# MATH 7 <br> HOMEWORK 2: POWERS AND EXPONENTS 

SEP 23, 2018

## Radicals

$$
\begin{aligned}
& a^{\frac{m}{n}}=\sqrt[n]{a^{m}}, n \neq 0 \\
& \sqrt{a b}=\sqrt{a} \sqrt{b}
\end{aligned}
$$

## Algebraic Identities

$$
\begin{aligned}
& (a+b)^{2}=a^{2}+2 a b+b^{2} \\
& (a-b)^{2}=a^{2}-2 a b+b^{2} \\
& a^{2}-b^{2}=(a-b)(a+b)
\end{aligned}
$$

## Scientific Notation

A number is written in standard form or scientific notation if it has the form $\mathbf{N} \times \mathbf{1 0}^{\mathbf{n}}$, where $1 \leqslant N<10$ and $n$ is an integer. For example 0.00023 is $2.3 \times 10^{-4}$ in scientific notation.

## Homework

1. Write down all the squares for numbers 1 to 20 .
2. Evaluate:
(a) $81^{\frac{1}{2}}=$
(b) $\sqrt{144}=$
(c) $\sqrt{4^{2} \times 9^{2}}=$
(d) $\sqrt{2^{3} \times 3^{4}}=$
3. Evaluate:
(a) $\frac{10^{-\dot{3}}}{5^{-3}}=$
(b) $\frac{3^{2} \times 6^{-3}}{10^{-3} \times 5^{2}}=$
4. Simplify:
(a) $\left(3^{-4}\right)^{2}=$
(b) $\left(3^{4} \times 3^{0}\right)^{3}=$
(c) $\left(2^{-3} \times 2^{7}\right)^{2}=$
(d) $\left(5^{8} \times 5^{-4}\right)^{-3}=$
(e) $\frac{7^{-2} \times 7^{8}}{7^{12}}=$
(f) $\frac{5^{5}}{3^{8} \times 5^{3} \times 3^{-7}}=$
5. Evaluate $\frac{5^{-1}}{3} \times\left(\frac{8}{15}\right)^{-4} \times\left(\frac{15}{16}\right)^{-3}=$
6. Simplify:
(a) $\frac{a^{3}}{a^{2}}=$
(b) $\frac{(-x)^{5}}{(-x)^{3}}=$
(c) $\left(a^{2} b^{3}\right)\left(b^{4} a^{3}\right)=$
(d) $\left(r^{-5} s^{-2}\right)\left(s^{5} r^{-2}\right)=$
(e) $\left(t^{4} u^{-8}\right)\left(u^{5} t^{0}\right)\left(t^{-5} u^{0}\right)=$
7. Express in ordinary notation: $6.01 \times 10^{3}, 0.021 \times 10^{-4}$
8. Rewrite in scientific notation: 1234.1, $0.0012,3400000$ (correct to 3 significant digits), $42.36 \times 10^{-3}$
9. Factor:
(a) $25 a^{2}-9 b^{2}=$
(b) $(x+1)^{2}-4=$
(c) $(3+x)^{2}+2(3+x)+1=$
(d) $a^{2}+b c+a b+a c=$
(e) $(a-1)^{2}-(a+1)^{2}=$
(f) $1+30 a+225 a^{2}=$
10. Simplify
(a) $\frac{2}{x-1}+\frac{3}{x-2}=$
(b) $x-\frac{x y}{y-x}=$
(c) $\frac{a}{a-b}+\frac{a}{b-a}=$
11. Jasmine can do a certain job in 3 hours, Alex can do this same job in 2 hours. How long would it take both of them if they work together?
12. A bathtub can be filled in 3 minutes, and emptied in 4 minutes. If both the faucet and the drain are open, how long does it take to fill the tub?
13. The smallest circle has a radius of 2 . Each successive circle has a radius of 2 more than the previous. Approximately what percent of the design is black?

