Chapter 11 Review Packet

Graphing Square Root Functions

Big Idea 1

You can graph a square root function $y = a\sqrt{x - h} + k$ and compare its graph with the graph of the parent function, $y = \sqrt{x}$, based on the constants a, h, and k.

Constant	Comparison of graphs
a	• When $a > 0$, the graph is a vertical stretch or shrink of the parent graph. • When $a < 0$, the graph is a vertical stretch or shrink with a reflection in the x-axis of the parent graph.
h	The graph is a horizontal translation of the parent graph.
k	The graph is a vertical translation of the parent graph.

Big Idea 2

Using Properties of Radicals in Expressions and Equations

You can use the properties of radicals to simplify radical expressions and to solve radical equations.

Product property of radicals	$\sqrt{ab} = \sqrt{a} \cdot \sqrt{b}$ where $a \geq 0$ and $b \geq 0$
Quotient property of radicals	$\sqrt{\frac{a}{b}} = \frac{\sqrt{a}}{\sqrt{b}}$ where $a \geq 0$ and $b > 0$

Big Idea 3

Working with Radicals in Geometry

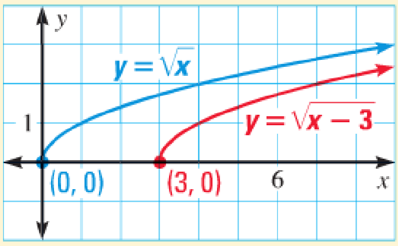
You can use radicals to solve problems involving the following geometric theorems and formulas.

Distance formula	$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$
Midpoint formula	$M\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

11.1 Graph Square Root Functions

Graph the function $y = \sqrt{x - 3}$ and identify its domain and range. Compare the graph with the graph of $y = \sqrt{x}$.

To graph the function, make a table, plot the points, and draw a smooth curve through the points. The domain is $x \geq 3$.

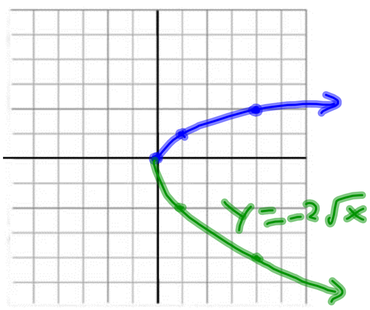


x	3	4	5	6
y	0	1	1.4	1.7

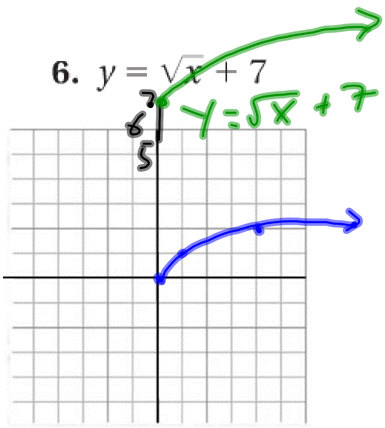
The range is $y \geq 0$. The graph of $y = \sqrt{x - 3}$ is a horizontal translation (of 3 units to the right) of the graph of $y = \sqrt{x}$.

Graph the function and identify its domain and range. Compare the graph with the graph of $y = \sqrt{x}$.

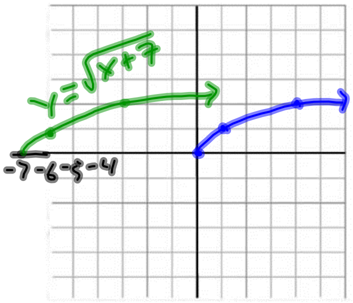
5. $y = -2\sqrt{x}$



6. $y = \sqrt{x} + 7$



7. $y = \sqrt{x + 7}$



11.2 Simplify Radical Expressions

Simplify $7\sqrt{5} - \sqrt{45}$.

$7\sqrt{5} - \sqrt{45}$	$= 7\sqrt{5} - \sqrt{9 \cdot 5}$	**Factor using perfect square factor.**
	$= 7\sqrt{5} - \sqrt{9} \cdot \sqrt{5}$	**Product property of radicals**
	$= 7\sqrt{5} - 3\sqrt{5}$	**Simplify.**
	$= 4\sqrt{5}$	**Simplify.**

Simplify the expression.

