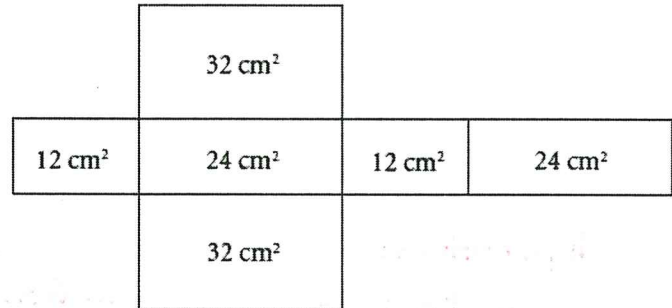


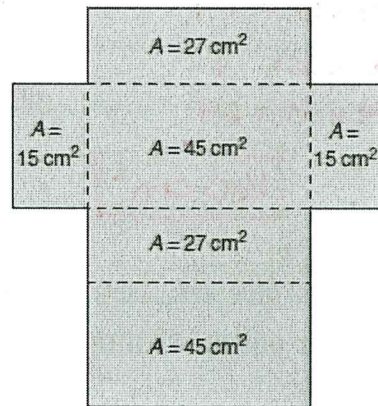
Math 8**Lesson M2 Part 1 ~ Calculating Surface Area of Right Rectangular Prisms**• Developing:

1. The diagram shows the net of a right rectangular prism. The area of each face is given. Calculate the surface area of the prism.



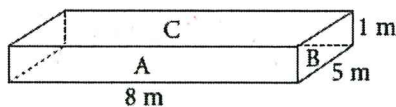
$$\text{Area} = \underline{12} + \underline{24} + \underline{12} + \underline{24} + \underline{32} + \underline{32} = \underline{136} \text{ cm}^2$$

4. Here is the net of a right rectangular prism. The area of each face is given. What is the surface area of the prism?



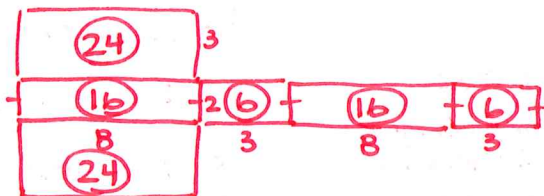
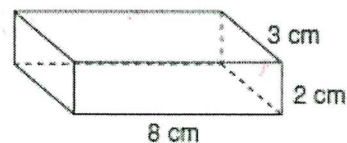
$$27 + 45 + 27 + 45 + 15 + 15 = \boxed{174 \text{ cm}^2}$$

2. Determine the surface area of the rectangular prism.



$$\begin{aligned} \text{Rectangle A has area } & \underline{8} \times \underline{1} = \underline{8 \text{ cm}^2} \\ \text{Rectangle B has area } & \underline{1} \times \underline{5} = \underline{5 \text{ cm}^2} \\ \text{Rectangle C has area } & \underline{8} \times \underline{5} = \underline{40 \text{ cm}^2} \\ \text{Surface area} & = 2 \times \underline{8} + 2 \times \underline{5} + 2 \times \underline{40} \\ & = \underline{106 \text{ cm}^2} \end{aligned}$$

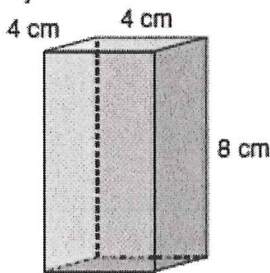
5. Sketch a net of this right rectangular prism. What is its surface area?



$$2 \times 24 + 2 \times 16 + 2 \times 6 = \boxed{92 \text{ cm}^2}$$

6. Find the surface area of each right rectangular prism.

a)



top/bottom:

$$2 \times 4 \times 4 = 32$$

left/right: +

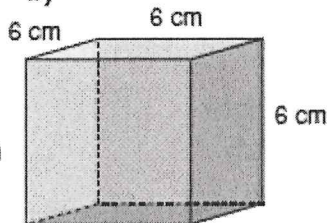
$$2 \times 4 \times 8 = 64$$

front/back: +

$$2 \times 4 \times 8 = 64$$

$$\boxed{160 \text{ cm}^2}$$

b)



$$2 \times 6 \times 6 = 72$$

+

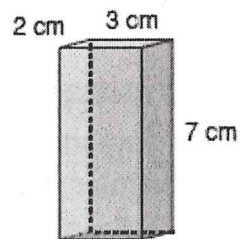
$$2 \times 6 \times 6 = 72$$

+

$$2 \times 6 \times 6 = \underline{72}$$

$$\boxed{216 \text{ cm}^2}$$

c)



$$2 \times 2 \times 3 = 12$$

+

$$2 \times 2 \times 7 = 28$$

+

$$2 \times 3 \times 7 = \underline{42}$$

$$\boxed{82 \text{ cm}^2}$$

• Proficient:

7. Find the surface area of a right rectangular prism with these dimensions.

a) 4 m by 3 m by 10 m

$$2 \times 4 \times 3 = 24$$

$$2 \times 4 \times 10 = 80$$

$$2 \times 3 \times 10 = 60$$

$$\boxed{164 \text{ m}^2}$$

b) 3 cm by 5 cm by 8 cm

$$2 \times 3 \times 5 = 30$$

$$2 \times 3 \times 8 = 48$$

$$2 \times 5 \times 8 = 80$$

$$\boxed{158 \text{ cm}^2}$$

9. Tanya paints the walls of her family room. The room measures ~~height~~ 7 m by 4 m by 3 m.

The walls need 2 coats of paint.

A 4-L can of paint covers 40 m².

a) How much paint should Tanya buy? 4 cans

b) What assumptions do you make? door/windows

Explain. • height of room is 3 m

• floor & ceiling are not being painted

$$2 \times 7 \times 3 = 42$$

$$2 \times 4 \times 3 = \underline{24}$$

$$66 \text{ m}^2 \times 2 = 132 \text{ m}^2$$

↳ 2 coats of paint

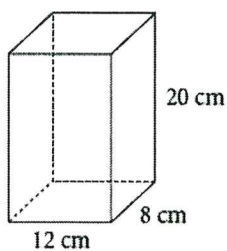
$$132 \div 40 = 3.3$$

$$\boxed{4 \text{ cans of paint}}$$

included in area even though they don't get painted

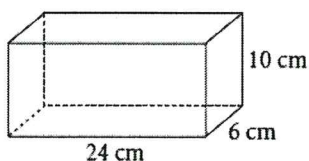
3. Glenda and Louis each design a rectangular package.
Whose package has the greater surface area? Show your work.

Glenda's package:



$$\begin{aligned}
 SA &= 2 \times 12 \times 8 + 2 \times 20 \times 8 + 2 \times 20 \times 12 \\
 &= 192 + 320 + 480 \\
 &= 992 \text{ cm}^2
 \end{aligned}$$

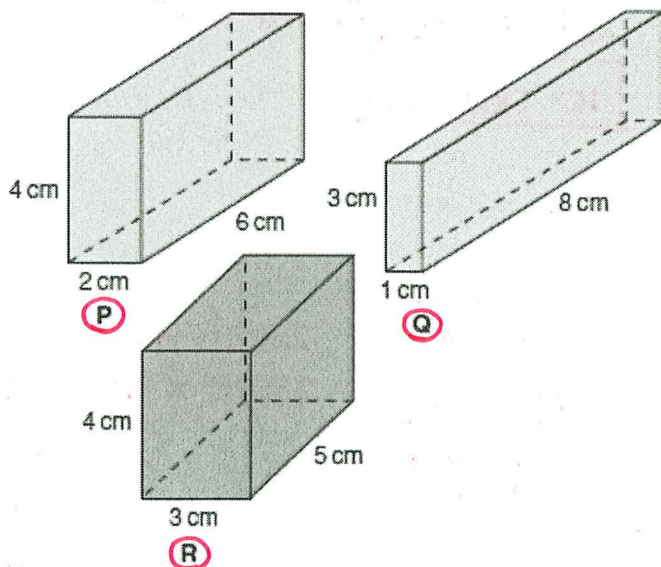
Louis's package:



$$\begin{aligned}
 SA &= 2 \times 24 \times 6 + 2 \times 10 \times 6 + 2 \times 10 \times 24 \\
 &= 288 + 120 + 480 \\
 &= 888 \text{ cm}^2
 \end{aligned}$$

992 > 888 So, Glenda's package has the greater surface area.

13. Which prism has the greatest surface area? The least surface area?



$$\begin{aligned}
 P: & 2 \times 2 \times 6 = 24 \\
 & 2 \times 2 \times 4 = 16 \\
 & 2 \times 4 \times 6 = 48 \\
 & \underline{88 \text{ cm}^2}
 \end{aligned}$$

$$\begin{aligned}
 Q: & 2 \times 1 \times 8 = 16 \\
 & 2 \times 1 \times 3 = 6 \\
 & 2 \times 8 \times 3 = 48 \\
 & \underline{70 \text{ cm}^2}
 \end{aligned}$$

$$\begin{aligned}
 R: & 2 \times 3 \times 5 = 30 \\
 & 2 \times 3 \times 4 = 24 \\
 & 2 \times 4 \times 5 = 40 \\
 & \underline{94 \text{ cm}^2}
 \end{aligned}$$

greatest SA: prism R

least SA: prism Q

• Extending:

4. The surface area of a cube is 294 cm^2 .

a) What is the area of each face of the cube?

$$294 \div 6 = 49 \text{ cm}^2$$

b) What is the length of one edge of the cube?

$$\sqrt{49} = 7 \text{ cm}$$

10. The surface area of a cube is 54 cm^2 .

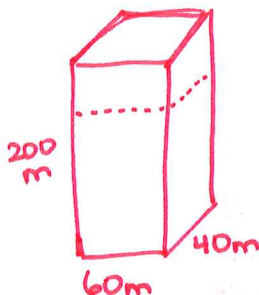
a) What is the area of one face of the cube?

$$54 \div 6 = 9 \text{ cm}^2$$

b) What is the length of one edge of the cube?

$$\sqrt{9} = 3 \text{ cm}$$

8. An office building is in the shape of a right rectangular prism with height 200 m, length 60 m, and width 40 m. The top quarter of each vertical face of the building is to be covered with a large banner advertising a major sporting event. What is the total surface area to be covered with banners?



$$2 \times 200 \times 60 = 24\,000$$

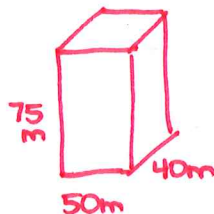
$$2 \times 200 \times 40 = 16\,000$$

$$\hline 40\,000 \text{ m}^2$$

$\div 4$ ← "quarter"

$$\boxed{10\,000 \text{ m}^2}$$

12. The Sandberg Institute building in Amsterdam generates revenue by selling advertising space on the exterior of the building. The building is a rectangular prism with dimensions 50 m by 40 m by 75 m. Suppose it costs 1 Euro per month to rent an advertising space of 50 cm^2 . Each of the 4 walls of the building is covered with advertisements. How much money will the institute earn in one month?



$$2 \times 75 \times 50 = 7500$$

$$2 \times 75 \times 40 = 6000$$

$$\hline 13\,500 \text{ m}^2$$

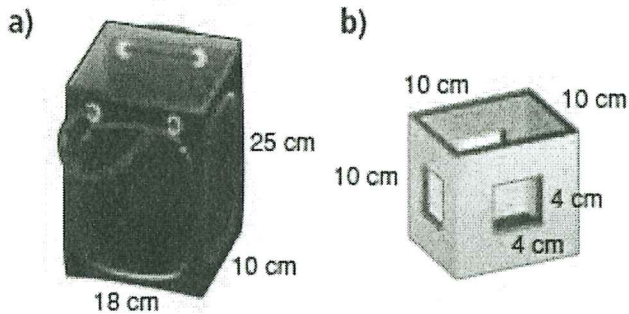
$$\div 0.005$$

$$\boxed{2\,700\,000 \text{ Euros}}$$

$$50 \text{ cm}^2 = 0.005 \text{ m}^2$$

↳ ie: $5 \text{ cm} \times 10 \text{ cm}$
 $0.05 \text{ m} \times 0.1 \text{ m}$ ↗

15. Each object has the shape of a rectangular prism, but one face or parts of faces are missing. Find each surface area.



$$1 \times 10 \times 10 = 100$$

$$4 \times 10 \times 10 - 4 \times 4 \times 4 = 336$$

$$\boxed{436 \text{ cm}^2}$$

(no top)

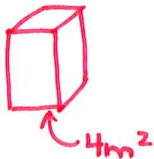
$$1 \times 18 \times 10 = 180$$

$$2 \times 18 \times 25 = 900$$

$$2 \times 10 \times 25 = 500$$

$$\boxed{1580 \text{ cm}^2}$$

16. Take It Further A right rectangular prism has a square base with area 4 m^2 . The surface area of the prism is 48 m^2 . What are the dimensions of the prism?



$$48 - 2(4) = 40 \text{ m}^2 \div 4 = 10 \text{ m}^2$$

$$\quad \quad \quad \wedge$$

$$\quad \quad \quad 2 \times 5$$

Dimensions: $\boxed{2 \times 2 \times 5 \text{ m}}$

17. Take It Further A right rectangular prism has faces with these areas: 12 cm^2 , 24 cm^2 , and 18 cm^2 . What are the dimensions of the prism? How did you find out?

12	24	18
\wedge	\wedge	\wedge
1×12	1×24	1×18
2×6	2×12	2×9
$\boxed{3 \times 4}$	3×8	$\boxed{3 \times 6}$
	$\boxed{4 \times 6}$	

