Applications Connections Extensions ACE

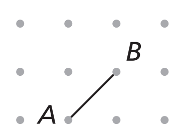
Applications

1. Find the area of every square that can be drawn by connecting dots on a 3 dot-by-3 dot grid.

2. On dot paper, draw a hexagon with an area of 16 square units.

3. On dot paper, draw a square with an area of 2 square units. Write an argument to convince a friend that the area is 2 square units.

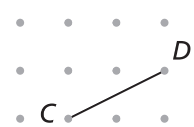
4. Consider segment AB at right.



a. On dot paper, draw a square with side AB. What is the area of the square?

b. Use a calculator to estimate the length of segment AB.

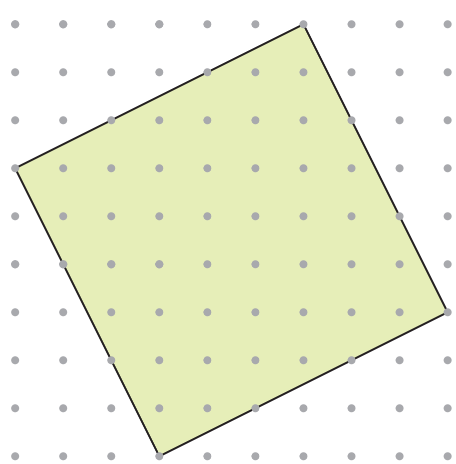
5. Consider segment CD at right.



a. On dot paper, draw a square with side CD. What is the area of the square?

b. Use a calculator to estimate the length of segment CD.

6. Find the area and the side length of this square.



For Exercises 7–34, do not use the $\sqrt{\ }$ key on your calculator.

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For Exercises 7–9, estimate each square root to one decimal place.

7. $\sqrt{11}$ **8.** $\sqrt{30}$ **9.** $\sqrt{172}$

10. Multiple Choice Choose the pair of numbers $\sqrt{15}$ is between.

A. 3.7 and 3.8 **B.** 3.8 and 3.9 **C.** 3.9 and 4.0 **D.** 14 and 16

Find exact values for each square root.

11. $\sqrt{144}$ **12.** $\sqrt{0.36}$ **13.** $\sqrt{961}$

Find the two consecutive whole numbers the square root is between. Explain.

14. $\sqrt{27}$ **15.** $\sqrt{1{,}000}$

Tell whether each statement is true.

16. $6 = \sqrt{36}$ **17.** $1.5 = \sqrt{2.25}$ **18.** $11 = \sqrt{101}$

Find the missing number.

19. $\sqrt{\blacksquare} = 81$ **20.** $14 = \sqrt{\blacksquare}$ **21.** $\blacksquare = \sqrt{28.09}$

22. $\sqrt{\blacksquare} = 3.2$ **23.** $\sqrt{\blacksquare} = \frac{1}{4}$ **24.** $\sqrt{\frac{4}{9}} = \blacksquare$

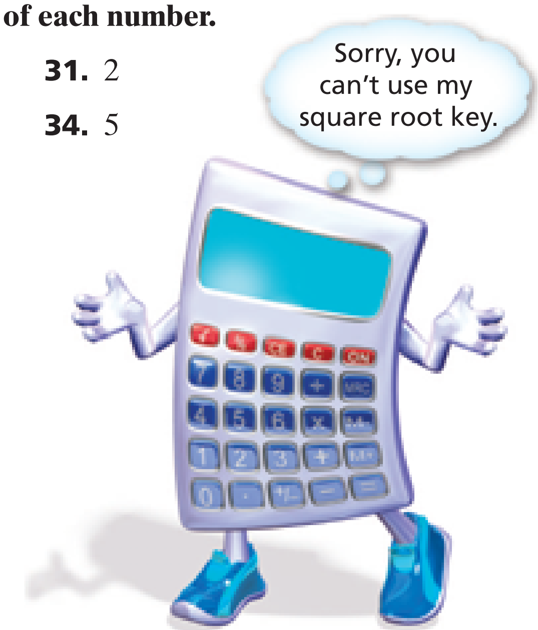
Find each product.

