Precalculus Honors
Prerequisites Toolkit

Name: ______________________
Date: ______________________
Period:____

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Properties of Exponents

Property	Examples	
$x^m x^n = x^{m+n}$ for all x	$x^3 x^4 = x^{3+4} = x^7$	$2^5 \cdot 2^{-1} = 2^4$
$\frac{x^m}{x^n} = x^{m-n}$ for $x \neq 0$	$x^{10} \div x^4 = x^{10-4} = x^6$	$\frac{5^4}{5^7} = 5^{-3}$
$(x^m)^n = x^{mn}$ for all x	$(x^4)^3 = x^{4(3)} = x^{12}$	$(10^5)^6 = 10^{30}$
$x^0 = 1$ for $x \neq 0$	$\frac{y^2}{y^2} = y^0 = 1$	$9^0 = 1$
$x^{-n} = \frac{1}{x^n}$ for $x \neq 0$	$x^{-2} = \frac{1}{x^2}$	$3^{-1} = \frac{1}{3}$
$x^{m/n} = \sqrt[n]{x^m}$ for $n \neq 0$	$x^{4/5} = \sqrt[5]{x^4}$	$8^{2/3} = \sqrt[3]{8^2} = \sqrt[3]{64} = 4$

Point-Slope Form of a Line

The equation of a line with slope m that passes through the point (x_1, y_1) is written in **point-slope form** as $y - y_1 = m(x - x_1)$.

Example: The equation of a line that has a slope of $-\frac{2}{7}$ that passes through the point $(-1, 5)$ can be written as $y - 5 = -\frac{2}{7}(x + 1)$.

Notice that the "break" in the function is at $x = 3$. $x = 3$ is included in both sections of the table. One section of the graph has an open circle at $x = 3$, while the other section has a closed circle.

Rewriting Radical Expressions

Before calculators were readily available, people found it convenient to rewrite square root expressions in a simplified form to make it easier to perform calculations, combine, and compare them. A square root is simplified when there are no more perfect square factors (square numbers such as 4, 25, and 81) under the radical sign.

Example: $\sqrt{72}$ can be rewritten as $\sqrt{36}\cdot\sqrt{2}$, or as $\sqrt{9}\cdot\sqrt{8}$ and you still get the same result when you simplify completely. Verify with your calculator that both $6\sqrt{2}$ and $\sqrt{72}\approx 8.485$.

$$\begin{aligned}&\sqrt{72}\\&=\sqrt{9}\cdot\sqrt{8}\\&=3\cdot\sqrt{4}\cdot\sqrt{2}\\&=3\cdot2\cdot\sqrt{2}\\&=6\sqrt{2}\end{aligned}$$

OR

$$\begin{aligned}&\sqrt{72}\\&=\sqrt{36}\\&=6\sqrt{2}\end{aligned}$$

Example: $\sqrt{72}+\sqrt{18}$

To add terms with radicals, the radicals need to be alike. Verify your simplification with your calculator.

$$\begin{aligned}&\sqrt{72}+\sqrt{18}\\&=6\sqrt{2}+3\sqrt{2}\\&=9\sqrt{2}\end{aligned}$$

It is difficult to estimate the value of a number with a radical in the denominator, and it is also difficult to combine it with or compare it to other numbers. For these reasons, it is sometimes helpful to **rationalize the denominator** so that no radical remains in the denominator.

Example: $\frac{10}{\sqrt{2}}$

First, multiply the numerator and denominator by the radical in the denominator. Since $\frac{\sqrt{2}}{\sqrt{2}}=1$, this does not change the value of the expression.

After multiplying, notice that the denominator no longer has a radical, since $\sqrt{2}\cdot\sqrt{2}=2$.

Often, the product can be further simplified.

$$\begin{aligned}\frac{10}{\sqrt{2}}\left(\frac{\sqrt{2}}{\sqrt{2}}\right)&=\frac{10\sqrt{2}}{2}\\&=5\sqrt{2}\end{aligned}$$