Applications Connections Extensions

ACE

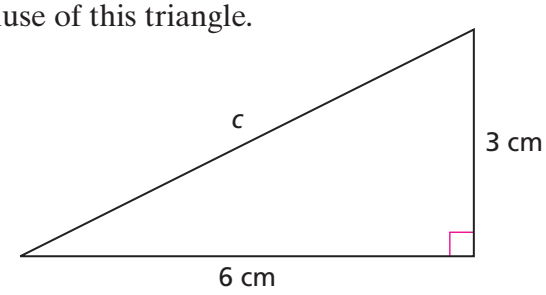
Applications

1. A right triangle has legs of length 5 inches and 12 inches.

a. Find the area of a square drawn on the hypotenuse of the triangle.

b. What is the length of the hypotenuse?

2. Use the Pythagorean Theorem to find the length of the hypotenuse of this triangle.



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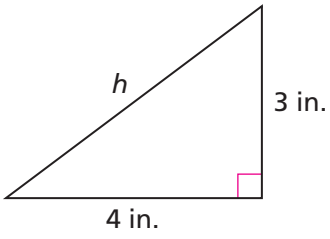
3. On dot paper, find two points that are $\sqrt{17}$ units apart. Label the points W and X. Explain how you know the distance between the points is $\sqrt{17}$ units.

4. On dot paper, find two points that are $\sqrt{20}$ units apart. Label the points Y and Z. Explain how you know the distance between the points is $\sqrt{20}$ units.

Find the missing length(s).

5.



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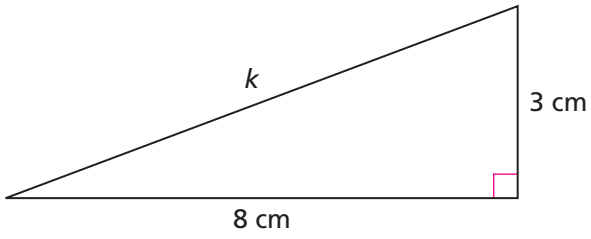

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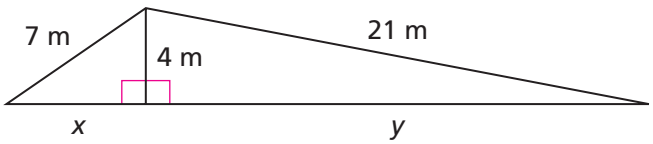


