

## •• NEGATIVE EXPONENTS ••

$$x^{-a} = \frac{1}{x^a}$$

### EXAMPLES

$$37 \quad 9^{-2} = \frac{1}{9^2} = \frac{1}{81} \quad 38 \quad \frac{1}{2^{-3}} = 2^3 = 8$$

$$39 \quad x^{-5} = \frac{1}{x^5} \quad 40 \quad \frac{q^4}{p^{-2}} = \frac{q^4 p^2}{1}$$

$$41 \quad \frac{x^{-7} y^2}{z^{-1}} = \frac{y^2 z}{x^7} \quad 42 \quad 4m^{-1} n^2 p^{-7} = \frac{4n^2}{mp^7}$$

$$19 \quad \frac{15q^5}{3q^3} = 5q^2$$

$$20 \quad \frac{4a^{11}b}{8a^2b} = \frac{a^9}{2}$$

$$21 \quad \frac{24m^{11}}{36m^8} = \frac{2m^3}{3}$$

$$22 \quad \frac{7c^6 d^2 \cdot -6c^2 d}{-3c^7 d^2} = \frac{-42c^8 d^3}{-3c^7 d^2} = 14cd$$

$$23 \quad \frac{4w^2 v^3 \cdot 10w^7 v^2}{-5wv^4} + 14w^8 v$$

$$\frac{40w^9 v^5}{-5wv^4} + 14w^8 v = -8w^8 v + 14w^8 v = 6w^8 v$$

$$24 \quad \frac{16x^9 y^5 - 4x^9 y^5}{2x^3 y^5} + 3x \cdot 7x^5$$

$$\frac{12x^9 y^5}{2x^3 y^5} + 21x^6 = 6x^6 + 21x^6 = 27x^6$$

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## REVIEW BOOK

EXONENT RULES  
& Reference

## POWER RULE

$$(x^a)^b = x^{ab}$$

## EXAMPLES

25  $(4^2)^5 = 4^{10}$

26  $(n^4)^3$

~~$n^7$~~   
 $n^{12}$

27  $(r^3 s^7)^2$   
 $r^6 s^{14}$

28  $(4a)^4$   
 $256a^4$

29  $(-7w^4)^2$   
 $49w^8$

30  $(-2x^7 y^5)^3$   
 $-8x^{21} y^{15}$

31  $(3gh^9)^4$   
 $81g^4 h^{36}$

32  $\left(\frac{1}{4}a^8 b^4\right)^2$   
 $\frac{1}{16}a^{16} b^8$

33  $(-c^6 d)^2$   
 $c^{12} d^2$

34  $(2x^4 y^7)^3 \cdot -3x^3 y^2$   
 $8x^{12} y^{21} \cdot -3x^3 y^2$   
 $-24x^{15} y^{23}$

35  $(3pq)^4 \cdot (p^6 q) - (2p^2 q)^5$

~~$3p^5 q^5$~~   
 $81p^4 q^4 \cdot p^6 q - 32p^{10} q^5$   
 $81p^{10} q^5 - 32p^{10} q^5 = 49p^{10} q^5$

36  $\frac{24m^8 n^5}{(-m^2 n)^3 + 5m^6 n^3} \cdot (-3mn^4)^2$

$\frac{24m^8 n^5}{-m^6 n^3 + 5m^6 n^3} \cdot 9m^2 n^6$   
 $6m^2 n^2 \cdot 9m^2 n^6 = 54m^4 n^8$

