Solutions

Page 236 #s 1acegi, 2bdfhj, 3aceg, 4bdf, 5acegi, 6, 7bd, 8gh, 9cdk, 10ae, 13bf, 14

1. Multiply.

a) $3\times 2x$

$= (3)(2)(x)$

$= 6x$

c) $-2(7y)$

$= (-2)(7)(y)$

$= -14y$

e) $x(9x)$

$= (x)(9)(x)$

$= 9x^2$

g) $-2m(6m)$

$=(-2)(m)(6)(m)$

$= -12m^2$

i) $(-5p^2)(-3p^2)$

$= (-5)(p^2)(-3)(p^2)$

$= 15p^{2+2}$

$= 15p^4$

2. Divide.

b) $\frac{-12x}{4}$

$= (-12 \div 4)(x)$

$= -3x$

d) $\frac{14y}{7y}$

$= (14 \div 7)(y \div y)$

$= (2)(1)$

$= 2$

f) $\frac{24h^2}{3h^2}$

$= (24 \div 3)(h^2 \div h^2)$

$= (8)(1)$

$= 8$

h) $\frac{-28x^3}{x}$

$= (-28 \div 1)(x^3 \div x)$

$= (-28)(x^{3-1})$

$= -28x^2$

j) $\frac{-20r^6}{-4r^2}$

$= (-20 \div -4)(r^6 \div r^2)$

$= (5)(r^{6-2})$

$= 5r^4$

3. Multiply.

a) $4 \times 6xy$

$= (4)(6)(x)(y)$

$= 24xy$

c) $6a \times 2b$

$= (6)(a)(2)(b)$

$= 12ab$

e) $(8x)(9yz)$

$= (8)(x)(9)(y)(z)$

$= 72xyz$

g) $(-2pq)(-10r)$

$= (-2)(p)(q)(-10)(r)$

$= 20pqr$

4. Divide.

b) $\frac{32ab}{8}$

$= (32 \div 8)(a)(b)$

$= 4ab$

d) $\frac{-36pqr}{9r}$

$= (-36 \div 9)(p)(q)(r \div r)$

$= 4pq(1)$

$= 4pq$

f) $\frac{-22st^2}{-11t^2}$

$f) = (-22 \div -11)(s)(t^2 \div t^2)$

$= (2)(s)(1)$

$= 2s$

5. Simplify.

a) $\frac{4(3x)}{6}$

$= (4 \times 3 \div 6)(x)$

$= 2x$

c) $\frac{10(2x)}{5x}$

$= (10 \times 2 \div 5)(x \div x)$

$= 4(1)$

$= 4$

e) $\frac{(12a)(4a)}{8a^2}$

$= \left(\frac{12 \times 4}{8}\right)\left(\frac{a \times a}{a^2}\right)$

$= \frac{48}{8}\left(\frac{a^2}{a^2}\right)$

$= 6(1)$

$= 6$

g) $\frac{-4(10xy)}{5xy}$

$= (-4 \times 10 \div 5)(xy \div xy)$

$= (-8)(1)$

$= -8$

i) $\frac{(20q)(3r)}{(2q)(15r)}$

$= \left(\frac{20 \times 3}{2 \times 15}\right)\left(\frac{qr}{qr}\right)$

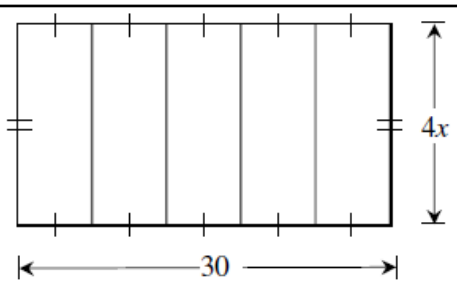
$= \frac{60}{30}(1)$

$= 2$

6. A rectangle is divided into 5 equal sections as shown on the right.

a) Determine a simplified expression that represents the area of the entire rectangle.

b) Determine a simplified expression that represents the area of one section.



a) Area = length x width
$= (30)(4x)$
$= 120x$

b) one section = area ÷ 5
$= \frac{120x}{5}$
$= 24x$

7. Write as a single power and then evaluate. Express all answers in exact form.

b) $(2^3)^2(2^2)^2$

$= (2^{3\times2})(2^{2\times2})$
$= (2^6)(2^4)$
$= 2^{6+4}$
$= 2^{10}$

d) $\frac{(5^3)^4}{(5^2)^5}$

$= \frac{(5^{3\times4})}{(5^{2\times5})}$
$= \frac{5^{12}}{5^{10}}$
$= 5^{12-10}$
$= 5^2$

