

15.4 Powers of Monomials

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POWER OF A POWER

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

EXAMPLES

Write the expression as a single power of the base.

1. $(4^3)^6 = 4^{18}$

2. $(p^8)^4 = p^{32}$

3. $[(-6)^4]^2 = (-6)^8$

4. $(k^5)^5 = k^{25}$

YOU TRY...

Write the expression as a single power of the base.

a) $(5^2)^3 = 5^6$

b) $(h^7)^4 = h^{28}$

c) $[(-2)^3]^4 = (-2)^{12}$

POWER OF A PRODUCT

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

EXAMPLES Simplify the expression.

5. $(-6 \cdot 5)^2 = 900$

$$\begin{matrix} (-6)^2 \cdot 5^2 = 36 \cdot 25 \\ \underbrace{-6 \cdot -6} \end{matrix}$$

6. $(2xy)^4$

$$2^4 \cdot x^4 \cdot y^4 = 16x^4y^4$$

7. $(-2w)^2$

$$\begin{matrix} 2^2 \cdot w^2 \\ \downarrow \\ -4w^2 \end{matrix}$$

8. $(7gh)^3$

$$\begin{matrix} 7^3 \cdot g^3 \cdot h^3 = 343g^3h^3 \\ \begin{matrix} 7 \cdot 7 \cdot 7 \\ \downarrow \\ 49 \cdot 7 \\ \downarrow \\ 343 \end{matrix} \end{matrix}$$

YOU TRY...

Simplify the expression.

a) $(3 \cdot 4)^2 = 3^2 \cdot 4^2 = 9 \cdot 16 = 144$

b) $(4ef)^6 = 4^6 \cdot e^6 \cdot f^6 = 4096e^6f^6$

c) $(-7k)^5 = (-7)^5 \cdot k^5 = -16807k^5$

$$\begin{array}{r} 3 2 \\ 343 \\ \times 49 \\ \hline 3087 \\ 13720 \\ \hline 16807 \end{array}$$

$$\begin{matrix} -7 \cdot -7 \cdot -7 \cdot -7 \cdot -7 \\ \downarrow \downarrow \downarrow \\ 49 \cdot 49 \cdot -7 \\ \downarrow \downarrow \\ 49 \cdot -343 \end{matrix}$$

PRODUCT OF A MONOMIAL

$$(a^m b^n)^p = a^{mp} b^{np}$$

EXAMPLES

Write the expression as a single power of the base.

$$9. (a^2 b^3)^2 = a^4 b^6$$

$$10. (4a^3)^2 = 4^2 a^6$$

$$11. (x^3 y^2)^{10} = x^{30} y^{20}$$

$$12. (-2e^3 f)^4 = (-2)^4 e^{12} f^4$$

YOU TRY...

Write the expression as a single power of the base.

$$a) -(5rs)^3 = -(5)^3 r^3 s^3$$

$$b) (-3r^3)^4 = (-3)^4 r^{3 \cdot 4} = (-3)^4 r^{12}$$

$$c) (4x^2 y^3)^2 = (4)^2 x^{2 \cdot 2} y^{3 \cdot 2} = 4^2 x^4 y^6$$

PRODUCT OF POWERS

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

EXAMPLES

Write the expression as a single power of the base.

$$13. \quad 5^3 \cdot 5^6 = 5^9$$

$$14. \quad (-2)^1 (-2)^4 = (-2)^5$$

$$15. \quad x^4 \cdot x^3 \cdot x^2 = x^9$$

$$16. \quad (-3)^1 (-3)^5 (-3)^2 = (-3)^8$$

YOU TRY...

Write the expression as a single power of the base.

$$a) \quad 7^8 \cdot 7^1 = 7^9$$

$$b) \quad g^2 \cdot g^5 \cdot g^9 = g^{16}$$

$$c) \quad (-9)^4 (-9)^4 = (-9)^8$$

Attachments

Review Section 9.1.docx