$$12 \quad 9m^7n \cdot 3m^2n^2 - 4m^4 \cdot 5m^5n^3$$

$27m^9n^3 - 20m^9n^3$   
 $7m^9n^3$

$$11 \quad (-8x^3y^3)(5x^3y^2) + 3x^4y^5 - 40x^4y^5 + 3x^4y^5 - 37x^4y^5$$

$$10 \quad -2r^6s^2t \cdot -9r^3s^2t^4$$

$18r^9s^4t^5$

$$9 \quad 5a^2b^3 \cdot 3a^5b^2$$

$15a^7b^5$

$$8 \quad -4m^2(2m) - 8m^3$$

$$7 \quad 2k^9 \cdot 3k^2$$

$6k^{11}$

## PRODUCT RULE

$$x^a \cdot x^b = x^{a+b}$$

### EXAMPLES

$$1 \quad 3^2 \cdot 3^6 = 3^8$$

$$2 \quad 7^3 \cdot 7 = 7^4$$

$$3 \quad x^3 \cdot x^2 = x^5$$

$$4 \quad a^9(a) = a^{10}$$

$$5 \quad m^2 \cdot m \cdot m^3 = m^6$$

$$6 \quad w^2v \cdot w^4v^6 = w^6v^7$$

$$56 \quad \frac{81c^2d^2}{c^4d^4} = \frac{9c^2d^2}{c^2d^2}$$

$$55 \quad \frac{10m^2v^2}{m^3v^5} = \frac{10m^{-1}v^{-3}}{1}$$

$$54 \quad \frac{9d^2b^5}{15d^2b^3} = \frac{3b^2}{5}$$

$$53 \quad \frac{48m^8n^2}{16m^9n^2} = \frac{3}{m}$$

$$52 \quad \frac{(-4a^3b^2)^2 \cdot \frac{1}{2}ab^3}{16a^6b^4} = \frac{1}{2}ab^3$$

$$51 \quad \frac{4x^2y \cdot -3x^5y^2}{-12x^3y^3} = x^3$$

## MORE PRACTICE

$$57 \quad (-g^2h^3)^4 + 10g^8h^{12}$$

$g^8h^{12} + 10g^8h^{12}$   
 $11g^8h^{12}$

$$58 \quad \frac{32ab^4}{-8a^{-2}b} - 3a^3b^3$$

$-4a^3b^3 - 3a^3b^3$   
 $-7a^3b^3$

$$59 \quad -6r^{-5}s^{-2} \cdot (-2r^8s^{-2})^3$$

$48r^4s^{-8}$   
 $\frac{48r^4}{s^8}$

$$60 \quad \left(\frac{2}{3}c^4d^{-5}\right) \cdot (3c^2d)^3$$

$\frac{2}{3}c^4d^{-5} \cdot 27c^6d^3$   
 $18c^{10}d^{-2}$   
 $\frac{18c^{10}}{d^2}$

$$61 \quad (-7m^6n^4)^2 - (4m^3n^2)^4$$

$49m^{12}n^8 - 256m^{12}n^8$   
 $-207m^{12}n^8$

$$62 \quad \left(\frac{12x^3y^{-4}}{4x^{-2}y^{-4}}\right)^{-2}$$

$(3x^5)^{-2}$   
 $3^{-2}x^{-10}$   
 $\frac{1}{9x^{10}}$



$$\frac{9x^{10}}{1}$$

$$\frac{3x^5 - 2}{3x^5 - 2}$$

$$\left( \frac{12x^3y^4}{4x^2y^4} \right)^2$$

$$(-7m^6n^4)^2 - (4m^3n^2)^4$$

$$49m^{12}n^8 - 256m^{12}n^8$$

$$-207m^{12}n^8$$

$$7^9 m^7 = 7^4 m^4 \cdot 7^5 m^3$$

$$9^6 = 3^2 \cdot 3^6 = 3^8$$

$$a^9 = (a^3)^3$$

$$x^5 = x^2 \cdot x^3$$

$$7^3 \cdot 7 = 7^4$$

$$3^2 \cdot 3^6 = 3^8$$

EXAMPLES

$$x^a \cdot x^b = x^{a+b}$$

PRODUCT RULE

MORE PRACTICE

$$51 \quad \frac{4x^2y \cdot -3x^{-5}y^2}{-12x^{-3}y^3}$$

$$= \frac{-12y^3}{x^3}$$

$$52 \quad \frac{(-4a^3b^2)^2 \cdot \frac{1}{2}a^3b}{16a^6b^4 \cdot \frac{1}{2}a^3b}$$

