

Name: KEY

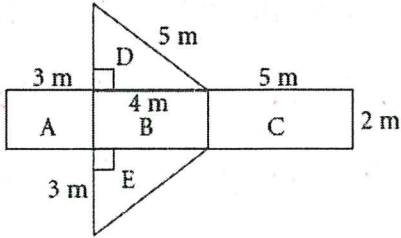
Date: _____

Math 8

Lesson M2 Part 2 ~ Calculating Surface Area of Right Triangular Prisms

• Developing:

1. The diagram shows the net of a right triangular prism.



Calculate the area of the net.

Rectangle A has area 3 × 2 = 6

Rectangle B has area 4 × 2 = 8

Rectangle C has area 5 × 2 = 10

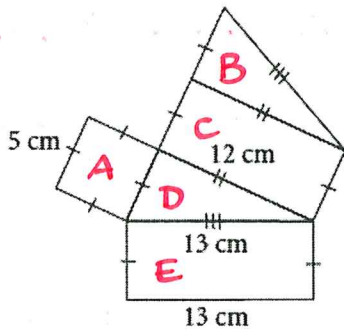
Triangle D has area $\frac{1}{2} \times$ 3 × 4 = 6

Triangle E has area $\frac{1}{2} \times$ 3 × 4 = 6

Area = 6 + 8 + 10 + 6 + 6 = 36

The area of the net is 36 m².

4. Calculate the area of the net of a prism.



A: $5 \times 5 = 25$

B: $5 \times 12 \div 2 = 30$

C: $5 \times 12 = 60$

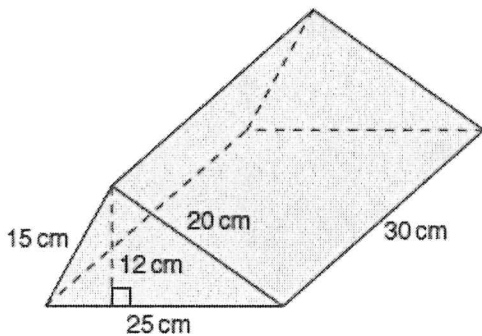
D: $5 \times 12 \div 2 = 30$

E: $5 \times 13 = 65$

210cm²

6. Sketch a net of this triangular prism.

What is its surface area?



$$\Delta's: \frac{25 \times 12}{2} \times 2 = 300$$

$$\text{bottom: } 25 \times 30 = 750$$

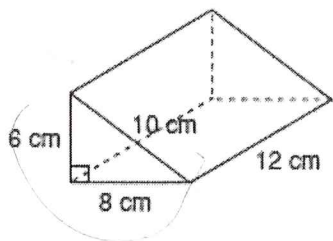
$$\text{left: } 15 \times 30 = 450$$

$$\text{right: } 20 \times 30 = \underline{600}$$

$$2100 \text{ cm}^2$$

9. Find the surface area of each triangular prism.

a)



$$\Delta's: \frac{6 \times 8}{2} \times 2 = 48$$

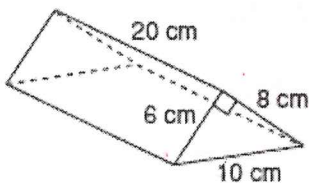
$$\text{bottom: } 8 \times 12 = 96$$

$$\text{left: } 6 \times 12 = 72$$

$$\text{right: } 10 \times 12 = \underline{120}$$

$$336 \text{ cm}^2$$

8. Calculate the surface area of each prism.



Prism D

$$\Delta's: \frac{8 \times 6}{2} \times 2 = 48$$

$$\text{bottom: } 10 \times 20 = 200$$

$$\text{left: } 6 \times 20 = 120$$

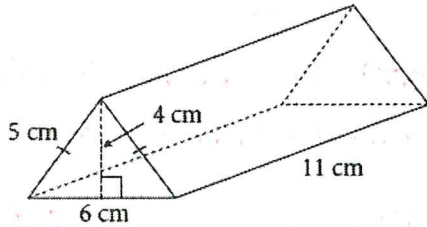
$$\text{right: } 8 \times 20 = \underline{160}$$

$$528 \text{ cm}^2$$

• Proficient:

