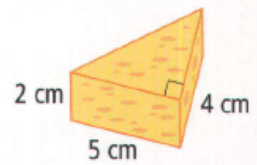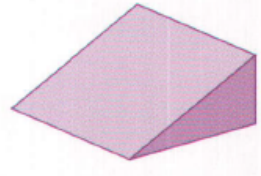# Solutions

1. Carl says the size of the piece of cheese shown is 20 cm². Explain what mistake he is making.

2 cm   4 cm   5 cm

Carl is talking about the VOLUME of cheese.

The volume is 20, but the units should be cm³, not cm².

2. Bob wants to know how much foam is needed to fill a wedge-shaped pillow. What does he need to calculate, surface area or volume? Justify your response.

Bob needs to fill the pillow, not cover it. Therefore he needs to calculate the volume.

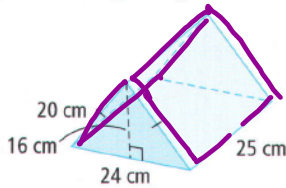**3.** The dimensions of a right triangular prism are given.

15 cm

9 cm

12 cm

5 cm
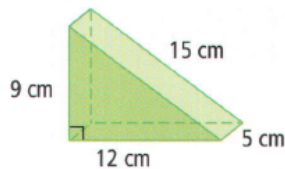
a) Determine its surface area.

b) Calculate its volume.

a) $SA = 2\triangle s + 3\square s$

$= 2\left(\frac{1}{2} \times 12 \times 9\right) + (12 \times 5) + (9 \times 5)$

$+ (15 \times 5)$

$= 108 + 60 + 45 + 75$

$= 288 \text{ cm}^2$

b) $Vol = \frac{1}{2} \times 12 \times 9 \times 5$

$= 270 \text{ cm}^3$

[15 is not needed for the volume]

4. The diagram shows the dimensions of an isosceles triangular prism.
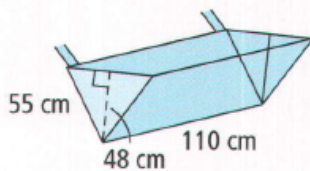
20 cm
16 cm
25 cm
24 cm

a) Determine its surface area.
b) Calculate its volume.

b) $Vol = \frac{1}{2} \times 24 \times 16 \times 25$
$= 4800 \, cm^3$

2 rectangles are congruent

a) $SA = 2 \triangle s + 3 \square s$
$= 2\left(\frac{1}{2} \times 24 \times 16\right) + (24 \times 25) + 2(20 \times 25)$
$= 384 + 600 + 1000$
$= 1984 \, cm^2$

5. The scoop on a backhoe is an equilateral triangular prism.

55 cm
110 cm
48 cm

a) What area of sheet metal was used to make the scoop?
b) How much liquid can the scoop hold?
c) How much earth might the scoop hold? Explain your answer.

← no top!

a) $SA = 2 \triangle s + 2 \square s$
$= 2\left(\frac{1}{2} \times 55 \times 48\right) + 2(55 \times 110)$
$= 2640 + 12100$
$= 14740 \, cm^2$

b) $Vol = \frac{1}{2} \times 55 \times 48 \times 110$
$= 145200 \, cm^3$ $\xrightarrow{\div 1000}$ 145.2 litres

Could convert to litres

c) The same. It is still a volume.

6. One type of chocolate is packaged in a box that is a triangular prism.

3.9 cm   3 cm

16 cm   5 cm

a) Find the least amount of cardboard needed to package each chocolate bar. Round your answer to the nearest unit.

b) The manufacturer needs to allow for the overlapping part that makes up the seams. How much cardboard is needed for each box if 10% more is added for the seams?

c) If 1.2 g of chocolate fills 1 cm³, how many grams of chocolate fit in each box?

a) $SA = 2\triangle_s + 3\square_s$

$= 2(\frac{1}{2} \times 5 \times 3) + (16 \times 5)$
$\quad + 2(3.9 \times 16)$
$= 15 + 80 + 124.8$
$= 219.8$
$= 220 \text{ cm}^2$

b) 10% of $220 = 22 \text{ cm}^2$
Total $= 220 + 22$
$= 242 \text{ cm}^2$

c) $Vol = \frac{1}{2} \times 5 \times 3 \times 16$
$= 120 \text{ cm}^3$

Mass of chocolate $= 1.2 \times 120$
$= 144 \text{ g}$

7. Decide whether the following statements are always, sometimes, or never true. Justify your answers using pictures and words. Then, change each statement that is sometimes true to make a similar statement that is always true.

a) The surface area of a triangular prism can be found by adding half the area of the triangular faces to the area of the rectangular faces.

b) The volume of a triangular prism can be found by multiplying the area of the base by the height.

c) The base area of a triangular prism is calculated by dividing the base area of a rectangular prism by two.

Never true

Always true

Sometimes true
$[\triangle$ needs to be half the size of the $\square]$

8. Samantha is preparing a project for her science class. She has decided to demonstrate the nature of white light as it passes through solid glass prisms. Her teacher asks her to show some related calculations.
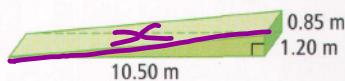
Using the dimensions provided, help Samantha determine the amount of glass used to make the triangular prism.

20 cm
16 cm
24 cm
25 cm
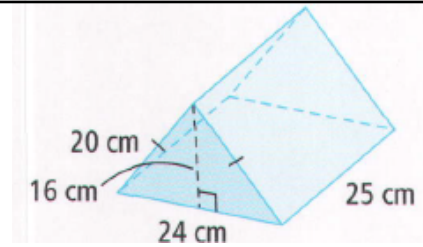
Need to find the volume.

$$Vol = \frac{1}{2} \times 24 \times 16 \times 25$$
$$= 4800 \text{ cm}^3$$

9. The school has hired construction workers to build a wheelchair ramp to the entrance.

Try This!

0.85 m
1.20 m
10.50 m

a) How much concrete is needed to make the ramp?

b) The exposed surfaces of the the ramp are to be painted blue. How many cans of paint are needed? One can covers 20 m².

a) $Vol = \frac{1}{2} \times 10.5 \times 0.85 \times 1.2$
$= 5.355 \text{ m}^3$

b) $SA = 2\triangle s + 2\square s$
$= 2(\frac{1}{2} \times 10.5 \times 0.85)$
$+ (1.2 \times 0.85)$
$+ (1.2 \times 10.53)$
$= 8.925 + 1.02 + 12.636$
$= 22.581 \text{ m}^2$

Use Pythagorean theorem to find x
$x^2 = 10.5^2 + 0.85^2$
$x^2 = 110.9725$
$x = \sqrt{}$ ANS
$x = 10.53 \text{ m}$

\# cans needed $= \frac{22.58}{20}$
$= 1.13$ cans
$\Rightarrow$ need to buy 2 cans