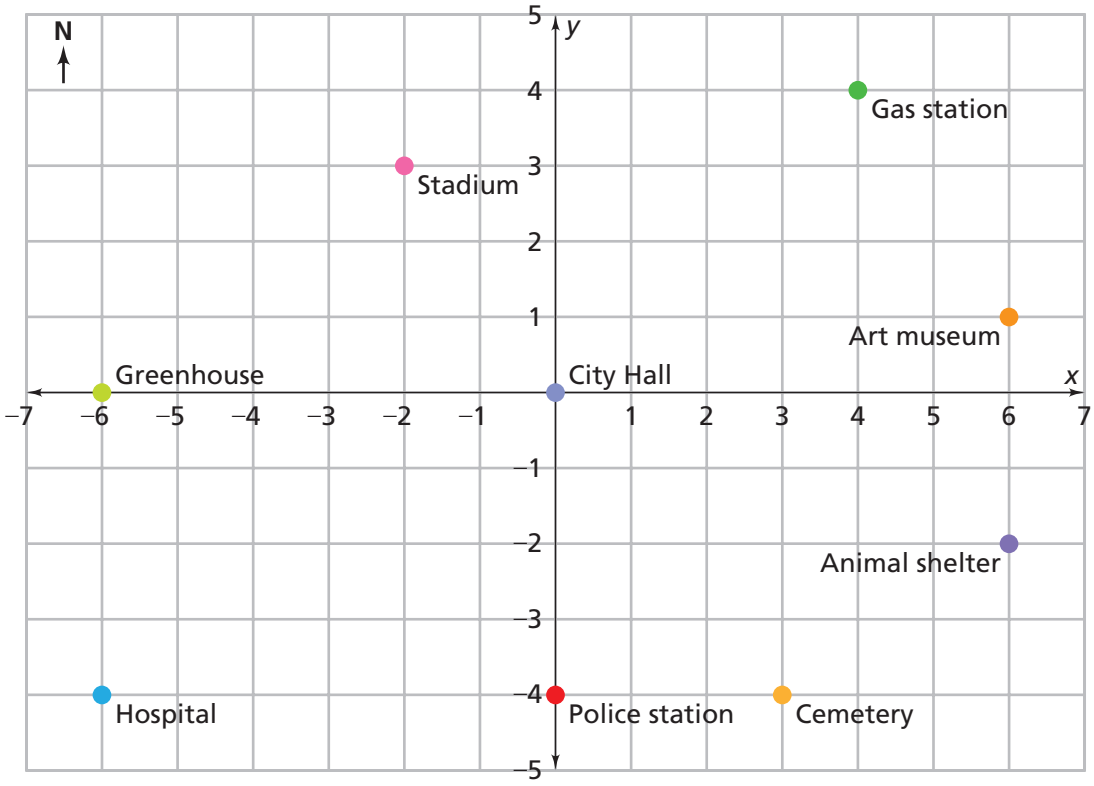
For Exercises 8–11, use the map of Euclid. Find the flying distance in blocks between the two landmarks without using a ruler. Explain.

8. greenhouse and stadium

9. police station and art museum

10. greenhouse and hospital

11. City Hall and gas station



12. Multiple Choice Refer to the map above. Which landmarks are $\sqrt{40}$ blocks apart?

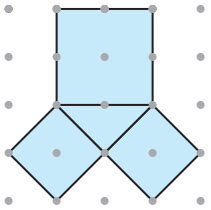
A. greenhouse and stadium

B. City Hall and art museum

C. hospital and art museum

D. animal shelter and police station

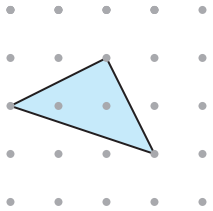
13. The diagram at the right shows a right triangle with a square on each side.



a. Find the areas of the three squares.

b. Use the areas from part (a) to show that this triangle satisfies the Pythagorean Theorem.

14. Show that this triangle satisfies the Pythagorean Theorem.



15. **Multiple Choice** Choose the set of side lengths that could make a right triangle.

F. 10 cm, 24 cm, 26 cm

G. 4 cm, 6 cm, 10 cm

H. 5 cm, 10 cm, $\sqrt{50}$ cm

J. 8 cm, 9 cm, 15 cm

Tell whether the triangle with the given side lengths is a right triangle.

16. 10 cm, 10 cm, $\sqrt{200}$ cm

17. 9 in., 16 in., 25 in.

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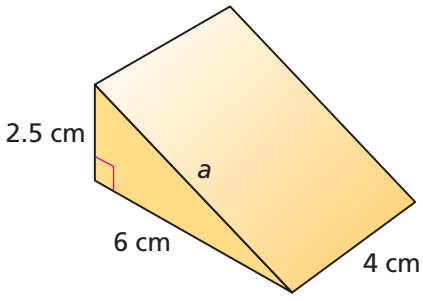
Connections

18. The prism at the right has a base that is a right triangle.



a. What is the length of a?

