PRACTICE & PROBLEM SOLVING

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Practice Tutorial

Additional Exercises Available Online

UNDERSTAND

20. Use Structure For $\sqrt{x^n}$, consider rewriting this expression without a perfect square factor in the radicand for even and odd values of n, where n is a positive integer.

a. What is the expression when n is even?

b. What is the expression when n is odd?

21. Error Analysis Describe and correct the error a student made in multiplying $2\sqrt{7x^2}$ by $2\sqrt{14x^3}$.

$$\begin{aligned} &2\sqrt{7x^2} \cdot 2\sqrt{14x^3} \\ &= 2 \cdot 2\sqrt{7x^2 \cdot 14x^3} \\ &= 4\sqrt{7 \cdot 2 \cdot 7 \cdot x \cdot x \cdot x \cdot x \cdot x} \\ &= 8 \cdot 7\sqrt{x^2 \cdot x^2 \cdot x} \\ &= 56x^2\sqrt{x} \end{aligned}$$

✗

22. Use Structure Find $\sqrt{591x^{15}y^3} \cdot \sqrt{591x^{15}y^3}$ without calculating or simplifying.

23. Communicate Precisely Why do the multiplication properties of exponents apply to radicals? Explain.

24. Make Sense and Persevere How many perfect squares are under each radical?

Radical	Perfect squares
$\sqrt{8}$	
$\sqrt{18}$	
$\sqrt{32x^6}$	
$\sqrt{50x}$	
$\sqrt{72}$	

25. Higher Order Thinking Can you use the Product Property of Square Roots to find equivalent expressions for each radical? Explain.

a. $\sqrt[3]{24x^8}$

b. $\sqrt[4]{3^9x^{13}}$

PRACTICE

Compare each pair of radical expressions. SEE EXAMPLE 1

26. $6\sqrt{3}$ and $\sqrt{108}$

27. $2\sqrt{21}$ and $4\sqrt{5}$

28. $40\sqrt{42}$ and $42\sqrt{40}$

29. $\frac{1}{2}\sqrt{120}$ and $\sqrt{30}$

30. $\sqrt{68}$ and $2\sqrt{18}$

31. $\sqrt{96}$ and $3\sqrt{15}$

Write each expression so the radicand has no perfect squares other than 1. SEE EXAMPLES 2 AND 3

32. $\sqrt{210}$

33. $\sqrt{250}$

34. $\sqrt{108}$

35. $2\sqrt{21}$

36. $\sqrt{98x^8}$

37. $\sqrt{200x^3}$

38. $\sqrt{32x^4y^3}$

39. $4x\sqrt{\frac{1}{4}x^6}$

Write each expression so the radicand has no perfect squares other than 1. SEE EXAMPLE 4

40. $\sqrt{12x} \cdot \sqrt{3x}$

41. $\sqrt{2x^9} \cdot \sqrt{26x^6}$

42. $\sqrt{27m} \cdot \sqrt{6m^{20}}$

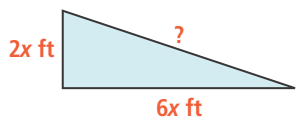
43. $\sqrt{2x^3} \cdot \sqrt{25x^2y}$

44. $\sqrt{9x^9} \cdot \sqrt{18x^3}$

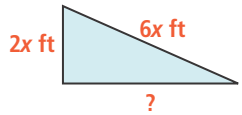
45. $\sqrt{32x} \cdot \sqrt{72x^{18}}$

Write an expression in simplest form for the missing side length. Then find the side lengths of each triangle to the nearest tenth when $x = 15$. SEE EXAMPLE 5

46.



47.



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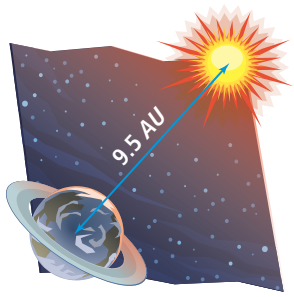
Mixed Review Available Online

APPLY

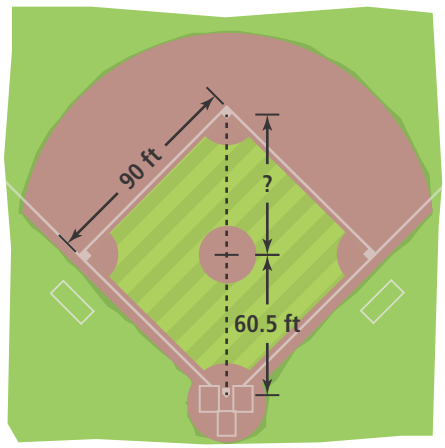
48. Use Structure The time it takes a planet to revolve around the sun in Earth years can be modeled by $t = \sqrt{d^3}$, where d is the average distance from the sun in astronomical units (AU).



a. Write an equivalent equation for the function.

b. How long does it take Saturn, pictured above, to orbit the sun? Show that both expressions give the same value.

49. Model With Mathematics A baseball "diamond" is a square that measures 90 ft on each side.



a. Write an expression for the distance from 2nd base to home plate in feet. What is this distance to the nearest tenth?

b. The pitcher standing on the pitcher's mound is about to throw to home plate but turns around and throws to 2nd base. How much farther is the throw? Explain.

50. Model With Mathematics A framed television has a ratio of width to height of about 1.732 : 1.

a. For a television with a height of h inches, what is an equivalent expression for the length of the diagonal? Justify your answer.

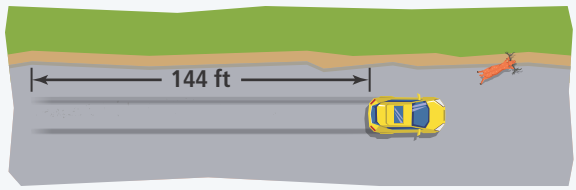
b. Write an expression for the perimeter.

ASSESSMENT PRACTICE

51. Copy and complete the table. Find the product of each row and column without a perfect square factor in the radicand and enter it in the appropriate cell.

	$\sqrt{48}$	$5x\sqrt{6x^3}$
$\sqrt{12}$		
$2x\sqrt{6x}$		
$4x^2\sqrt{2x^5}$		

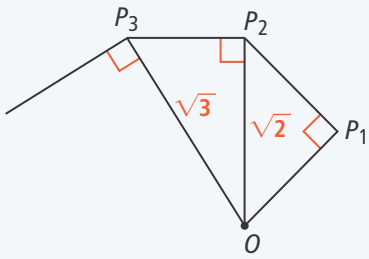
52. SAT/ACT A car skidded s ft when traveling on a damp paved road. The expression $r = \sqrt{18s}$ is an estimate of the car's rate of speed in ft/s.



Which expression represents the speed of the car in feet per second?

Ⓐ $24\sqrt{6}$
Ⓑ $12\sqrt{6}$
Ⓒ $36\sqrt{2}$
Ⓓ $24\sqrt{3}$
Ⓔ $48\sqrt{2}$

53. Performance Task Copy the figure. Center it on a large piece of paper so you can expand it.



Part A Use the pattern to complete the triangle on the left. Label the side lengths.

Part B Continue using the pattern to add triangles while labeling side lengths.

Part C Are equivalent expressions of the square roots appropriate? Explain your reasoning.