

Name: _____

Simplify each of the following.

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

a^{1+2+3}

a^6

2) $(2a^2b)(4ab^2)$

$2 \cdot 4 \cdot a^{2+1} b^{1+2}$

$8a^3b^3$

3) $(6x^2)(-3x^5)$

$6 \cdot -3 x^{2+5}$

$-18x^7$

4) $b^3 \cdot b^4 \cdot b^7 \cdot b$

$b^{3+4+7+1}$

b^{15}

5) $(3x^3)(3x^4)(-3x^2)$

$3 \cdot 3 \cdot -3 x^{3+4+2}$

$-27x^9$

6) $(2x^2y^3)^2$

$2^2 x^{2 \cdot 2} y^{3 \cdot 2}$

$4x^4y^6$

7) $(5x^2y^4)^3$

$5^3 x^{2 \cdot 3} y^{4 \cdot 3}$

$125x^6y^{12}$

8) $(6x^4y^6)^3$

$6^3 x^{4 \cdot 3} y^{6 \cdot 3}$

$216x^{12}y^{18}$

9) $(4x^3y^3)^3$

$4^3 x^{3 \cdot 3} y^{3 \cdot 3}$

$64x^9y^9$

10) $(7xy)^2$

$7^2 x^2 y^2$

$49x^2y^2$

11) $\frac{x^3}{x}$

x^{3-1}

x^2

12) $\frac{18c^3}{-3c^2}$

$\frac{18}{-3} c^{3-2}$

$-6c^1$

$-6c$

13) $\frac{9a^3b^5}{-3ab^2}$

$\frac{9}{-3} a^{3-1} b^{5-2}$

$-3a^2b^3$

14) $\frac{-48c^2d^4}{-8cd}$

$\frac{-48}{-8} c^{2-1} d^{4-1}$

$6cd^3$

$6cd^3$

15) $\frac{22y^6z^8}{2yz^{-7}}$

$\frac{22}{2} y^{6-1} z^{8-(-7)}$

$11y^5z^{15}$

$$16) x^2 \cdot x^7$$

$$x^{2+7}$$

$$\boxed{x^9}$$

$$17) (x^2)^7$$

$$x^{2 \cdot 7}$$

$$\boxed{x^{14}}$$

$$18) (-2x^4)^5$$

$$(-2)^5 x^{4 \cdot 5}$$

$$\boxed{-32x^{20}}$$

$$19) 7^0$$

$$\boxed{1}$$

$$20) 8x^0$$

$$8 \cdot 1$$

$$\boxed{8}$$

$$21) \frac{2x^3}{-8x^4}$$

$$\frac{2}{-8} x^{3-4}$$

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

$$\boxed{-\frac{1}{4x}}$$

$$22) \frac{xy^7}{x^3y^4}$$

$$x^{1-3} y^{7-4}$$

$$x^{-2} y^3$$

$$\frac{y^3}{x^2}$$

$$23) 6x^5 \cdot 3x^5 \cdot x^0$$

$$6 \cdot 3 \cdot x^{5+5+0}$$

$$\boxed{18x^{10}}$$

$$24) (3st^{12})^3$$

$$3^3 s^3 t^{12 \cdot 3}$$

$$\boxed{27s^3t^{36}}$$

$$25) \left(\frac{3m^2n^7}{m} \right)^5$$

$$\frac{3^5 m^{2 \cdot 5} n^{7 \cdot 5}}{m^5}$$

$$\frac{243m^{10}n^{35}}{m^5}$$

$$243m^{10-5}n^{35}$$

$$\boxed{243m^5n^{35}}$$

$$23) (u^2v^{-4})^4$$

$$u^{2 \cdot 4} v^{-4 \cdot 4} \Rightarrow u^8 v^{-16}$$

$$\frac{u^8}{v^{16}}$$

$$24) \frac{6u^3v^{-3}}{3u^4v^3}$$

$$\frac{6}{3} u^{3-4} v^{-3-3}$$

$$2u^{-1}v^{-6}$$

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

$$26) 3r^{-4} = \frac{3}{r^4}$$

$$25) (5a^4)^0 = \boxed{1}$$

whole base to

$$27) 4x^{-4} = \frac{4}{x^4}$$

$$29) \frac{4x^{-3}y^4}{7x^2y^{-4}}$$

$$\frac{4}{7} x^{-3-2} y^{4-4}$$

$$\frac{4}{7} x^{-5} y^8$$

$$\frac{4y^8}{7x^5}$$

$$30) \frac{3yx^4}{6x^3}$$

$$\frac{3}{6} x^{4-3} y$$

$$\frac{1}{2} x^1 y$$

$$\frac{xy}{2}$$