

Name : KEY

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IA Exponents and Multiplication — no neg. exponent

Simplify. Your answer should contain only positive exponents.

1) $y^1 \cdot y^6$ y^7
 y^7

8) $3c^6w^4 \cdot 8cw^2$ $24c^7w^6$
 $24c^7w^6$

2) $3z^1 \cdot 6z^6$ $18z^7$
 $18z^7$

9) $5y^1k^2 \cdot 3y^5k^4$ $15y^6k^6$
 $15y^6k^6$

3) $5k^6 \cdot 7k^3$ $35k^9$
 $35k^9$

10) $\left(\frac{1}{c}\right)^6 \cdot \left(\frac{1}{c}\right)^5 \cdot \left(\frac{1}{c}\right)^4 = \left(\frac{1}{c}\right)^{15}$
 $\left(\frac{1}{c}\right)^{15}$

4) $5^1 \cdot 5^4$ 5^5
 5^5

11) $y^4n^6 \cdot 6y^5n^2 \cdot 7yn^5$
 $42y^{10}n^{13}$ $42y^{10}n^{13}$

5) $\left(\frac{2}{9}\right)^5 \cdot \left(\frac{2}{9}\right)^6 = \left(\frac{2}{9}\right)^{11}$
 $\left(\frac{2}{9}\right)^{11}$

12) $4^6 \cdot 4^2$ 4^8
 4^8

6) $\left(\frac{1}{6}\right)^3 \cdot \left(\frac{1}{6}\right)^5 \cdot \left(\frac{1}{6}\right)^6 = \left(\frac{1}{6}\right)^{14}$
 $\left(\frac{1}{6}\right)^{14}$

13) $\left(\frac{3}{7}\right)^6 \cdot \left(\frac{3}{7}\right)^3 \cdot \left(\frac{3}{7}\right)^4 = \left(\frac{3}{7}\right)^{13}$
 $\left(\frac{3}{7}\right)^{13}$

7) $r^6 \cdot r^4 \cdot r^2$ r^{12}
 r^{12}

14) $\left(\frac{1}{9}\right)^2 \cdot \left(\frac{1}{9}\right)^5 = \left(\frac{1}{9}\right)^7$
 $\left(\frac{1}{9}\right)^7$



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Exponents and Division I

Simplify. Your answer should contain only positive exponents.

$$1) \frac{7r^6}{8r^3s^4} = \frac{7r^3}{8s^4}$$

$$7) \frac{r^5}{r^4} = r$$

$$2) \frac{7g^5d^3}{5g^2d^4} = \frac{7g^3}{5d}$$

$$8) \frac{9^2}{9^1} = 9$$

$$3) \frac{4k^6}{8k} = \frac{1k^5}{2} = \frac{k^5}{2}$$

$$9) \frac{8k^6}{3k^5} = \frac{8k}{3}$$

$$4) \frac{3^3}{3^2} = 3$$

$$10) \frac{2c}{7c^6} = \frac{2c^{-5}}{7} = \frac{2}{7c^5}$$

$$5) \frac{5kr^4}{9k^5r^2} = \frac{5k^{-4}r^2}{9} = \frac{5r^2}{9k^4}$$

$$11) \frac{2b^4r^6}{6br^2} = \frac{1b^3r^4}{3}$$

$$6) \frac{hk}{4h^3k^2} = \frac{h^{-2}k^{-1}}{4} = \frac{1}{4h^2k}$$

$$12) \frac{h^1}{h^4} = \frac{1}{h^3}$$



Evaluate the Exponents

KEY

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Solve the following expressions.

