces. A closed rectangular prism has $SA = 2(lw + lh + wh)$. For $4, 3, 2$ cm this is $2(12 + 8 + 6) = 52$ cm^2. An open-top box omits one lw face; a triangular prism has two triangular ends and three rectangular walls.

Worked example

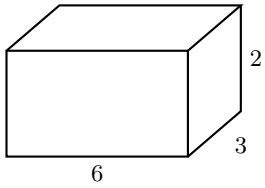
Find area of a closed 4 by 3 by 2 cm box.

1. One of each face pair has areas $4(3) = 12$, $4(2) = 8$, $3(2) = 6$.
2. Pair total $= 12 + 8 + 6 = 26$ cm^2.
3. Double for opposite faces: $2(26) = 52$ cm^2.
Answer: 52 cm^2.

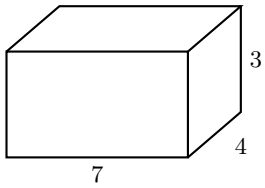
Practice Problems

Show your thinking.

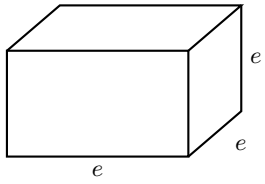
1. A student uses volume 36 for surface area of a 6 by 3 by 2 cm closed box. Correct the measure and units.



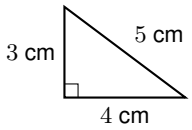
2. A student includes two 7 by 4 faces in an open-top box. Correct the area for dimensions $7, 4, 3$ cm.



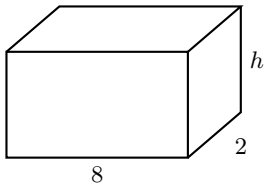
3. A cube surface area is 150 cm^2. Recover the face area and edge length.



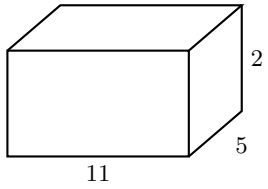
4. A 9 cm long triangular prism has right-triangle base legs $3, 4$ cm and hypotenuse 5 cm. A student counts only the three rectangles. Find the omitted area and corrected total.



5. A box with base 8 by 2 cm has lateral area 80 cm^2. Recover height and then total surface area.



6. A box 11 by 5 by 2 cm is missing one 5 by 2 end panel. Find its remaining surface area.



Answer Key

1. Area 72 cm^2.
2. Area 94 cm^2.
3. Face area 25 cm^2; edge 5 cm.
4. Omitted ends 12 cm^2; total 120 cm^2.
5. Height 4 cm; total area 112 cm^2.
6. Area 164 cm^2.

Step-by-Step Solutions

Follow each calculation, then check your own work.

Problem 1

1. $6(3)(2) = 36$ cm^3 is volume. Surface area adds face areas.
2. Top and bottom: $2(6)(3) = 36$ cm^2.
3. Front/back: $2(6)(2) = 24$; ends: $2(3)(2) = 12$ cm^2.
4. Total $= 36 + 24 + 12 = 72$ cm^2.

Problem 2

1. Base: $7(4) = 28$ cm^2.
2. Four walls: $2(7)(3) + 2(4)(3) = 66$ cm^2.
3. Total $= 28 + 66 = 94$ cm^2; no top is counted.

Problem 3

1. Divide the total among 6 congruent faces: $150/6 = 25$ cm^2.
2. For a square face, $e^2 = 25$, so $e = \sqrt{25} = 5$ cm.
3. Check: $6(5^2) = 150$ cm^2.

Problem 4

1. Two triangular ends: $2(1/2)(3)(4) = 12$ cm^2.
2. Three rectangles: $(3 + 4 + 5)(9) = 12(9) = 108$ cm^2.
3. Total $= 12 + 108 = 120$ cm^2.

Problem 5

1. Base perimeter $= 2(8 + 2) = 20$ cm.
2. Use the given lateral area: $20h = 80$, so $h = 80/20 = 4$ cm.
3. Add top and bottom: $80 + 2(8)(2) = 112$ cm^2.

Problem 6

1. Closed area $= 2(55 + 22 + 10) = 174$ cm^2.
2. The missing end area is $5(2) = 10$ cm^2.
3. Remaining area $174 - 10 = 164$ cm^2.

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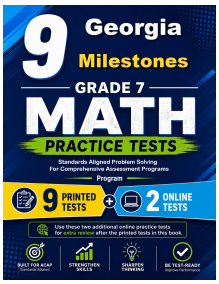

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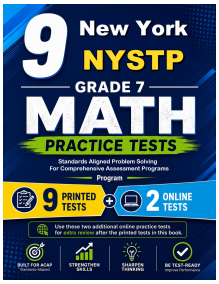

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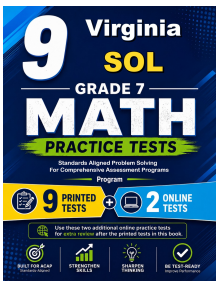

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