8. Simplify.

g) $(5x^4 \times 6x^8)^2$ h) $[(-2a)(5a^9)]^3$

$= (5^{1\times2}x^{4\times2})(6^{1\times2}x^{8\times2})$

$= (5^2x^8)(6^2x^{16})$

$= (25x^8)(36x^{16})$

$= (25\times36)(x^{8+16})$

$= 900x^{24}$

$= [(-2)(a)(5)(a^9)]^3$

$= [(-10)(a^{1+9})]^3$

$= [-10a^{10}]^3$

$= [(-10)^{1\times3}(a^{10\times3})]$

$= (-10)^3(a^{30})$

$= -1000a^{30}$

9. Simplify.

c) $(x^4y^5)(x^2y^3)$ d) $(9x^2y^3)(4x^4y^2)$ k) $-3x^2y(-2x^7y^4z^2)^3$

$= (x^{4+2})(y^{5+3})$

$= x^6y^8$

$= (9\times4)(x^{2+4})(y^{3+2})$

$= 36x^6y^5$

k) $= (-3)(-2)^{1\times3}(x^2)(x^{7\times3})(y)(y^{4\times3})(z^{2\times3})$

$= (-3)(-2)^3(x^2)(x^{21})(y)(y^{12})(z^6)$

$= (-3)(-8)(x^{2+21})(y^{1+12})(z^6)$

$= 24x^{23}y^{13}z^6$

10. Simplify.

a) $\frac{x^5y^6}{x^2y^2}$

$= (x^{5-2})(y^{6-2})$

$= x^3y^4$

e) $\frac{(-2xy^3)^4}{(-2y^4)^3}$

$= \frac{(-2)^{1\times4}(x^{1\times4})(y^{3\times4})}{(-2)^{1\times3}(y^{4\times3})}$

$= \frac{(-2)^4(x^4)(y^{12})}{(-2)^3(y^{12})}$

$= (-2)^{4-3}(x^4)(y^{12}\div y^{12})$

$= (-2)^1(x^4)(1)$

$= -2x^4$

13. Simplify. Express all answers using positive exponents.

b) $\frac{(x^{10})(x^{-4})}{x^2}$

$= \frac{x^{10+(-4)}}{x^2}$

$= \frac{x^6}{x^2}$

$= x^{6-2}$

$= x^4$

f) $(2a^{-5}b^6)(5ab^{-4})$

$= (2)(5)(a^{-5})(a)(b^6)(b^{-4})$

$= 10(a^{-5+1})(b^{6+(-4)})$

$= 10(a^{-4})(b^2)$

$= 10a^{-4}b^2$

$= 10\left(\frac{1}{a}\right)^4b^2$

$= \frac{10(1)^4b^2}{a^4} = \frac{10b^2}{a^4}$

14. The length of a triangle's base is $5x^2y^3$ cm and its height is $4xy^2$ cm.

a) Determine a simplified expression for the area of the triangle.

b) If the triangle is the base of a prism with a length of x cm, find a simplified expression for the volume of the prism.

c) If $x = 4$ cm and $y = 3$ cm, determine the area of the triangle and the volume of the triangular prism.

a) $\text{Area} = \dfrac{\text{base} \times \text{height}}{2}$

$= \dfrac{(5x^2y^3)(4xy^2)}{2}$

$= \left(\dfrac{5 \times 4}{2}\right)(x^{2+1})(y^{3+2})$

$= 10x^3y^5 \text{ cm}^2$

14. The length of a triangle's base is $5x^2y^3$ cm and its height is $4xy^2$ cm.

a) Determine a simplified expression for the area of the triangle.

b) If the triangle is the base of a prism with a length of x cm, find a simplified expression for the volume of the prism.

c) If $x = 4$ cm and $y = 3$ cm, determine the area of the triangle and the volume of the triangular prism.

$\text{Area} = 10x^3y^5 \text{ cm}^2$

b) $\text{Vol} = \text{cross-sectional area} \times \text{length}$

$= (10x^3y^5)(x)$

$= (10)(x^{3+1})(y^5)$

$= 10x^4y^5 \text{ cm}^3$

14. The length of a triangle's base is $5x^2y^3$ cm and its height is $4xy^2$ cm.

a) Determine a simplified expression for the area of the triangle.

b) If the triangle is the base of a prism with a length of x cm, find a simplified expression for the volume of the prism.

c) If $x = 4$ cm and $y = 3$ cm, determine the area of the triangle and the volume of the triangular prism.

c) Area $= 10x^3y^5$

$= 10(4)^3(3)^5$

$= 10(64)(243)$

$= 155,520 cm^2$

Vol $= 10x^4y^5$

$= 10(4)^4(3)^5$

$= 10(256)(243)$

$= 622,080 cm^3$