1) $5^{-3} = \frac{1}{5^3} = \left(\frac{1}{125}\right)$

2) $2^{-9} = \frac{1}{2^9} = \left(\frac{1}{512}\right)$

3) $8^0 = 1$

4) $6^{-3} = \frac{1}{6^3} = \left(\frac{1}{216}\right)$

5) $3^{-4} = \frac{1}{3^4} = \left(\frac{1}{81}\right)$

6) $14^{-2} = \frac{1}{14^2} = \left(\frac{1}{196}\right)$

7) $2^{-7} = \frac{1}{2^7} = \left(\frac{1}{128}\right)$

8) $2^{-8} = \frac{1}{2^8} = \left(\frac{1}{256}\right)$

9) $10^{-2} = \frac{1}{10^2} = \left(\frac{1}{100}\right)$

10) $4^{-5} = \frac{1}{4^5} = \left(\frac{1}{1024}\right)$

11) $13^0 = 1$

12) $1^{-7} = \frac{1}{1^7} = 1$

13) $11^{-2} = \frac{1}{11^2} = \left(\frac{1}{121}\right)$

14) $10^{-3} = \frac{1}{10^3} = \left(\frac{1}{1000}\right)$

15) $6^{-4} = \frac{1}{6^4} = \left(\frac{1}{1296}\right)$

16) $3^{-6} = \frac{1}{3^6} = \left(\frac{1}{729}\right)$

Practice 8-1

Zero and Negative Exponents

Simplify each expression.

1. 16^0

$$1$$

2. 4^{-2}

$$\frac{1}{4^2} = \frac{1}{16}$$

3. 3^{-3}

$$\frac{1}{3^3} = \frac{1}{27}$$

4. 8^{-4}

$$\frac{1}{8^4} = \frac{1}{4096}$$

5. $\frac{1}{2^{-5}} = 2^5$

$$32$$

6. $3 \cdot 8^0$

$$3 \cdot 1 = 3$$

7. $16 \cdot 4^0$

$$16 \cdot 1 = 16$$

8. 9^0

$$1$$

9. $5(-6)^0$

$$5(1) = 5$$

10. $(3 \cdot 7)^0$

$$1$$

11. 12^{-1}

$$\frac{1}{12^1} = \frac{1}{12}$$

12. $(-4 \cdot 9)^0$

$$1$$

13. x^{-3}

$$\frac{1}{x^3}$$

14. $\frac{x^3}{y^3}$

$$\frac{x^3}{y^3}$$

15. $\frac{m^2 n^{-9}}{n^9}$

$$\frac{m^2}{n^9}$$

16. $\frac{1}{x^{-7}}$

$$x^7$$

17. $\frac{3}{a^{-4}}$

$$3a^4$$

18. $\frac{6}{r^{-5}s^{-1}}$

$$6r^5s^1$$

19. $3x^{-6}y^{-5}$

$$\frac{3}{x^6 y^5}$$

20. $8a^{-3}b^2c^{-2}$

$$\frac{8b^2}{a^3 c^2}$$

21. $\frac{d^{-4}}{e^{-7}}$

$$\frac{e^7}{d^4}$$

22. $\frac{3m^{-4}}{n^{-8}}$

$$\frac{3m^4}{n^8}$$

23. $\frac{6m^{-8}n^4}{p^{-1}}$

$$\frac{6n^4 p^1}{m^8}$$

24. $\frac{a^{-2}b^{-1}}{d^{-3}}$

$$\frac{d^3}{a^2 b^1 c^1}$$

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II Exponents and Multiplication

B

both positive exponents

Simplify. Your answer should contain only positive exponents.

1) $s^1 \cdot s^{-2} = s^{-1} = \frac{1}{s^1} = \frac{1}{s}$

8) $8y^4 \cdot 7y^5 \cdot 2y^2 = 112y^{11}$

2) $2s^1 \cdot 4s^6 = 8s^7$

9) $\left(\frac{1}{3}\right)^6 \cdot \left(\frac{1}{3}\right)^3 \cdot \left(\frac{1}{3}\right)^5 = \left(\frac{1}{3}\right)^{14}$

3) $6^1 \cdot 6^2 = 6^3 = 216$

10) $s^5 z^2 \cdot 8s^6 z^3 \cdot 6sz^6 = 48s^{12} z^{11}$

4) $9y^5 \cdot 7y^4 = 63y^9$

11) $c^{-6} \cdot c^3 = c^{-3} = \frac{1}{c^3}$

5) $7b^6 n^{-6} \cdot 9b^{-4} n^3 = \frac{63b^2}{n^3}$

12) $4z^4 \cdot 6z^{-6} = 24z^{-2} = \frac{24}{z^2}$

6) $3g^6 \cdot 5g^{-3} \cdot 4g^{-2} = 60g^1$

13) $7^{-5} \cdot 7^2 = 7^{-3} = \frac{1}{7^3} = \frac{1}{343}$

7) $w^2 \cdot w^6 = w^8$

14) $2h^{-4} s^5 \cdot 6hs^{-2} = 12h^{-3} s^3 = \frac{12s^3}{h^3}$



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subtract neg. exponent

Exponents and Division II

Simplify. Your answer should contain only positive exponents.