8. $\sqrt{98}$

$\sqrt{49 \cdot 2}$

$\sqrt{49} \cdot \sqrt{2}$

$7\sqrt{2}$

9. $\sqrt{121x^3}$

$\sqrt{121 \, x \cdot x \cdot x}$

$11x\sqrt{x}$

10. $\sqrt{7} \cdot \sqrt{21}$

$\sqrt{7 \cdot 21}$

$\sqrt{147}$

$\sqrt{49 \cdot 3}$

$7\sqrt{3}$

11. $\sqrt{7x} \cdot 7\sqrt{x}$

$7\sqrt{7x^2}$

$7x\sqrt{7}$

12. $\sqrt{\dfrac{5}{x^2}}$

$= \dfrac{\sqrt{5}}{\sqrt{x^2}}$

$= \dfrac{\sqrt{5}}{x}$

13. $\dfrac{2}{\sqrt{5}} \cdot \dfrac{\sqrt{5}}{\sqrt{5}}$

$= \dfrac{2\sqrt{5}}{5}$

14. $3\sqrt{2} - \sqrt{128}$

$\sqrt{64 \cdot 2}$

$3\sqrt{2} - 8\sqrt{2}$

$= -5\sqrt{2}$

15. $\sqrt{2}(7 - \sqrt{6})$

$7\sqrt{2} - \sqrt{12}$

$\sqrt{4 \cdot 3}$

$7\sqrt{2} - 2\sqrt{3}$

16. **GEOMETRY** The lateral surface area L of a square pyramid with height h and base length ℓ is given by $L = 2\ell\sqrt{0.25\ell^2 + h^2}$. Find L (in square feet) for a square pyramid that has a height of 4 feet and a base length of 4 feet.

$L = 2(4)\sqrt{0.25(4)^2 + (4)^2}$

$= 8\sqrt{.25(16) + 16}$

$= 8\sqrt{4 + 16}$

$= 8\sqrt{20}$

$8\sqrt{20}$

$\sqrt{4 \cdot 5}$

$16\sqrt{5}$

11.3 Solve Radical Equations

Solve $\sqrt{x+90} = x$.

$\sqrt{x+90} = x$	Write original equation.
$\left(\sqrt{x+90}\right)^2 = x^2$	Square each side.
$x + 90 = x^2$	Simplify.
$0 = x^2 - x - 90$	Write in standard form.
$0 = (x-10)(x+9)$	Factor.
$x - 10 = 0$ *or* $x + 9 = 0$	Zero-product property
$x = 10$ *or* $x = -9$	Solve for *x*.

▶ Checking 10 and -9 in the original equation shows that -9 is an extraneous solution. The only solution of the equation is 10.

Solve the equation. Check for extraneous solutions.

17. $\sqrt{x} - 28 = 0$

$\sqrt{x} = 28$

$(\sqrt{x})^2 = (28)^2$

$x = 784$

18. $8\sqrt{x-5} + 34 = 58$

$8\sqrt{x-5} = 24$

$\sqrt{x-5} = 3$

$(\sqrt{x-5})^2 = (3)^2$

$x - 5 = 9$

$x = 14$

19. $\sqrt{5x-3} = \sqrt{x+17}$

$(\sqrt{5x-3})^2 = (\sqrt{x+17})^2$

$5x - 3 = x + 17$

$4x - 3 = 17$

$4x = 20$

$x = 5$

11.5 Apply the Distance and Midpoint Formulas

Find the distance between (−3, 8) and (5, −12).

Let $(x_1, y_1) = (-3, 8)$ and $(x_2, y_2) = (5, -12)$.

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \quad \text{Distance formula}$$

$$= \sqrt{(5 - (-3))^2 + (-12 - 8)^2} \quad \text{Substitute.}$$

$$= \sqrt{464} = 4\sqrt{29} \quad \text{Simplify.}$$

Find the distance between the two points.

30. $(-1, -3), (9, -13)$

$= \sqrt{(9-(-1))^2 + (-13-(-3))^2}$

$= \sqrt{10^2 + (-10)^2}$

$= \sqrt{100 + 100}$

$= \sqrt{200}$

$= 10\sqrt{2}$

31. $(-8, -4), (0, 2)$

$= \sqrt{(-8-0)^2 + (-4-2)^2}$

$= \sqrt{(-8)^2 + (-6)^2}$

$= \sqrt{64 + 36}$

$= \sqrt{100}$

$= 10$

32. $(7, 1), (4, -0.25)$

$= \sqrt{(7-4)^2 + (1-(-0.25))^2}$

$= \sqrt{(3)^2 + (1.25)^2}$

$= \sqrt{9 + 1.5625}$

$= \sqrt{10.5625}$

Find the midpoint of the line segment with the given endpoints.

33. $(-2, -4), (9, -4)$

$\frac{-2+9}{2}, \frac{-4+(-4)}{2}$

$\left(\frac{7}{2}, -4\right)$

34. $(-8, 0), (-8, 2)$

$\frac{-8+(-8)}{2}, \frac{0+2}{2}$

$(-8, 1)$

35. $(6, 1), (4, -5)$

$\frac{6+4}{2}, \frac{1+(-5)}{2}$

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