

Lesson 14.1:

Surface Areas of Prisms

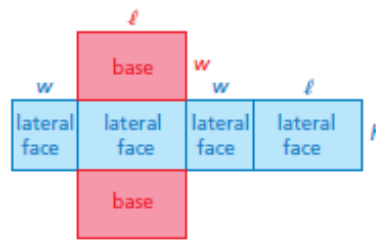
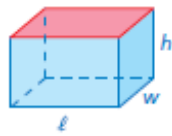
Essential Question

How can you find the surface area of a prism?

 **Key Idea** Refers to the shape of the base

Surface Area of a Rectangular Prism

Words The surface area S of a rectangular prism is the sum of the areas of the bases and the lateral faces.

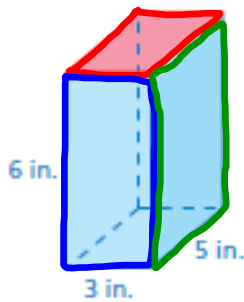


Algebra $S = 2\ell w + 2\ell h + 2wh$

↑
Areas of
bases

↑ ↑
Areas of
lateral faces

Find the surface area of the prism.



$$2(3\text{ in.} \cdot 5\text{ in.}) + 2(3\text{ in.} \cdot 6\text{ in.}) + 2(5\text{ in.} \cdot 6\text{ in.})$$

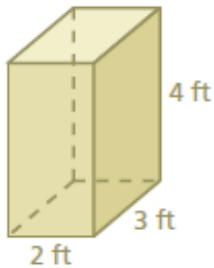
$$2(15\text{ in}^2) + 2(18\text{ in}^2) + 2(30\text{ in}^2)$$

$$30\text{ in}^2 + 36\text{ in}^2 + 60\text{ in}^2$$

$$\boxed{126\text{ in}^2}$$

Find the surface area of the prism.

1.



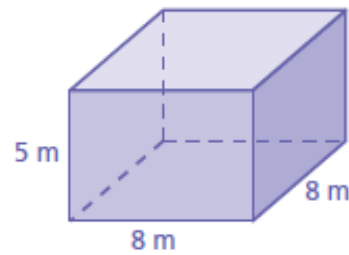
$$2(2\text{ft} \cdot 3\text{ft}) + 2(2\text{ft} \cdot 4\text{ft}) + 2(3\text{ft} \cdot 4\text{ft})$$

$$2(6\text{ft}^2) + 2(8\text{ft}^2) + 2(12\text{ft}^2)$$

$$12\text{ft}^2 + 16\text{ft}^2 + 24\text{ft}^2$$

$$\boxed{52\text{ft}^2}$$

2.



$$2(8\text{m} \cdot 8\text{m}) + 4(5\text{m} \cdot 8\text{m})$$

$$2(64\text{m}^2) + 4(40\text{m}^2)$$

$$128\text{m}^2 + 160\text{m}^2$$

$$\boxed{288\text{m}^2}$$

Key Idea

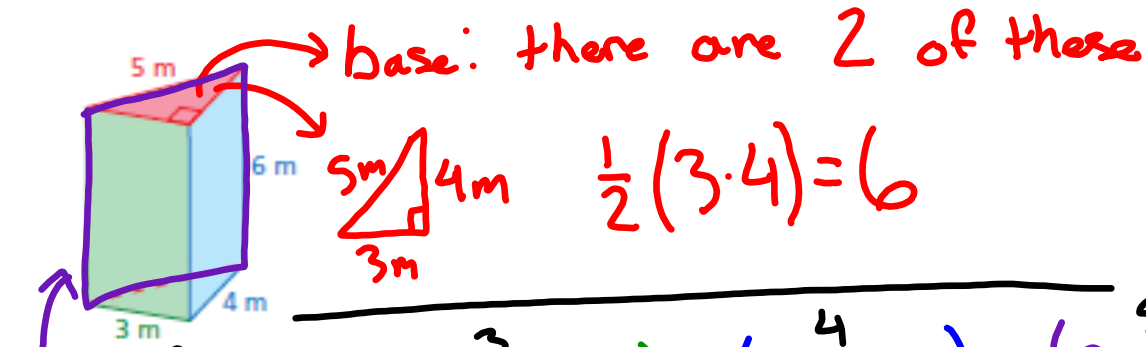
Surface Area of a Prism

The surface area S of any prism is the sum of the areas of the bases and the lateral faces.

$$S = \text{areas of bases} + \text{areas of lateral faces}$$

Find the surface area of the prism.