1) $\frac{6r^2h^2}{5r^4h^6} = \frac{6r^{-3}h^{-4}}{5} = \frac{6}{5r^3h^4}$

$\frac{6}{5r^3h^4}$

2) $\frac{y^3}{y^{-5}} = y^{3-(-5)} = y^{3+5} = y^8$

y^8

3) $\frac{4^{-3}}{4^7} = 4^{-3-7} = 4^{-10} = \frac{1}{4^{10}} = \frac{1}{256}$

$\frac{1}{4^4}$

4) $\frac{7^3}{7^7} = 7^{3-7} = 7^{-4} = \frac{1}{7^4}$

7^2

5) $\frac{4z^{-5}}{7z^{-2}} = \frac{4z^{-5-(-2)}}{7} = \frac{4z^{-3}}{7} = \frac{4}{7z^3}$

$\frac{4}{7z^3}$

6) $\frac{c^3}{c^5} = c^{3-5} = c^{-2} = \frac{1}{c^2}$

$\frac{1}{c^2}$

7) $\frac{5^2}{5^{-2}} = 5^{2-(-2)} = 5^{2+2} = 5^4 = 625$

5^4

8) $\frac{2k^{-3}}{9k^4} = \frac{2k^{-3-4}}{9} = \frac{2k^{-7}}{9} = \frac{2}{9k^7}$

$\frac{2}{9k^7}$

9) $\frac{8b^{-1}}{6b^{-3}} = \frac{4b^{-1-(-3)}}{3} = \frac{4b^{1+3}}{3} = \frac{4b^4}{3}$

$\frac{4b^4}{3}$

10) $\frac{dk^{-1}}{5d^3k^6} = \frac{d^{-2}k^{-5}}{5} = \frac{1}{5d^2k^5}$

$\frac{1}{5d^2k^5}$

11) $\frac{9^6}{9^3} = 9^{6-3} = 9^3 = 729$

9^3

12) $\frac{8d^{-5}}{4d^1} = \frac{2d^{-5-1}}{1} = 2d^{-6} = \frac{2}{d^6}$

$\frac{2}{d^6}$



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Exponents with Multiplication and Division

-A

Simplify. Your answer should contain only positive exponents.

$$1) \frac{g^1}{g^4} = \frac{1}{g^3}$$

$$g^{-3} = \frac{1}{g^3}$$

$$2) \frac{9d^5}{8d^2n^4} = \frac{9d^3}{8n^4}$$

$$\frac{9d^3}{8n^4}$$

$$3) 7b^2 \cdot 9b^5w^4 = 63b^7w^4$$

$$63b^7w^4$$

$$4) \frac{w^5}{w^2} = w^3$$

$$w^3$$

$$5) \left(\frac{1}{y}\right)^5 \cdot \left(\frac{1}{y}\right)^2 \cdot \left(\frac{1}{y}\right)^3 = \left(\frac{1}{y}\right)^{10}$$

$$\left(\frac{1}{y}\right)^{10}$$

$$6) \frac{2z^3}{4z^1} = \frac{1z^2}{2} = \frac{z^2}{2}$$

$$\frac{z^2}{2}$$

$$7) \frac{7z^4}{2z^2} = \frac{7z^2}{2}$$

$$\frac{7z^2}{2}$$

$$8) w^6 \cdot w^5 = w^{11}$$

$$w^{11}$$

$$9) 9k^6w^2 \cdot 8kw^5 = 72k^7w^7$$

$$72k^7w^7$$

$$10) \frac{3s^2g^4}{4sg^3} = \frac{3s^1g^1}{4} = \frac{3sg}{4}$$

$$\frac{3sg}{4}$$

$$11) yc \cdot 9y^5c^3 = 9y^6c^4$$

$$9y^6c^4$$

$$12) 2^1 \cdot 2^3 = 2^4 = 16$$

$$2^4$$



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Exponents with Multiplication and Division

*Subtracting
neg exp.*

Simplify. Your answer should contain only positive exponents.

