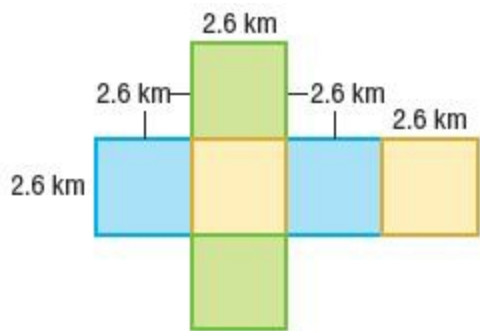


10-3 Surface Area of Rectangular Prisms

Find the surface area of the rectangular prism.



2.

SOLUTION:

Find the area of each pair of faces.

$$\text{front and back: } 2(2.6 \cdot 2.6) = 13.52$$

$$\text{top and bottom: } 2(2.6 \cdot 2.6) = 13.52$$

$$\text{sides: } 2(2.6 \cdot 2.6) = 13.52$$

Find the sum of the areas.

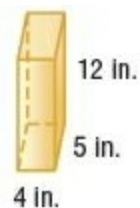
$$13.52 + 13.52 + 13.52 = 40.56$$

The surface area of the prism is 40.56 square kilometers.

ANSWER:

$$40.56 \text{ km}^2$$

4.



SOLUTION:

$$S.A. = 2lh + 2lw + 2hw$$

$$S.A. = 2(4)(12) + 2(4)(5) + 2(12)(5)$$

$$S.A. = 96 + 40 + 120$$

$$S.A. = 256$$

The surface area is 256 square inches.

ANSWER:

$$256 \text{ in}^2$$

10-3 Surface Area of Rectangular Prisms

6. **Justify Conclusions** Martina estimates that the surface area of a rectangular prism with a length of 13.2 feet, a width of 6 feet, and a height of 8 feet is about 460 square feet. Is her estimate reasonable? Explain your reasoning.

SOLUTION:

Use an estimate of 13 for the length.

$$S.A. = 2lh + 2lw + 2hw$$

$$S.A. = 2(13)(8) + 2(13)(6) + 2(8)(6)$$

$$S.A. = 208 + 156 + 96$$

$$S.A. = 460$$

The approximate surface area of the rectangular prism is 460 square feet. So, Martina's estimate is reasonable.

ANSWER:

Yes; the approximate surface area of the rectangular prism is $(2 \times 13 \times 6) + (2 \times 13 \times 8) + (2 \times 6 \times 8)$ or 460 ft^2 .

8. **Model with Mathematics** Refer to the graphic novel frame below for Exercises a–c. (Hint: The boxes are missing the top face.)



- The box on the left is 8 inches long, 8 inches wide, and 8 inches tall. What is the surface area of the box?
- The box on the right is 8 inches long, 6 inches wide, and 10 inches tall. What is the surface area of the box?
- How much more surface area does the larger container have?

SOLUTION:

10-3 Surface Area of Rectangular Prisms

a. Since there is no top to the box, change the formula to lw instead of $2lw$.

$$S.A. = 2lh + lw + 2hw$$

$$S.A. = 2(8)(8) + (8)(8) + 2(8)(8)$$

$$S.A. = 128 + 64 + 128$$

$$S.A. = 320$$

The surface area of the left box is 320 square inches.

b.

$$S.A. = 2lh + lw + 2hw$$

$$S.A. = 2(8)(10) + (8)(6) + 2(10)(6)$$

$$S.A. = 160 + 48 + 120$$

$$S.A. = 328$$

The surface area of the right box is 328 square inches.

c. The larger container has $328 - 320$ or 8 square inches more.

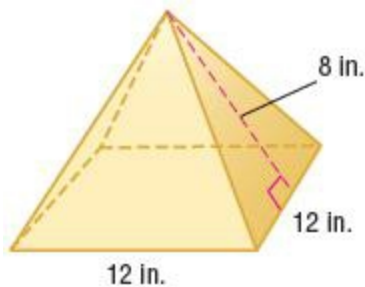
ANSWER:

a. 320 in^2

b. 328 in^2

c. 8 in^2

Persevere with Problems All of the triangular faces of the figure are congruent.



10. Use what you know about finding the surface area of a rectangular prism to find the surface area of the square pyramid.

SOLUTION:

There are 4 triangular sides and 1 square base. Multiply 4 by the area of one side to find the surface area of the triangular sides, then add the area of the base.

$$4 \times 48 = 192$$

$$192 + 144 = 336$$

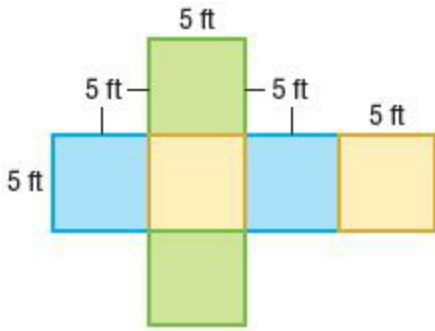
The surface area of the square pyramid is 336 square inches

ANSWER:

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

10-3 Surface Area of Rectangular Prisms

Find the surface area of the rectangular prism.



