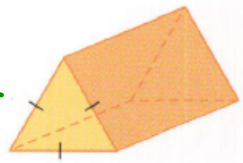
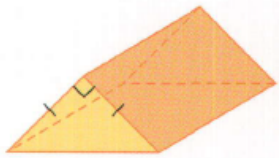
Solutions

1. In an equilateral triangular prism, the two bases are equilateral triangles. What is true about the three rectangular faces?



They are CONGRUENT and therefore each have the same area as each other.

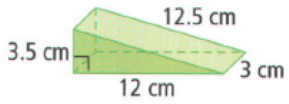
2. Describe the faces of a right isosceles triangular prism. How would you find its surface area?



2 congruent triangles.
2 congruent rectangles.
1 "base" rectangle

Find the area of each face and then add them up!

3. A small doorstop is in the shape of a right triangular prism.



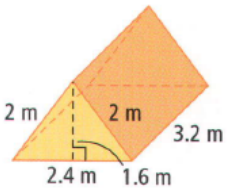
a) What is the area of one triangular face?
b) What is the total area of the rectangular faces?
c) What is the surface area of the doorstop?

a) $A_\Delta = \frac{1}{2} \times b \times h$
$= \frac{1}{2} \times 12 \times 3.5$
$= 21\ cm^2$

b) Base $= 12 \times 3$
$= 36\ cm^2$
Back $= 3.5 \times 3$
$= 10.5\ cm^2$
Ramp $= 12.5 \times 3$
$= 37.5\ cm^2$
Total $= 84\ cm^2$

c) Total Area $= 2\Delta s + \square s$
$= 2 \times 21 + 84$
$= 42 + 84$
$= 126\ cm^2$

4. A tent, with attached ground sheet, is an isosceles triangular prism.



a) What is the area of one triangular face?

b) What is the total area of the rectangular faces?

c) What is the surface area of the tent?

a) $A_\Delta = \frac{1}{2} \times b \times h$

$= \frac{1}{2} \times 2.4 \times 1.6$

$= 1.92 m^2$

b) Base $= 2.4 \times 3.2$

$= 7.68 m^2$

Sides $= 2 \times 3.2$

$= 6.4 m^2$

Total $= 7.68 + 2(6.4)$

$= 7.68 + 12.8$

$= 20.48 m^2$

c) Surface area

$= 2(1.92) + 20.48$

$= 3.84 + 20.48$

$= 24.32 m^2$

5. A triangular prism has a surface area of 450 cm^2. What is the total area of the rectangular faces if the total area of the triangular bases is 86 cm^2?

Surface Area = Triangles + Rectangles

$450 = 86 + x$

$450 - 86 = x$

$364 cm^2 = x$

$\Rightarrow$ Total area of rectangular faces $= 364 cm^2$

6. A triangular prism has a surface area of 200 cm^2. What is the area of one triangular face if the total area of the rectangular faces is 120 cm^2?

Surface area = Triangles + Rectangles

$200 = y + 120$

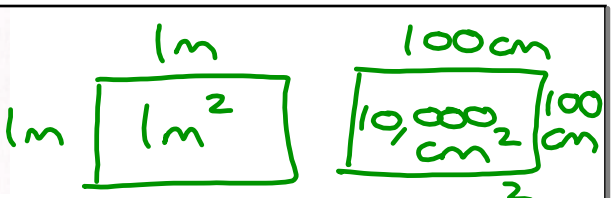
$200 - 120 = y$

$80 = y$

$\Rightarrow$ one triangular face $= \frac{80}{2}$

$= 40\,cm^2$

7. A triangular prism has a surface area of 1.8 m^2. If each triangular face has an area of 2500 cm^2, what is the total area of the rectangular faces, in square metres?



$\Rightarrow 1m^2 = 10,000\,cm^2$

Triangular faces $= 2 \times 2500$

$= 5,000\,cm^2$

$= \frac{5,000}{10,000}\,m^2$

$= 0.5\,m^2$

S.A. $= \triangle s + \square s$

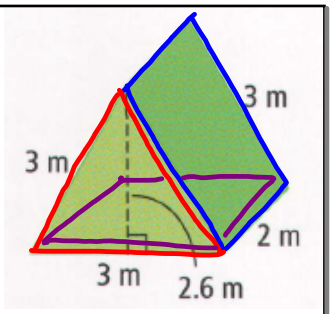
$1.8 = 0.5 + d$

$1.8 - 0.5 = d$

$1.3 = d$

$\Rightarrow$ Area of rectangular faces $= 1.3\,m^2$

8. Ellen built a storage shed in the shape of a triangular prism. What area of plywood did she need? The shed has a wooden floor but is open at the front (no front triangular face).