$$1) \frac{4^5}{4^1} = 4^4 = 256$$

$$7) \frac{5y^6}{6y^1} = \frac{5y^{-6-1}}{6} = \frac{5y^{-7}}{6} = \frac{5}{6y^7}$$

$$2) 9^3 \cdot 9^2 = 9^{-1} = \frac{1}{9}$$

$$8) \frac{2^4}{2^1} = 2^{-4-1} = 2^{-5} = \frac{1}{2^5} = \frac{1}{32}$$

$$3) rc \cdot 5r^6c^3 = 5r^7c^4$$

$$9) \frac{9r^1}{5r^2} = \frac{9r^{-1}}{5} = \frac{9}{5r}$$

$$4) \left(\frac{1}{2}\right)^6 \cdot \left(\frac{1}{2}\right)^3 = \left(\frac{1}{2}\right)^9$$

$$10) 5^1 \cdot 5^6 = 5^7 = 78,125$$

$$5) \frac{9d^5z^2}{2d^6z^3} = \frac{9d^{-1}z^{-1}}{2} = \frac{9}{2dz}$$

$$11) z^1 \cdot z^{-3} = z^{-2} = \frac{1}{z^2}$$

$$6) 5k^1 \cdot 8k^{-6} = 40k^{-5} = \frac{40}{k^5}$$

$$12) \frac{8yh^{-3}}{2y^6h^4} = \frac{4y^{1-(-6)}h^{-3-4}}{1} = 4y^{1+6}h^{-7} = 4y^7h^{-7} = \frac{4y^7}{h^7}$$



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Powers of Products

Simplify the exponents.

1) $(4nr^5)^2$ $4^2 n^2 r^{10} = 16n^2 r^{10}$
 $16n^2 r^{10}$

2) $(2b^3g^5)^3$ $2^3 b^9 g^{15} = 8b^9 g^{15}$
 $8b^9 g^{15}$

3) $(6g^4r^3)^4$ $6^4 g^{16} r^{12} = 1296g^{16} r^{12}$
 $1296g^{16} r^{12}$

4) $(9w^5s^2)^4$ $9^4 w^{20} s^8 = 6561w^{20} s^8$
 $6561w^{20} s^8$

5) $(5h^2b)^4$ $5^4 h^8 b^4 = 625h^8 b^4$
 $625h^8 b^4$

6) $(5b^4)^3$ $5^3 b^{12} = 125b^{12}$
 $125b^{12}$

7) $(8g^6b)^3$ $8^3 g^{18} b^3 = 512g^{18} b^3$
 $512g^{18} b^3$

8) $(4dh^5)^2$ $4^2 d^2 h^{10} = 16d^2 h^{10}$
 $16d^2 h^{10}$

9) $(8sh^2)^4$ $8^4 s^4 h^8 = 4096s^4 h^8$
 $4096s^4 h^8$

10) $(7y^6)^2$ $7^2 y^{12} = 49y^{12}$
 $49y^{12}$

11) $(7bw^5)^2$ $7^2 b^2 w^{10} = 49b^2 w^{10}$
 $49b^2 w^{10}$

12) $(9b^3w^5)^3$ $9^3 b^9 w^{15} = 729b^9 w^{15}$
 $729b^9 w^{15}$

13) $(3s^5)^2$ $3^2 s^{10} = 9s^{10}$
 $9s^{10}$

14) $(5k^4b)^3$ $5^3 k^{12} b^3 = 125k^{12} b^3$
 $125k^{12} b^3$



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Powers of Products II

Simplify the exponents.