25. $\sqrt{2} \cdot \sqrt{2}$ **26.** $\sqrt{3} \cdot \sqrt{3}$ **27.** $\sqrt{4} \cdot \sqrt{4}$ **28.** $\sqrt{5} \cdot \sqrt{5}$

Give both the positive and negative square roots of each number.

29. 1 **30.** 4 **31.** 2

32. 16 **33.** 25 **34.** 5



35. Find the length of every line segment that can be drawn by connecting dots on a 3 dot-by-3 dot grid.

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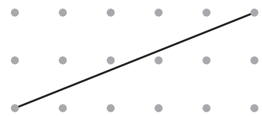
36. Consider this segment.

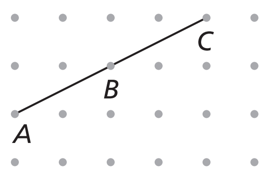


a. Express the exact length of the segment, using the $\sqrt{\ }$ symbol.

b. What two consecutive whole numbers is the length of the segment between?

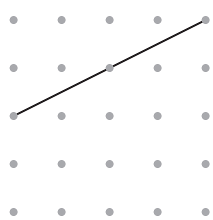
37. Show that $2\sqrt{5}$ is equal to $\sqrt{20}$ by finding the length of line segment *AC* in two ways:

- Find the length of *AB*. Use the result to find the length of *AC*.
- Find the length of *AC* directly, as you did in Problem 2.3.



38. **Multiple Choice** Which line segment has a length of $\sqrt{17}$ units?

F.



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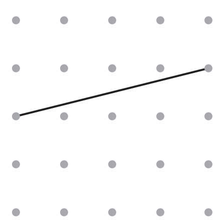
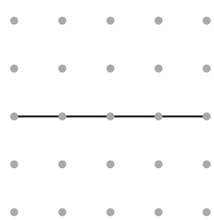
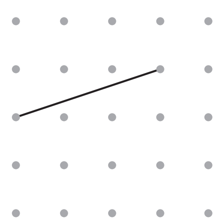


H.

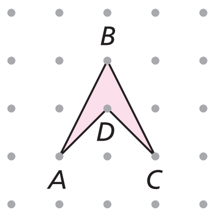


J.

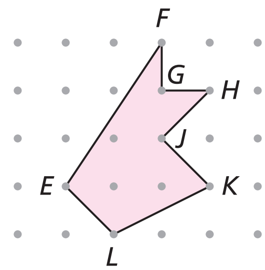


For Exercises 39 and 40, find the length of each side of the figure.

39.



40.

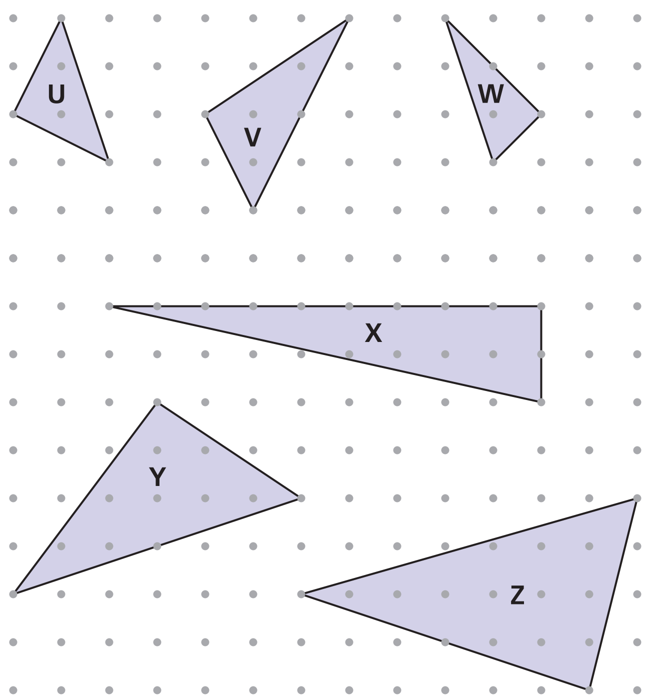


41. Put the following set of numbers in order on a number line.

2.3	$2\frac{1}{4}$	$\sqrt{5}$	$\sqrt{2}$	$\frac{5}{2}$	$\sqrt{4}$
4	-2.3	$-2\frac{1}{4}$	$\frac{4}{2}$	$-\frac{4}{2}$	2.09

Connections

42. a. Which of the triangles below are right triangles? Explain.