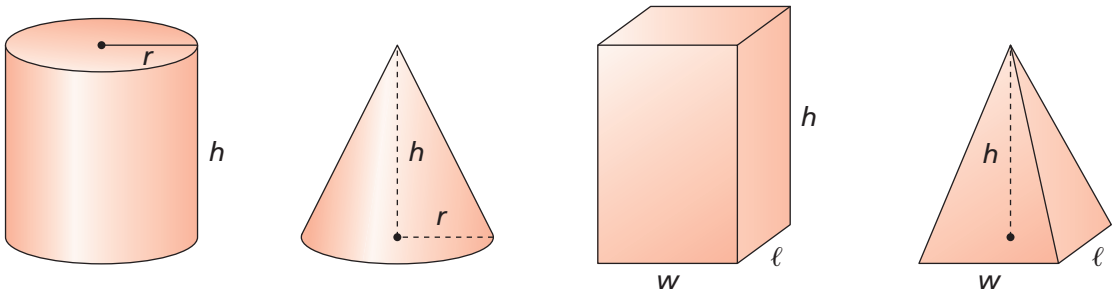
b. Do you need to know the length of a to find the volume of the prism? Do you need to know it to find the surface area? Explain.

c. What is the volume?

d. What is the surface area?

e. Sketch a net for the prism.

For Exercises 19–22, refer to the figures below.



Cylinder Cone Prism Pyramid

19. Multiple Choice Which expression represents the volume of the cylinder?

A. $2\pi r^2 + 2\pi rh$ **B.** $\pi r^2 h$ **C.** $\frac{1}{3}\pi r^2 h$ **D.** $\frac{1}{2}\pi r^2 h$

20. Multiple Choice Which expression represents the volume of the cone?

F. $2\pi r^2 + 2\pi rh$ **G.** $\pi r^2 h$ **H.** $\frac{1}{3}\pi r^2 h$ **J.** $\frac{1}{2}\pi r^2 h$

21. Multiple Choice Which expression represents the volume of the prism?

A. $2(\ell w + \ell h + wh)$ **B.** ℓwh

C. $\frac{1}{3}\ell wh$ **D.** $\frac{1}{2}\ell wh$

22. Multiple Choice Which expression represents the volume of the pyramid?

F. $2(\ell w + \ell h + wh)$ **G.** ℓwh

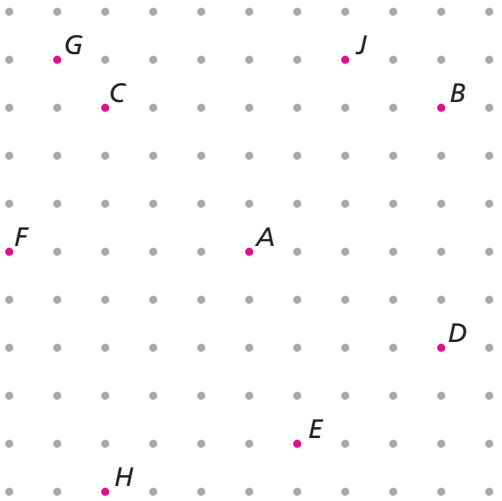
H. $\frac{1}{3}\ell wh$ **J.** $\frac{1}{2}\ell wh$

23. In the city of Euclid, Hilary's house is located at $(5, -3)$, and Jamilla's house is located at $(2, -4)$.

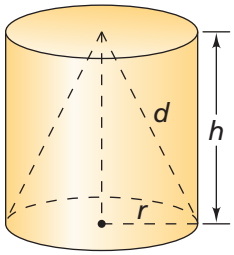
a. Without plotting points, find the shortest driving distance in blocks between the two houses.

b. What is the exact flying distance between the two houses?

24. Which labeled point is the same distance from point A as point B is from point A? Explain.



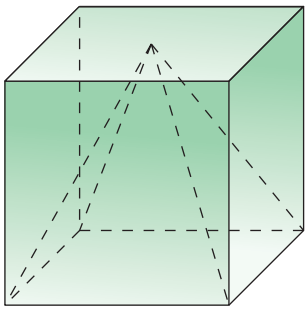
25. In the drawing at right, the cone and the cylinder have the same height and radius. Suppose the radius r of the cone is 2 units and the slant height d is $\sqrt{29}$ units.



a. What is the height of the cone?

b. What is the volume of the cone?