12.

SOLUTION:

Find the area of each pair of faces.

$$\text{front and back: } 2(5)(5) = 50$$

$$\text{top and bottom: } 2(5)(5) = 50$$

$$\text{sides: } 2(5)(5) = 50$$

Find the sum of the areas.

$$50 + 50 + 50 = 150$$

The surface area of the prism is 150 square feet.

ANSWER:

$$150 \text{ ft}^2$$

14.



SOLUTION:

$$S.A. = 2lh + 2lw + 2hw$$

$$S.A. = 2(7)(3) + 2(7)(5) + 2(3)(5)$$

$$S.A. = 42 + 70 + 30$$

$$S.A. = 142$$

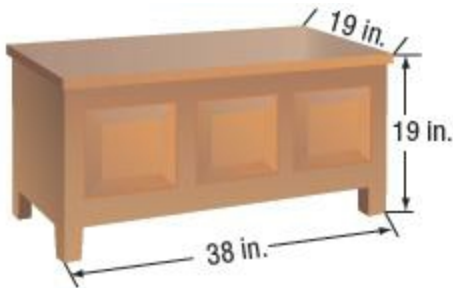
The surface area is 142 square feet.

ANSWER:

$$142 \text{ ft}^2$$

10-3 Surface Area of Rectangular Prisms

16. Nadine is going to paint her younger sister's toy chest, including the bottom. What is the approximate surface area that she will paint?



SOLUTION:

$$S.A. = 2lh + 2lw + 2hw$$

$$S.A. = 2(38)(19) + 2(38)(19) + 2(19)(19)$$

$$S.A. = 1,444 + 1,444 + 722$$

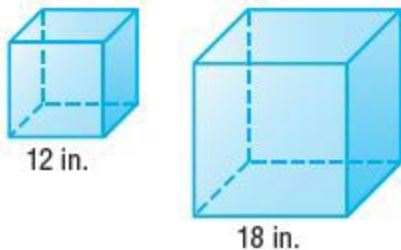
$$S.A. = 3,610$$

The surface area of the toy chest is 3,610 square inches.

ANSWER:

$$3,610 \text{ in}^2$$

18. A company is experimenting with two new boxes for packaging merchandise. Each box is a cube with the side lengths shown.



Select the correct values to complete each statement.

2	9
3	864
4	1,728
6	1,944
8	5,832

- a. The surface area of the smaller box is square inches.
- b. The surface area of the larger box is square inches.
- c. The ratio of the side lengths of the smaller box to the side lengths of the larger box, in lowest terms, is to .
- d. The ratio of the surface area of the smaller box to the surface area of the larger box, in lowest terms, is to .

10-3 Surface Area of Rectangular Prisms

Are the ratios in parts c and d the same? Did you expect them to be the same explain your reasoning.

SOLUTION:

a. Surface Area of Smaller Box

$$S.A. = 2lh + 2lw + 2hw$$

$$S.A. = 2(12)(12) + 2(12)(12) + 2(12)(12)$$

$$S.A. = 288 + 288 + 288$$

$$S.A. = 864$$

The surface area of the smaller box is 864 square inches.

b. Surface Area of Larger Box

$$S.A. = 2lh + 2lw + 2hw$$

$$S.A. = 2(18)(18) + 2(18)(18) + 2(18)(18)$$

$$S.A. = 648 + 648 + 648$$

$$S.A. = 1,944$$

The surface area of the larger box is 1,944 square inches.

c. The ratio of the side lengths of the smaller box to the ratio of the side lengths of the larger box is $\frac{12}{18}$. Reduce the fraction. $\frac{12}{18} = \frac{12 \div 6}{18 \div 6} = \frac{2}{3}$.

d. The ratio of the surface area of the smaller box to the surface area of the larger box is $\frac{864}{1944}$. Reduce the fraction.

$$\begin{aligned} \frac{864}{1944} &= \frac{864 \div 216}{1944 \div 216} \\ &= \frac{4}{9} \end{aligned}$$

no; Sample answer: No, since to find the surface area, the side lengths are squared for each face. It makes sense that the ratios are different.

ANSWER:

a. 864

b. 1944

c. 2 to 3

d. 4 to 9

no; Sample answer: No, since to find the surface area, the side lengths are squared for each face. It makes sense that the ratios are different.

10-3 Surface Area of Rectangular Prisms

Add or multiply.

20. 14×16

SOLUTION:

$$14 \times 16 = 224$$

ANSWER:

224

22. 27×63

SOLUTION:

$$\begin{array}{r} 27 \\ \times 63 \\ \hline 81 \\ 1620 \\ \hline 1701 \end{array}$$

ANSWER:

1,701