5 total surfaces



base: there are 2 of these

$$\frac{1}{2}(3 \cdot 4) = 6$$

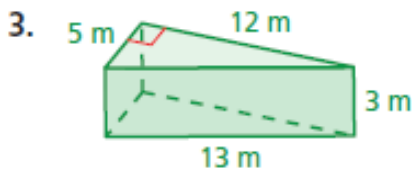
Don't forget this one!

$$2(6m^2) + (3m \cdot 6m) + (4m \cdot 6m) + (5m \cdot 6m)$$

$$12m^2 + 18m^2 + 24m^2 + 30m^2$$

$$= \boxed{84m^2}$$

Find the surface area of the prism.



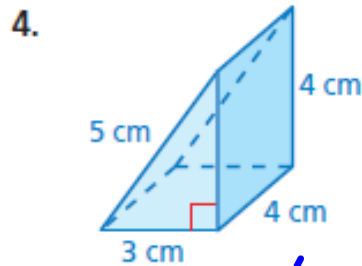
$$\frac{1}{2}(13 \cdot 5) = 30$$

$$30 + 30 + (5 \cdot 3) + (12 \cdot 3) + (13 \cdot 3)$$

2 bases 3 faces

$$60 + 15 + 36 + 39$$

$$\boxed{150m^2}$$



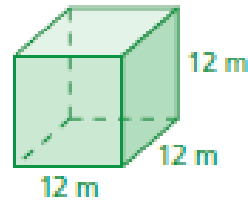
$$2\left(\frac{1}{2} \cdot 3 \cdot 4\right) + (4 \cdot 4) + (3 \cdot 4) + (4 \cdot 5)$$

2 bases 3 faces

$$12 + 16 + 12 + 20$$

$$\boxed{60cm^2}$$

Find the surface area of the cube.



In a cube, there are **6** identical faces:

$$6(12\text{m} \cdot 12\text{m}) = 6(144\text{m}^2) = \boxed{864\text{m}^2}$$

The outsides of purple traps are coated with glue to catch emerald ash borers. You make your own trap in the shape of a rectangular prism with an open top and bottom. What is the surface area that you need to coat with glue.

Here, we have two $12\text{in} \times 20\text{in}$ faces and two $10\text{in} \times 20\text{in}$ faces. When the bases are excluded, this is called LATERAL SURFACE AREA.

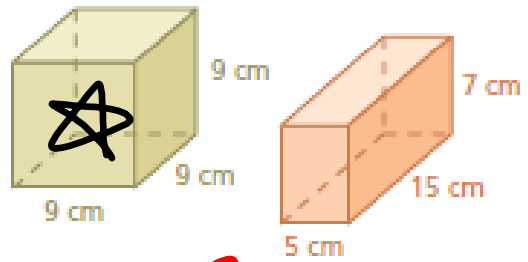


$$\begin{aligned} &2(12\text{in} \cdot 20\text{in}) + 2(10\text{in} \cdot 20\text{in}) \\ &2(240\text{in}^2) + 2(200\text{in}^2) \\ &480\text{in}^2 + 400\text{in}^2 \end{aligned}$$

$$\boxed{880\text{in}^2}$$

5. Which prism has the greater surface area?

$$6(9 \cdot 9) = 6(81) = 486 \text{ cm}^2$$



$$2(5 \cdot 7) + 2(15 \cdot 7) + 2(5 \cdot 15)$$

$$2(35) + 2(105) + 2(75)$$

$$70 + 210 + 150$$

$$430 \text{ cm}^2$$