

Chapter 2: Exponents or powers

Laws of Exponents

1. $a^m \times a^n = a^{m+n}$

2. $a^m \div a^n = a^{m-n}$

3. $(a^m)^n = a^{mn}$

4. $(ab)^m = a^m \times b^m$

Negative Exponents

1) $\left(\frac{p}{q}\right)^{-1} = \frac{q}{p}$

2) $\frac{1}{a^m} = a^{-m}; a^{-m} = \frac{1}{a^m}$

Exercise 2.1 P. NO: 19

1. Write in exponential form

a) $(-7)^{-3} \times (-7)^4$

Since: $a^m \times a^n = a^{m+n}$

$$(-7)^{-3} \times (-7)^4 = (-7)^{-3+4} = -7$$

2. Simplify and write the answer with positive exponents

a) $\left(\frac{-5}{6}\right)^4 \div \left(\frac{-5}{6}\right)^{-6}$

$$a^m \div a^n = a^{m-n}$$

Date _____
Page _____

$$\left(\frac{-5}{6}\right)^4 \div \left(\frac{-5}{6}\right)^{-6} = \left(\frac{-5}{6}\right)^{4 - (-6)}$$

$$= \left(\frac{-5}{6}\right)^{4+6} = \left(\frac{-5}{6}\right)^{10}$$

3 Find the value

a) $6^0 \times 3^0 \times 5^0$

anything power zero is equal to 1

$$6^0 \times 3^0 \times 5^0 = 1 \times 1 \times 1 = 1$$

4 Simplify

a)

$$(3^2 \times 4^{-3})(3^2 \times 4^3)$$

$$= 3^2 \times 4^{-3} \times 3^2 \times 4^3$$

$$= 4^{-3} \times 4^3 \times 3^2 \times 3^2$$

$$a^m \times a^n = a^{m+n}$$

$$= 4^{-3+3} \times 3^{2+2}$$

$$= 4^0 \times 3^4 = 1 \times 3 \times 3 \times 3 \times 3$$

$$= 81$$

5 Evaluate

a) $\left(\left(\frac{1}{3}\right)^{-2} - \left(\frac{1}{9}\right)^{-2}\right) \div 3^{-2}$

$$\left(\frac{p}{q}\right)^{-1} = \frac{q}{p}$$

Date _____
Page _____

$$\left(\left(\frac{3}{1} \right)^{+2} - \left(\frac{9}{1} \right)^{+2} \right) \div 3^{-2}$$

$$9 - 81 \div \frac{1}{3^2} \Rightarrow \frac{72}{9} = 8$$

6 Find the value of k

a) $(7)^{-3} \times (7)^{3k+2} = (7)^{15} \div (7)^8$

$$7^{-3+3k+2} = 7^{15-8}$$

$$-3+3k+2 = 15-8$$

$$3k-1 = 7$$

$$3k = 8 \Rightarrow k = \frac{8}{3}$$

7 By what number should $\left(\frac{-5}{6}\right)^{-1}$ be multiplied so as to get 6^{-1}

$$\left(\frac{-5}{6}\right)^{-1} \times x = -1$$

$$x = -1 \left(\frac{-5}{6}\right)$$

$$x = \frac{5}{6}$$

8 By what number should $\left(\frac{4}{9}\right)^{-5}$ be multiplied so as to get $\left(\frac{2}{3}\right)^{-2}$

$$\left(\frac{4}{9}\right)^{-5} \times x = \left(\frac{2}{3}\right)^{-2}$$

$$x = \left(\frac{2}{3}\right)^{-2} \div \left(\frac{4}{9}\right)^{-5}$$

$$= \left(\frac{2}{3}\right)^{-2} \div \left(\frac{2}{3}\right)^{-5}$$

$$= \left(\frac{2}{3}\right)^{-2 - (-5)} = \left(\frac{2}{3}\right)^{-2 + 5} = \left(\frac{2}{3}\right)^3$$

10. For any non-zero rational numbers p , which of the following statements are true?

c) $(p^x)^{-y} = \frac{1}{p^{xy}}$

$$(p^x)^{-y} = p^{-xy} \quad \because (a^m)^n = a^{mn}$$

$$p^{-xy} = \frac{1}{p^{xy}} \quad \because a^{-m} = \frac{1}{a^m}$$

This statement is true.

d) $(p^x)^0 = p^0$

$$(a^m)^n = a^{mn}$$

$$(p^x)^0 = p^{x \times 0} = p^0$$

This statement is true.

Note: solve rest of the questions by yourself.