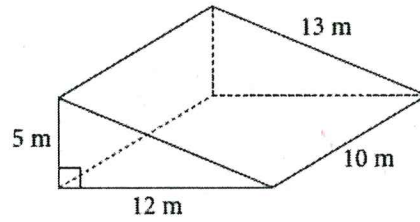
2. Calculate the surface area of each prism.

a)



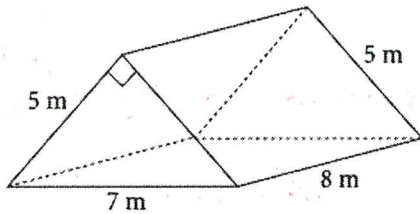
$$\begin{aligned} \Delta's: & \frac{4 \times 6}{2} \times 2 = 24 \\ b: & 6 \times 11 = 66 \\ l: & 5 \times 11 = 55 \\ r: & 5 \times 11 = 55 \\ & \underline{\hspace{1.5cm}} \\ & 200 \text{ cm}^2 \end{aligned}$$

b)



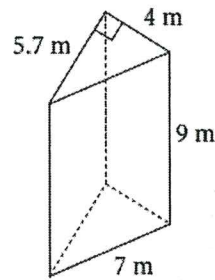
$$\begin{aligned} \Delta's: & \frac{5 \times 12}{2} \times 2 = 60 \\ b: & 12 \times 10 = 120 \\ l: & 5 \times 10 = 50 \\ r: & 13 \times 10 = 130 \\ & \underline{\hspace{1.5cm}} \\ & 360 \text{ m}^2 \end{aligned}$$

c)



$$\begin{aligned} \Delta's: & \frac{5 \times 5}{2} \times 2 = 25 \\ b: & 7 \times 8 = 56 \\ l: & 5 \times 8 = 40 \\ r: & 5 \times 8 = 40 \\ & \underline{\hspace{1.5cm}} \\ & 161 \text{ m}^2 \end{aligned}$$

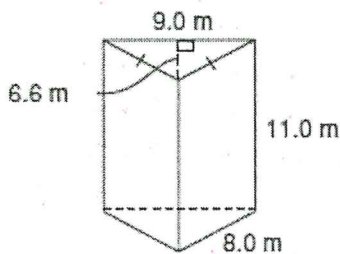
d)



$$\begin{aligned} \Delta's: & \frac{5.7 \times 4}{2} \times 2 = 22.8 \\ l: & 5.7 \times 9 = 51.3 \\ \text{front:} & 7 \times 9 = 63 \\ r: & 4 \times 9 = 36 \\ & \underline{\hspace{1.5cm}} \\ & 173.1 \text{ m}^2 \end{aligned}$$

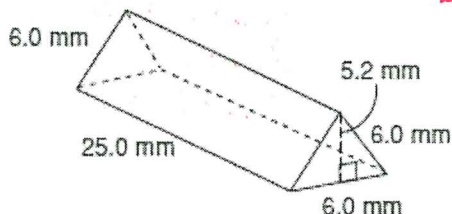
9. Find the surface area of each triangular prism.

b)



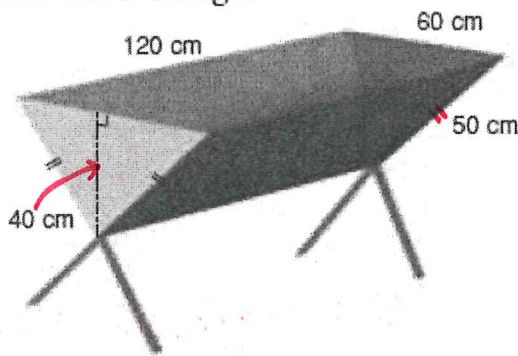
$$\begin{aligned} \Delta's: & \frac{9 \times 6.6}{2} \times 2 = 59.4 \\ \text{back:} & 9 \times 11 = 99 \\ l: & 8 \times 11 = 88 \\ r: & 8 \times 11 = 88 \\ & \underline{\hspace{1.5cm}} \\ & 334.4 \text{ m}^2 \end{aligned}$$

c)



$$\begin{aligned} \Delta's: & \frac{6 \times 5.2}{2} \times 2 = 31.2 \\ b: & 6 \times 25 = 150 \\ l: & 6 \times 25 = 150 \\ r: & 6 \times 25 = 150 \\ & \underline{\hspace{1.5cm}} \\ & 481.2 \text{ mm}^2 \end{aligned}$$