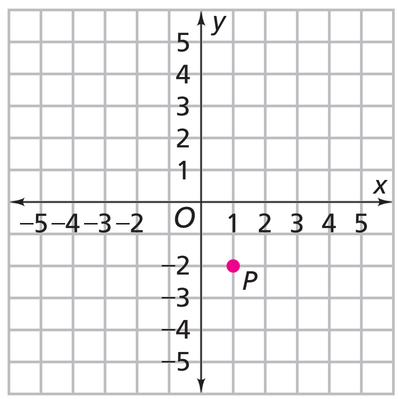
b. Find the area of each right triangle.

43. Refer to the squares you drew in Problem 2.1.

a. Give the perimeter of each square to the nearest hundredth of a unit.

b. What rule can you use to calculate the perimeter of a square if you know the length of a side?

44. On grid paper, draw coordinate axes like the ones below. Plot point P at $(1, -2)$.

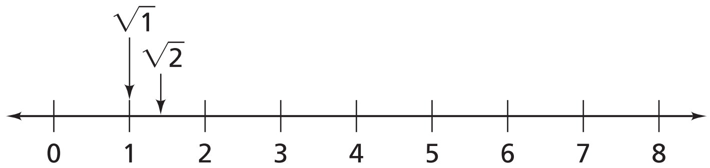


a. Draw a square $PQRS$ with an area of 10 square units.

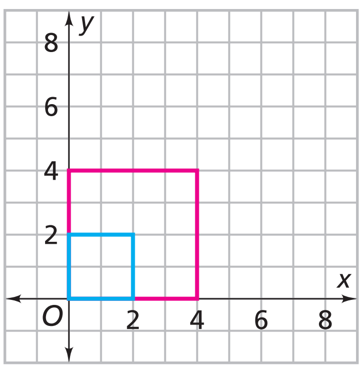
b. Name a vertex of your square that is $\sqrt{10}$ units from point P.

c. Give the coordinates of at least two other points that are $\sqrt{10}$ units from point P.

45. In Problem 2.3, you drew segments of length 1 unit, $\sqrt{2}$ units, 4 units, and so on. On a copy of the number line below, locate and label each length you drew. On the number line, $\sqrt{1}$ and $\sqrt{2}$ have been marked as examples.



46. In Problem 2.1, it was easier to find the "upright" squares. Two of these squares are represented on the coordinate grid.



a. Are these squares similar? Explain.

b. How are the coordinates of the corresponding vertices related?

c. How are the areas of the squares related?

d. Copy the drawing. Add two more "upright" squares with a vertex at (0, 0). How are the coordinates of the vertices of these new squares related to the 2×2 square? How are their areas related?

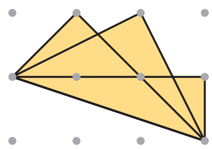
Extensions

47. On dot paper, draw a non-rectangular parallelogram with an area of 6 square units.

48. On dot paper, draw a triangle with an area of 5 square units.

49. Dalida claims that $\sqrt{8} + \sqrt{8}$ is equal to $\sqrt{16}$ because 8 plus 8 is 16. Is she right? Explain.

50. The drawing shows three right triangles with a common side.



a. Find the length of the common side.

b. Do the three triangles have the same area? Explain.

We know that $\sqrt{5} \cdot \sqrt{5} = \sqrt{5 \cdot 5} = \sqrt{25} = 5$. Tell whether each product is a whole number. Explain.

51. $\sqrt{2} \cdot \sqrt{50}$

52. $\sqrt{4} \cdot \sqrt{16}$

53. $\sqrt{4} \cdot \sqrt{6}$

Connections Extensions