1) $(4d^2 \cdot 2d^3)^2 = (8d^5)^2 = 8^2 d^{10}$
 $= 64d^{10}$

8) $(2y^3 \cdot y^2)^2 = (2y^5)^2 = 2^2 y^{10}$
 $= 4y^{10}$

2) $(5zb^2)^2 = 5^2 z^2 b^4 = 25z^2b^4$
 $25z^2b^4$

9) $(4d^2 \cdot d)^3 = (4d^3)^3 = 4^3 d^9$
 $= 64d^9$

3) $(3r^3 \cdot r^2)^2 = (3r^5)^2 = 3^2 r^{10}$
 $= 9r^{10}$

10) $(d \cdot 4d^3)^2 = (4d^4)^2 = 4^2 d^8$
 $= 16d^8$

4) $(7zw^5)^2 = 7^2 z^2 w^{10} = 49z^2w^{10}$
 $49z^2w^{10}$

11) $(3c \cdot 4c^3)^2 = (12c^4)^2 = 12^2 c^8 = 144c^8$
 $144c^8$

5) $(2z^3 \cdot 4z^2)^3 = (8z^5)^3 = 8^3 z^{15}$
 $= 512z^{15}$

12) $(7y^6h^2)^3 = 7^3 y^{18} h^6$
 $= 343y^{18}h^6$

6) $(6c^2)^4 = 6^4 c^8 = 1296c^8$
 $1296c^8$

13) $(3w^2 \cdot 2w)^2 = (6w^3)^2 = 6^2 w^6 = 36w^6$
 $36w^6$

7) $(4n^3 \cdot n)^3 = (4n^4)^3 = 4^3 n^{12}$
 $= 64n^{12}$

14) $(7c^4s)^3 = 7^3 c^{12} s^3$
 $= 343c^{12}s^3$



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Powers of Quotients

Simplify the exponents.

$$1) \left(\frac{7z^6h^3}{3zh^5} \right)^2 = \left(\frac{7z^5h^{-2}}{3} \right)^2 = \left(\frac{7z^5}{3h^2} \right)^2$$

$$\frac{49z^{10}}{9h^4} = \frac{49z^{10}}{9h^4}$$

$$2) \left(\frac{11b}{2h^5b^6} \right)^3 = \left(\frac{h^{-4}b^{-5}}{2} \right)^3 = \left(\frac{1}{2h^4b^5} \right)^3 = \frac{1}{8h^{12}b^{15}}$$

$$\frac{1}{8h^{12}b^{15}}$$

$$3) \left(\frac{4cy^3}{5c^4y^2} \right)^2 = \left(\frac{4c^{-3}y^1}{5} \right)^2 = \left(\frac{4y}{5c^3} \right)^2$$

$$\frac{16y^2}{25c^6} = \frac{16y^2}{25c^6}$$

$$4) \left(\frac{g^1}{g^2} \right)^3 = (g^{-1})^3 = g^{-3} = \frac{1}{g^3}$$

$$\frac{1}{g^3}$$

$$5) \left(\frac{7^2}{7^1} \right)^2 = (7^1)^2 = 7^2 = 49$$

$$7^2$$

$$6) \left(\frac{7^3}{7^5} \right)^3 = (7^{-2})^3 = \left(\frac{1}{7^2} \right)^3$$

$$\frac{1}{7^6} = \frac{1}{117,649}$$

$$7) \left(\frac{2k^6}{8k^1} \right)^2 = \left(\frac{1k^5}{3} \right)^2 = \frac{k^{10}}{9}$$

$$\frac{k^{10}}{9}$$

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

$$\frac{1^3}{27d^6} = \frac{1}{27d^6}$$

$$9) \left(\frac{2c^4}{7c^5d^3} \right)^3 = \left(\frac{2c^{-1}}{7d^3} \right)^3 = \frac{2^3c^{-3}}{7^3d^9}$$

$$\frac{8}{343c^3d^9} = \frac{8}{343c^3d^9}$$

$$10) \left(\frac{8n^3b^4}{3n^6b^5} \right)^2 = \left(\frac{8n^{-3}b^{-1}}{3} \right)^2 = \left(\frac{8}{3n^3b^1} \right)^2$$

$$\frac{64}{9n^6b^2} = \frac{64}{9n^6b^2}$$

$$11) \left(\frac{3b^6}{5b^3} \right)^2 = \left(\frac{3b^3}{5} \right)^2 = \frac{9b^6}{25}$$

$$\frac{9b^6}{25}$$

$$12) \left(\frac{z^2}{z^5} \right)^2 = (z^{-3})^2 = \left(\frac{1}{z^3} \right)^2$$

$$\frac{1}{z^6} = \frac{1}{z^6}$$



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Powers of Products and Quotients

Simplify the exponents.