13. How much metal is needed to build this water trough?



$$\Delta's: \frac{60 \times 40}{2} \times 2 = 2400$$

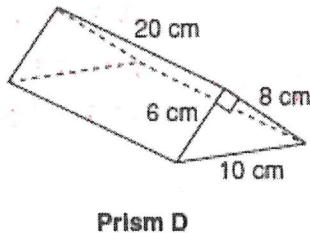
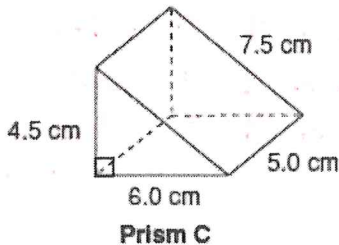
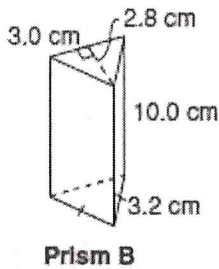
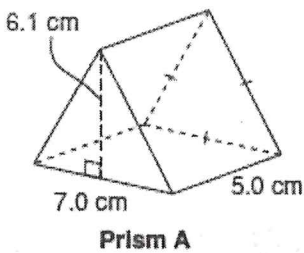
$$\text{left: } 50 \times 120 = 6000$$

$$\text{right: } 50 \times 120 = 6000$$

(no top) 14400 cm^2
+ legs

• Extending : please complete proficient questions first

8. Calculate the surface area of each prism. Order the prisms from greatest to least surface area. Show your work.



$$A: 2 \times \frac{7 \times 6.1}{2} = 42.7$$

$$3 \times 7 \times 5 = 105$$

$$\boxed{147.7 \text{ cm}^2}$$

$$B: 2 \times \frac{3 \times 2.8}{2} = 8.4$$

$$1 \times 3 \times 10 = 30$$

$$2 \times 3.2 \times 10 = 64$$

$$\boxed{102.4 \text{ cm}^2}$$

$$C: 2 \times \frac{6 \times 4.5}{2} = 27$$

$$4.5 \times 5 = 22.5$$

$$6 \times 5 = 30$$

$$7.5 \times 5 = 37.5$$

$$\boxed{117 \text{ cm}^2}$$

$$D: 2 \times \frac{6 \times 8}{2} = 48$$

$$6 \times 20 = 120$$

$$8 \times 20 = 160$$

$$10 \times 20 = 200$$

$$\boxed{528 \text{ cm}^2}$$

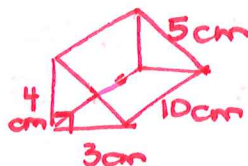
$$2 \times \frac{3 \times 4}{2} = 12$$

$$3 \times 10 = 30$$

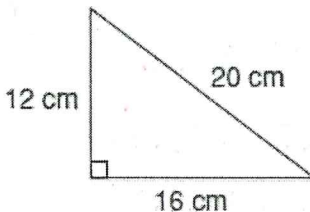
$$4 \times 10 = 40$$

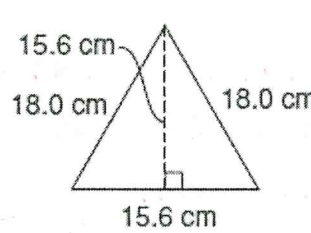
$$5 \times 10 = 50$$

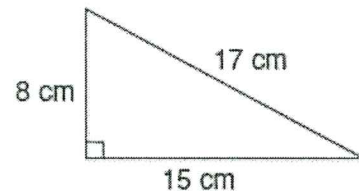
10. The 3 rectangular faces of a triangular prism have areas 30 cm^2 , 40 cm^2 , and 50 cm^2 . The 2 triangular bases have a combined area of 12 cm^2 . What are the dimensions of the triangular prism? Explain your thinking using diagrams, numbers, and words.



