

## Math 105 Skill Builder #F - 18

### Performing Exponentiation on Fractions

Exponents indicate repeated multiplication.

$$\begin{aligned}\text{Example, } 2^3 &= 2 \cdot 2 \cdot 2 \\ 3^4 &= 3 \cdot 3 \cdot 3 \cdot 3 \\ x^3 &= x \cdot x \cdot x\end{aligned}$$

For any natural number  $n$ ,  $x^n = \underbrace{x \cdot x \cdot x \dots x}_{n \text{ factors}}$

$$\text{base} \rightarrow x^{n \rightarrow \text{exponent}}$$

Exponents mean the same when the base is a fraction. For example,

$$\left(\frac{1}{3}\right)^3 = \frac{1}{3} \cdot \frac{1}{3} \cdot \frac{1}{3} = \frac{1}{27}$$

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**Examples:**

Exponentiation on Fractions
$\left(\frac{2}{3}\right)^2 = \frac{2}{3} \cdot \frac{2}{3} = \frac{4}{9}$
$\left(\frac{1}{2}\right)^4 = \frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2} = \frac{1}{16}$
$\left(\frac{3}{5}\right)^3 = \frac{3}{5} \cdot \frac{3}{5} \cdot \frac{3}{5} = \frac{27}{125}$

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Perform the indicated operation:

1) $\left(\frac{2}{5}\right)^2$	4) $\left(\frac{2}{7}\right)^3$
2) $\left(\frac{2}{3}\right)^3$	5) $\left(\frac{1}{6}\right)^3$
3) $\left(\frac{1}{3}\right)^4$	6) $\left(\frac{1}{2}\right)^5$

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Answers:

1)  $\frac{4}{25}$

4)  $\frac{8}{343}$

2)  $\frac{8}{27}$

5)  $\frac{1}{216}$

3)  $\frac{1}{81}$

6)  $\frac{1}{32}$

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