MATH 8: Week of April 13

Go through the slides (notes) and work through the examples on a separate piece of paper. Then do the given practice problems (again, on a separate piece of paper). Check your answers with the key given at the bottom of the practice page. Check Google Classroom for the schedule of online help sessions via Zoom.

Answers to last week's packet can be found on the 3rd page of the Algebra section in this packet.

3-E: Multiplication Properties of Exponents

Target:
Simplify expressions involving multiplication using properties of exponents.

Vocabulary

Power   An expression such as x^a which consists of two parts, the base (x) and the exponent (a).

Base   The base of the power is the repeated factor. In x^a, x is the base.

Exponent   In x^a, a is the exponent. The exponent shows the number of times the factor (x) is repeated.

Squared   A term raised to the power of 2.

Cubed   A term raised to the power of 3.

Multiplication Properties of Exponents

Product of Powers
To multiply two powers with the same base, add the exponents.

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

Power of a Power
To find the power of a power, multiply the exponents.

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

Power of a Product
To find the power of a product, find the power of each factor and multiply.

$$(ab)^n = a^n b^n$$

Example 1a

Simplify the following.

a. $y^3 x^2 y^6 x$

Group like variables together. $y^3 x^2 y^6 x = y^3 y^6 x^2 x$

Add exponents with the same base. $y^3 y^6 x^2 x = y^{3+6} x^{2+1}$
$$y^9 x^3$$

Example 1b

Simplify the following.

b. $(b^3 w^2)^4$

Distribute the exponent to each base. $\left(b^3 w^2\right)^4 = \left(b^3\right)^4 \left(w^2\right)^4$

Multiply exponents. $b^{3\times4} w^{2\times4} = b^{12} w^8$

Example 1c

Simplify the following.

c. $(5p^4)(2p^3)$

Group like values together. $(5p^4)(2p^3) = (5\cdot2)(p^4 p^3)$

Multiply coefficients. $(5\cdot2)(p^4 p^3) = 10(p^4 p^3)$

Add exponents with the same base. $10(p^{4+3}) = 10p^7$

Simplified Expressions

A simplified expression should have:

- each base appear exactly once,

- no powers to powers,

- no numeric values with powers (only variables w/power), and

- Fractions (NO DECIMALS!) written in simplest form.

- No parenthesis

Example 2a

Simplify the following.

a. $6x^2y^4z^3 \cdot 3x^5z^2$

Group like values together. $6 \cdot 3 \cdot x^2 \cdot x^5 \cdot y^4 \cdot z^3 \cdot z^2$

Multiply coefficients. $18 \cdot x^2 \cdot x^5 \cdot y^4 \cdot z^3 \cdot z^2$

Add exponents with the same base. $18 \cdot x^{2+5} \cdot y^4 \cdot z^{3+2}$

$18x^7y^4z^5$

Example 2b

Simplify the following.

b. $(4m^3w)^2(5m^2w^2)^3$

Distribute. $4^2(m^3)^2(w)^2 \cdot 5^3(m^2)^3(w^2)^3$

Evaluate coefficients and multiply exponents. $16m^6w^2 \cdot 125m^6w^6$

Multiply coefficients. $(16 \cdot 125) \cdot m^6m^6w^2w^6$

Add exponents with the same base. $2000\ m^{12}w^8$

3-E Practice Problems: Simplify the Exponential Expressions (day 1)

1. y^2y^3 2. $(x^4)^2$

3. $(ab)^4$ 4. $(3p^3)^2$

5. $(m^4yz^4)(m^3yz^2)$ 6. $(3a^2b^4)(2a^3b^5)$

3-E Practice Problems: Simplify the Exponential Expressions (day 2)

7. $(2gh^5)^2$ 8. $(-5x^3y^4)(3x^2y^{10})$

9. $(2x^3)^3(3x^3)^2$ 10. $(2y^2w)^4(y^2)^5$

11. $2p^5(4p^4)^2$ 12. $(-2x^4)^2(2x^3)^2$

3-E Practice Problems: Answers

- 1. y^5
- 2. x^8
- 3. a^4b^4
- 4. $9p^6$
- 5. $m^7y^2z^6$
- 6. $6a^5b^9$
- 7. $4g^2h^{10}$
- 8. $-15x^5y^{14}$
- 9. $72x^{15}$
- 10. $16y^{18}w^4$
- 11. $32p^{13}$
- 12. $16x^{14}$

MATH 8: FINAL SLIDE for this week!