11. Suppose you want to construct a right triangular prism 15 cm long with the greatest surface area. Which of these triangles should you choose for its base? Explain your choice.

a)  $\frac{12 \times 16}{2} = 96 \text{ cm}^2$
 $(12 + 16 + 20) \times 15 = 720 \text{ cm}^2$ } 816 cm^2

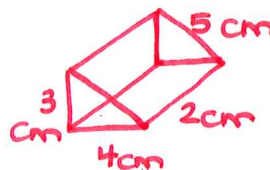
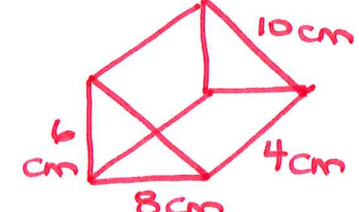
b)  $\frac{15.6 \times 15.6}{2} = 121.68 \text{ cm}^2$
 $(18 + 18 + 15.6) \times 15 = 774 \text{ cm}^2$ } 895.68 cm^2

c)  $\frac{8 \times 15}{2} = 60 \text{ cm}^2$
 $(8 + 15 + 17) \times 15 = 600 \text{ cm}^2$ } 660 cm^2

→ #b is best choice for greatest surface area.

12. **Assessment Focus** A student said, "If you double all the dimensions of a triangular prism, you will double its surface area." Is the student correct? Use words, numbers, and diagrams to explain your answer.

If you double all the dimensions, you will quadruple its surface area.

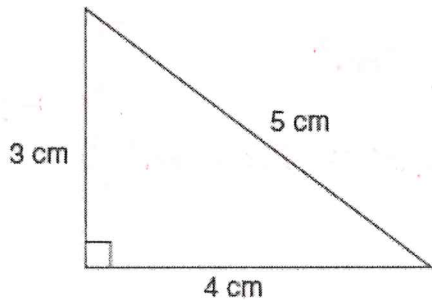



$2 \times \frac{3 \times 4}{2} = 12$	$2 \times \frac{6 \times 8}{2} = 48$
$3 \times 2 = 6$	$6 \times 4 = 24$
$4 \times 2 = 8$	$8 \times 4 = 32$
$5 \times 2 = 10$	$10 \times 4 = 40$
36	144
cm^2	cm^2

x4 →

↳ 6 is 2×3 } so $6 \times 8 = 2 \times 3 \times 2 \times 4$
 8 is 2×4 }
 ↓
 4 time greater.

16. Take It Further This triangle is one base of a right triangular prism. What should the length of the prism be so its surface area is between 100 cm^2 and 150 cm^2 ? Show your work.



$$2 \times \frac{3 \times 4}{2} = 12$$

$$\left. \begin{array}{l} 100 - 12 = 88 \\ 150 - 12 = 138 \end{array} \right\} \text{range of SA of rectangles.}$$

$$3 + 4 + 5 = 12$$

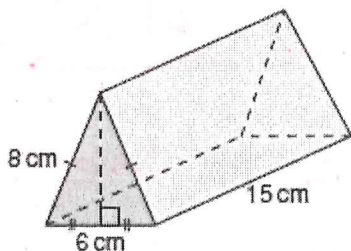
$$88 \div 12 = 7.\bar{3}$$

$$138 \div 12 = 11.5$$

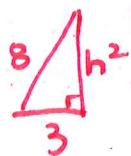
★ length of prism should be between $7.\bar{3} \text{ cm}$ & 11.5 cm .

17. Take It Further

- a) Use the Pythagorean Theorem. Find the height of a triangular base of this prism.
 b) What is the surface area of the prism? Give your answer to the nearest square centimetre.



a)



$$8^2 - 3^2 = h^2$$

$$64 - 9 = h^2$$

$$55 = h^2$$

$$\sqrt{55} = h$$

$$7.4 \approx h$$

$$b) 2 \times \frac{7.4 \times 6}{2} \approx 44.5$$

$$6 \times 15 = 90$$

$$2 \times 8 \times 15 = 240$$

$$\approx \boxed{374.5 \text{ cm}^2}$$