$$1) (4c^1 \cdot 2c^3 \cdot c^2)^2 = (8c^6)^2 = 8^2 c^{12} = 64c^{12}$$

$$7) \left(\frac{6^3}{6^1}\right)^3 = (6^2)^3 = 6^6 = 46,656$$

$$2) (2n^2 \cdot 3n^1 \cdot n^2)^3 = (6n^5)^3 = 6^3 n^{15} = 216n^{15}$$

$$8) \left(\frac{3^5}{3^2}\right)^2 = (3^3)^2 = 3^6 = 729$$

$$3) (4h^1 \cdot 2h^3)^2 = (8h^4)^2 = 8^2 h^8 = 64h^8$$

$$9) \left(\frac{2k^4}{3k^1}\right)^3 = \left(\frac{2k^3}{3}\right)^3 = \frac{2^3 k^9}{3^3} = \frac{8k^9}{27}$$

$$4) (3c^2 \cdot c^1)^3 = (3c^3)^3 = 3^3 c^9 = 27c^9$$

$$10) \left(\frac{w^1}{w^5}\right)^3 = (w^{-4})^3 = \left(\frac{1}{w^4}\right)^3 = \frac{1}{w^{12}}$$

$$5) (2z^2 \cdot 3z)^3 = (6z^3)^3 = 6^3 z^9 = 216z^9$$

$$11) \left(\frac{g^2}{g^6}\right)^2 = (g^{-4})^2 = \left(\frac{1}{g^4}\right)^2 = \frac{1}{g^8}$$

$$6) (6bh^2)^6 = 6^6 b^6 h^{12} = 46656b^6h^{12}$$

$$12) \left(\frac{8s^4}{2s^5}\right)^3 = (4s^{-1})^3 = \left(\frac{4}{s}\right)^3 = \frac{4^3}{s^3} = \frac{64}{s^3}$$



Properties of Exponents

Simplify. Your answer should contain only positive exponents.

1) $2m^2 \cdot 2m^3$

$4m^5$

2) $m^4 \cdot 2m^{-3}$

$2m$

3) $4r^{-3} \cdot 2r^2 = 8r^{-1} = \frac{8}{r}$

$\frac{8}{r}$

4) $4n^4 \cdot 2n^{-3}$

$8n$

5) $2k^4 \cdot 4k$

$8k^5$

6) $2x^3y^{-3} \cdot 2x^{-1}y^3$

$4x^2$

$4x^2y^0 = 4x^2$

7) $2y^2 \cdot 3x$

$6y^2x$

8) $4v^3 \cdot vu^2$

$4v^4u^2$

9) $4a^3b^2 \cdot 3a^{-4}b^{-3}$

$\frac{12}{ab}$

$12a^{-1}b^{-1} = \frac{12}{ab}$

10) $x^2y^{-4} \cdot x^3y^2$

$\frac{x^5}{y^2}$

$x^5y^{-2} = \frac{x^5}{y^2}$

11) $(x^2)^0$

1

12) $(2x^2)^{-4}$

$\frac{1}{16x^8}$

$2^{-4}x^{-8} = \frac{1}{2^4x^8} = \frac{1}{16x^8}$

13) $(4r^0)^4$

256

$4^4r^0 = 256$

14) $(4a^3)^2$

$16a^6$

15) $(3k^4)^4$

$81k^{16}$

16) $(4xy)^{-1}$

$\frac{1}{4xy}$

$$17) (2b^4)^{-1}$$

$$\frac{1}{2b^4}$$

$$18) (x^2y^{-1})^2 \quad x^4y^{-2} = \frac{x^4}{y^2}$$

$$19) (2x^4y^{-3})^{-1} \quad 2^{-1}x^{-4}y^3 = \frac{y^3}{2x^4}$$

$$20) (3m)^{-2} \quad \frac{1}{(3m)^2} = \frac{1}{9m^2}$$

$$21) \frac{r^2}{2r^3} \quad \frac{r^{-1}}{2} = \frac{1}{2r}$$

$$22) \frac{x^{-1}}{4x^4} \quad \frac{x^{-5}}{4} = \frac{1}{4x^5}$$

$$23) \frac{3n^4}{3n^3}$$

11

$$24) \frac{m^4}{2m^4} \quad \frac{1}{2}$$

$$\frac{1}{2}$$

$$25) \frac{3m^{-4}}{m^3} \quad 3m^{-7} = \frac{3}{m^7}$$

$$26) \frac{2x^4y^{-4}z^{-3}}{3x^2y^{-3}z^4} \quad \frac{2x^2y^{-1}z^{-7}}{3} = \frac{2x^2}{3yz^7}$$

$$27) \frac{1x^0y^{-2}z^3}{4x} = \frac{z^3}{xy^2}$$

$$28) \frac{2h^3j^{-3}k^4}{3jk} = \frac{2h^3j^{-4}k^3}{3} = \frac{2h^3k^3}{3j^4}$$

$$29) \frac{4m^4n^3p^3}{3m^2n^2p^4} = \frac{4m^2n^1p^{-1}}{3} = \frac{4m^2n}{3p}$$

$$30) \frac{3x^3y^{-1}z^{-1}}{x^{-4}y^0z^0} \quad \frac{3x^7y^{-1}z^{-1}}{1} = \frac{3x^7}{yz}$$

Practice 8-7 Exponential Functions

Evaluate each function rule for the given values.