$\triangle = \frac{1}{2} \times 3 \times 2.6$

$= 3.9 m^2$

Base $= 3 \times 2$

$= 6 m^2$

Sides $= 2(3 \times 2.6)$

$= 2(7.8)$

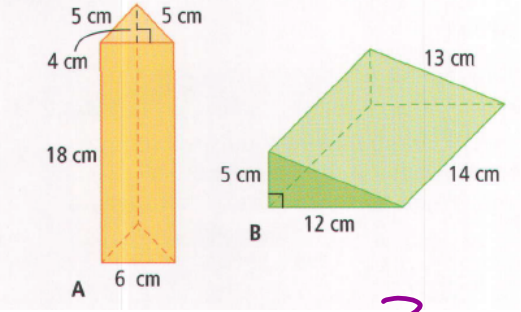
$= 15.6 m^2$

Total area $=$

$3.9 + 6 + 15.6$

$= 25.5 m^2$

9. a) Which triangular prism do you think has a greater surface area?



Ummm..... B ?

b) Determine the surface area of the two triangular prisms. Was your prediction correct?

Surface Area of A

$= 2(\frac{1}{2} \times 6 \times 4) + (6 \times 18)$

$+ 2(5 \times 18)$

$= 24 + 108 + 180$

$= 312 cm^2$

Surface Area of B

$= 2(\frac{1}{2} \times 12 \times 5) + (12 \times 14)$

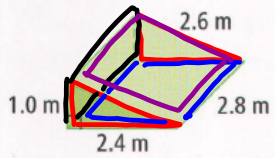
$+ (13 \times 14) + (5 \times 14)$

$= 60 + 168 + 182 + 70$

$= 480 cm^2$

It sure was! :)

10. A steel ramp is a right triangular prism.



a) What is the total area of sheet metal needed to make the ramp?

b) What assumptions did you make in part a)?

Area Δs $= 2\left(\frac{1}{2} \times 2.4 \times 1.0\right)$
$= 2.4 m^2$

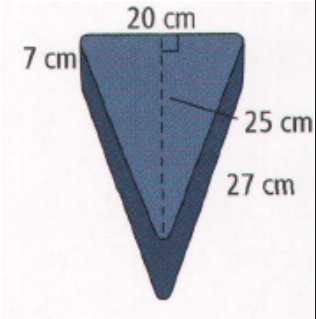
Base $= 2.4 \times 2.8$
$= 6.72 m^2$

Back $= 2.8 \times 1.0$
$= 2.8 m^2$

Ramp $= 2.8 \times 2.6$
$= 7.28 m^2$

Total $= 2.4 + 6.72 + 2.8 + 7.28$
$= 19.2 m^2$

11. A company makes bicycle seats from metal triangular prisms covered with rubber padding. How much padding is required to cover the seat's entire surface area?



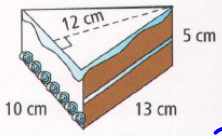
Area Δs $= 2\left(\frac{1}{2} \times 20 \times 25\right)$
$= 500 cm^2$

Back $= 20 \times 7$
$= 140 cm^2$

Sides $= 2(27 \times 7)$
$= 378 cm^2$

Total $= 500 + 140 + 378$
$= 1018 cm^2$

12. The diagram shows the dimensions of a slice of carrot cake. Icing is spread on the top and back of the slice.



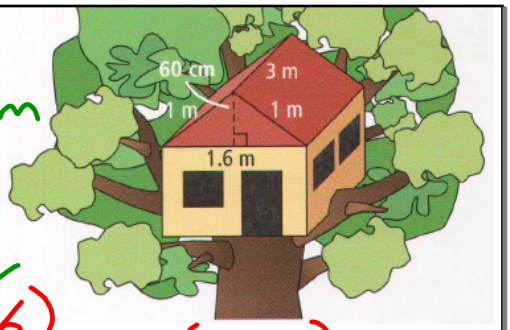
a) What is the surface area of the iced portion of the slice of cake?
b) What is the entire surface area of the slice of cake?
c) What percent of the slice of cake is covered with icing?

Iced area = Top + Back
$= \left(\frac{1}{2} \times 10 \times 12\right) + (10 \times 5)$
$= 60 + 50$
$= 110\ cm^2$

Total area = Iced + Sides
$= 110 + 2(13 \times 5)$
$= 110 + 130$
$= 240\ cm^2$

$\%\ covered = \frac{Iced}{Total} \times 100\%$
$= \frac{110}{240} \times 100\%$
$= 45.8\bar{3}\ \%$

13. Dan sketched the tree house he wants to build using scraps of wood. How many square metres of wood will Dan need to build the roof of the tree house, including the gable ends? Round your answer to the nearest square metre.



60 cm = 0.6 m

Roof = Ends + Sides
$= 2\left(\frac{1}{2} \times 1.6 \times 0.6\right) + 2(1 \times 3)$
$= 0.96 + 6$
$= 6.96\ m^2$
$\Rightarrow$ Dan needs $7\ m^2$ of wood.