$$= \frac{8a^9b^5}{8a^9b^5}$$

$$53 \quad \frac{48m^8n^2}{16m^9n^2} = \frac{3}{m}$$

$$54 \quad \frac{9p^{-2}q^5}{15p^2q^3} = \frac{3q^2}{5p^4}$$

$$7 \quad \frac{2k^9 \cdot 3k^2}{6k^{11}}$$

$$8 \quad \frac{-4m^2(2m)}{-8m^3}$$

$$9 \quad \frac{5a^2b^3 \cdot 3a^5b^2}{15a^7b^5}$$

$$10 \quad \frac{-2r^6s^2t \cdot -9r^3s^2t^4}{18r^9s^4t^5}$$

$$11 \quad (-8xy^3)(5x^3y^2) + 3x^4y^5$$

$$= -40x^4y^5 + 3x^4y^5$$

$$= -37x^4y^5$$

$$12 \quad 9m^7n \cdot 3m^2n^2 - 4m^4 \cdot 5m^5n^3$$

$$= 27m^9n^3 - 20m^9n^3$$

$$= 7m^9n^3$$

$$55 \quad \left( \frac{w^3v^5}{wv^6} \right)^2 \cdot \frac{w^6v^{10}}{w^2v^2}$$

$$= \frac{w^4}{v^2}$$

$$56 \quad \left( \frac{-9c^3d}{c^2d^2} \right)^2 = \frac{81c^6d^2}{c^4d^4}$$

$$= \frac{81c^2}{d^2}$$

$X^0 = 1$	ZERO EXPONENT
$X^{-a} = \frac{1}{X^a}$	NEGATIVE EXPONENT RULE
$(X^a)^b = X^{ab}$	POWER RULE
$\frac{X^a}{X^b} = X^{a-b}$	QUOTIENT RULE
$X^a \cdot X^b = X^{a+b}$	PRODUCT RULE
Combine like Terms Exponents Need to be the same	ADDING & SUBTRACTING

# EXPONENT RULES

Quick Reference

## QUOTIENT RULE

$$\frac{x^a}{x^b} = x^{a-b}$$

### EXAMPLES

13  $\frac{10^{13}}{10^4} = 10^9$

14  $\frac{(-2)^5}{(-2)} = -2^4$

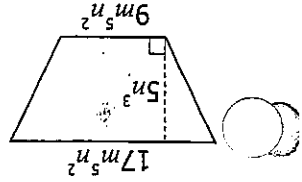
15  $\frac{p^9}{p^3} = p^6$

16  $\frac{c^5}{c^4} = c$

17  $\frac{r^8 s^3}{rs} = r^7 s^2$

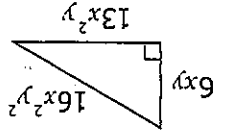
18  $\frac{x^6 y^5}{x^2 y^5} = x^4$

65  $65m^5h^5$



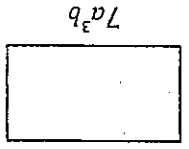
Find the area of the trapezoid.

64  $39x^3y^2$



Find the area of the triangle.

63  $14a^3b + 6a^2b$



Find the perimeter of the rectangle.

43  $\frac{a^{-6}b^{-2} \cdot a^8b^{-3}}{a^2b^{-5}} = \frac{a^2b^{-5}}{b^5}$

44  $\frac{-2p^4q^{-2} \cdot 3p^{-3}q^{-4}}{q^6} = -\frac{6p}{q^6}$

45  $\frac{m^3n}{m^2n^8} = \frac{m}{n^7}$

46  $\frac{-18v^3w}{9v^3w^6} = -\frac{2}{w^3}$

47  $\frac{6x^4y^{-1}}{8x^5y^{-3}} = \frac{3y^2}{4x}$

48  $\frac{20gh^{-4}}{12g^{-1}h^2} = \frac{5g^2}{4h^6}$

49  $(r^{-3}s^5)^{-2} = \frac{r^6}{s^{10}}$

50  $\frac{(-2c^{-1}d^3)^3}{c^3} = -\frac{8d^9}{c^3}$