1. $y = 5.5^x$ for $x = 3$

$y = 5.5^3 = 166.375$

2. $y = 4 \cdot 1.5^x$ for $x = 4$

$y = 4 \cdot 1.5^4 = 20.25$

3. $y = 3 \cdot 4^x$ for $x = 5$

$y = 3 \cdot 4^5 = 3072$

4. $y = 6^x$ for $x = 2, 3$

$y = 6^2 = 36$
 $y = 6^3 = 216$

Evaluate each function for the domain $\{-2, 0, 1, 2, 4\}$.

5. $y = 3.1^x$

x	3.1^x	y
-2	3.1^{-2}	$0.104 \approx 100/961$
0	3.1^0	1
1	3.1^1	3.1
2	3.1^2	9.61
4	3.1^4	92.3521

6. $y = 2 \cdot 4^x$

x	$2 \cdot 4^x$	y
-2	$2 \cdot 4^{-2}$	$0.125 = 1/8$
0	$2 \cdot 4^0$	2
1	$2 \cdot 4^1$	8
2	$2 \cdot 4^2$	32
4	$2 \cdot 4^4$	512

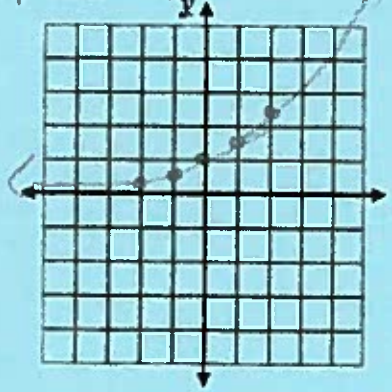
7. $y = (\frac{2}{3})^x$

x	$(\frac{2}{3})^x$	y
-2	$(\frac{2}{3})^{-2}$	$9/4 = 2.25$
0	$(\frac{2}{3})^0$	1
1	$(\frac{2}{3})^1$	$2/3 = 0.\overline{6}$
2	$(\frac{2}{3})^2$	$4/9 = 0.\overline{4}$
4	$(\frac{2}{3})^4$	$16/81 = 0.20$

Graph each function. Use the domain $x = \{-2, -1, 0, 1, 2\}$.

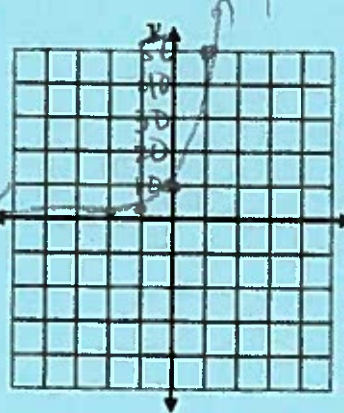
8. $y = 1.5^x$

x	1.5^x	y
-2	1.5^{-2}	$0.4 = 2/5$
-1	1.5^{-1}	$2/3$
0	1.5^0	1
1	1.5^1	1.5
2	1.5^2	2.25



9. $y = 10 \cdot 5^x$

x	$10 \cdot 5^x$	y
-2	$10 \cdot 5^{-2}$	$0.4 = 2/5$
-1	$10 \cdot 5^{-1}$	2
0	$10 \cdot 5^0$	10
1	$10 \cdot 5^1$	50
2	$10 \cdot 5^2$	250



10. $y = \frac{1}{2} \cdot 4^x$

x	$\frac{1}{2} \cdot 4^x$	y
-2	$0.5 \cdot 4^{-2}$	$0.03125 = 1/32$
-1	$0.5 \cdot 4^{-1}$	$0.125 = 1/8$
0	$0.5 \cdot 4^0$	$0.5 = 1/2$
1	$0.5 \cdot 4^1$	2
2	$0.5 \cdot 4^2$	8

