

QUOTIENT OF POWERS

You can divide powers using the **Quotient of Powers Property**. It states that when you are dividing powers with the same base, you can keep the base and subtract the exponents.

$$\frac{x^n}{x^m} = x^{n-m}$$

Let's try it! Simplify $\frac{5^6}{5^4}$ using the Quotient of Powers Property.

$$\frac{5^6}{5^4} = 5^{6-4} = 5^2$$

You can see why this property works by expanding each power and simplifying.

$$\frac{5^6}{5^4} = \frac{5 \cdot 5 \cdot 5 \cdot 5 \cdot 5 \cdot 5}{5 \cdot 5 \cdot 5 \cdot 5} = \frac{5 \cdot 5 \cdot \cancel{5} \cdot \cancel{5} \cdot \cancel{5} \cdot \cancel{5}}{\cancel{5} \cdot \cancel{5} \cdot \cancel{5} \cdot \cancel{5}} = \frac{5 \cdot 5}{1} = 5^2$$

Try it yourself! Divide. Express each quotient as a power.

$\frac{9^5}{9^2} =$ _____	$\frac{2^7}{2^3} =$ _____	$\frac{10^{10}}{10^6} =$ _____
$\frac{3^{10}}{3^5} =$ _____	$\frac{12^8}{12^1} =$ _____	$\frac{3^9}{3^2} =$ _____
$\frac{7^{12}}{7^3} =$ _____	$\frac{4^{15}}{4^4} =$ _____	$\frac{11^9}{11^1} =$ _____
$\frac{3^{19}}{3^{17}} =$ _____	$\frac{8^{15}}{8^8} =$ _____	$\frac{6^{21}}{6^{16}} =$ _____
$\frac{15^{20}}{15^9} =$ _____	$\frac{9^{17}}{9^{16}} =$ _____	$\frac{24^{30}}{24^{14}} =$ _____