26. In the drawing below, the pyramid and the cube have the same height and base.



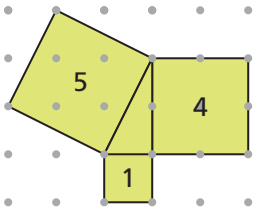
a. Suppose the edge length of the cube is 6 units. What is the volume of the pyramid?

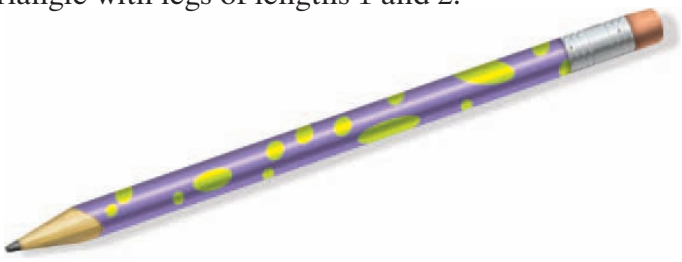
b. Suppose the edge length of the cube is x units. What is the volume of the pyramid?

Extensions

27. Any tilted segment that connects two dots on dot paper can be the hypotenuse of a right triangle. You can use this idea to draw segments of a given length. The key is finding two square numbers with a sum equal to the square of the length you want to draw.

For example, suppose you want to draw a segment with length $\sqrt{5}$ units. You can draw a right triangle in which the sum of the areas of the squares on the legs is 5. The area of the square on the hypotenuse will be 5 square units, so the length of the hypotenuse will be $\sqrt{5}$ units. Because 1 and 4 are square numbers, and $1 + 4 = 5$, you can draw a right triangle with legs of lengths 1 and 2.





a. To use this method, it helps to be familiar with sums of square numbers. Copy and complete the addition table to show the sums of pairs of square numbers.

+	1	4	9	16	25	36	49	64
1	2	5						
4	5							
9								
16								
25								
36								
49								
64								

For parts (b)–(d) find two square numbers with the given sum.

b. 10 **c.** 25 **d.** 89

For parts (e)–(h), draw tilted segments with the given lengths on dot paper. Use the addition table to help you. Explain your work.

e. $\sqrt{26}$ units **f.** 10 units

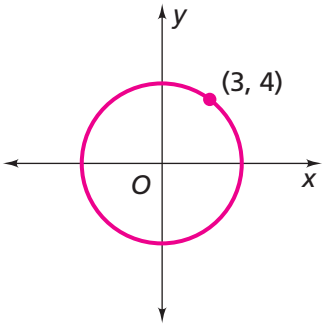
g. $\sqrt{10}$ units **h.** $\sqrt{50}$ units

For Exercises 28–33, tell whether it is possible to draw a segment of the given length by connecting dots on dot paper. Explain.

28. $\sqrt{2}$ units **29.** $\sqrt{3}$ units **30.** $\sqrt{4}$ units

31. $\sqrt{5}$ units **32.** $\sqrt{6}$ units **33.** $\sqrt{7}$ units

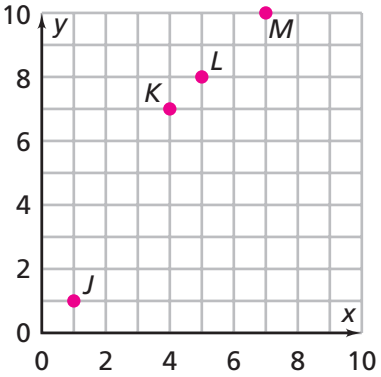
34. Ryan looks at the diagram below. He says, "If the center of this circle is at the origin, then I can figure out the radius."



a. Explain how Ryan can find the radius.

b. What is the radius?

35. Use the graph to answer parts (a)–(c).



a. Find the coordinates of J and K.

b. Use the coordinates to find the distance from J to K. Explain your method.

c. Use your method from part (b) to find the distance from L to M.