Overview This exponents worksheet focuses on two of the main rules for exponents and asks students to apply both of these rules (see below) to various types of problems.

**Exponent rule 1**: multiplying exponents i.e. $x^a \cdot x^b = x^{a+b}$

**Exponent rule 2**: exponents of exponents i.e. $(x^a)^b = x^{a\cdot b}$

Questions range in difficulty and the concluding questions include higher level thinking about the rules of exponents in math.
Exponents Worksheet

I. Directions: Rewrite the each question below without the exponents and simplify.

1) \(2^2 \cdot 2^3 =\)

2) \(2^2 \cdot 2^4 =\)

3) \(2^2 \cdot 2^5 =\)

4) \(2^2 \cdot 2^6 =\)

5) \(2^3 \cdot 2^5 =\)

6) \(3^2 \cdot 3^3 =\)

From Numbers to letters!

7) \(x^2 \cdot x^3 =\)

8) \(x^4 \cdot x^3 =\)

9) \(x^{12} \cdot x^3 =\)

10) \(x^6 \cdot x^{20} =\)

GENERAL SUMMARY: Fill in the blank: \(x^a \cdot x^b = x^{a+b}\)

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Part II
Directions:

11) \((x^2)^2 =\)

12) \((2^2)^2 =\)

13) \((2^2)^3 =\)

14) \((2^2)^4 =\)

15) \((3^2)^3 =\)

16) \((x^2)^3 =\)

17) \((x^3)^2 =\)

18) \((x^3)^4 =\)

19) \((x^4)^4 =\)

20) \((x^{10})^4 =\)

GENERAL SUMMARY: Fill in the blank: \((x^a)^b = x^{a\cdot b}\)

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Putting It all Together!

III. Simplify:

21) \(x^2 \cdot (x^2)^3 =\)

22) \(x^3 \cdot (x^5)^2 =\)

23) \(z^{12} \cdot (z^6)^5 =\)

24) \(z^3 \cdot (z^{11})^5 =\)

25) Find the product of \((z^3)^2\) and \((z^3)^4\)

26) \(z^2 \cdot (z^3)^0 =\)
Determine what number could replace the question mark

Example: \((x^{10})^2 = x^{17} \cdot x^2\)  
Example2: \((x^{12})^3 = x^{29} \cdot x^2\)

27) \((x^2)^3 = x^2 \cdot x^2\)  
28) \((x^3)^2 = x^5 \cdot x^2\)  
29) \((x^5)^2 = x^3 \cdot x^2\)  
30) \((x^2)^7 = x^4 \cdot x^{22}\)

31) \((x^3)^7 = x^5 \cdot x^7\)  
32) \((x^4)^2 = x^5 \cdot x^{11}\)  
33) \((x^7)^3 = x^2 \cdot x^{10}\)  
34) \((x^2)^2 = x^5 \cdot x^{20}\)

35) How many different pairs of integers could replace the question marks below?

\((x^2)^7 = x^2 \cdot x^6\)

Think-Pair-Share

Mr. Morris gave the class a problem that was very similar to the questions above (27—34) so the students were asked to find a number that could replace the question mark. The problem was: \((x^3)^0 = x^5 \cdot x^2\).

Jennifer says that the question mark should be replaced by 0.
John says that the question mark should be 1.
Joseph says that the question mark should be \(-5\).
Mary says that the question is impossible to answer.

Who is correct? Explain why:

Explanation:

36) Is the following statement true? \((x^a)^b = (x^b)^a\)  Why or why not?
Extension

Directions: Determine the value of $a$ in the equations below.

1) $(x^a)^6 = x^2 \cdot x^{10}$

2) $(x^{a+1})^5 = x^2 \cdot x^{13}$

3) $(x^{a+4})^2 = x^{12} \cdot x^4$

4) $(x^{a+2})^3 = x^9 \cdot x^6$

5) $(x^a)^2 = x^a \cdot x^1$

6) $(x^{a+4})^3 = x^a \cdot x^{14}$

7) $(x^{a+7})^2 = x^{5a} \cdot x^5$

8) $(x^{a+7})^0 = x^{5a}$
TEACHERS: Feel free to make copies of this worksheet for the sole purpose of use in your own classroom. ENJOY!!! Redistribution in any other form is prohibited.

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