Name : _____ Score : _____

Teacher : _____ Date : _____

Exponents and Multiplication

Simplify. Your answer should contain only positive exponents.

1) $9s^{6} \cdot 7s^{-5}$

$63s$

2) $y^{-2} \cdot y^{2}$

$y^{0} = 1$

3) $r^{2}y^{6} \cdot 6r^{5}y^{3} \cdot 9ry^{5}$

$54r^{8}y^{14}$

4) $7^{-4} \cdot 7^{6}$

$7^{2} = 49$

5) $c^{5}d^{-2} \cdot 7c^{-5}d^{4} \cdot 5cd^{6}$

$35cd^{8}$

6) $ws \cdot 3w^{-6}s^{-4}$

$3w^{-5}s^{-3} = \frac{3}{w^{5}s^{3}}$

7) $2 \cdot 2^{6}$

$2^{7} = 128$

8) $2s^{2}y^{5} \cdot 3s^{6}y^{4}$

$6s^{8}y^{9}$

9) $y^{2} \cdot y^{4} \cdot y^{3}$

y^{9}

10) $7s^{6} \cdot 4s^{5}w^{2}$

$28s^{11}w^{2}$

11) $8d^{2} \cdot 7d^{-3}n^{6}$

$56n^{6}d^{-1} = \frac{56n^{6}}{d}$

12) $\left(\frac{3}{5}\right)^{2} \cdot \left(\frac{3}{5}\right)^{3} \cdot \left(\frac{3}{5}\right)^{5}$

$\left(\frac{3}{5}\right)^{10} = \frac{59049}{9765625}$

13) $6z^{2} \cdot 9z^{-4} \cdot 2z^{-3}$

$108z^{-5} = \frac{108}{z^{5}}$

14) $\left(\frac{1}{s}\right)^{3} \cdot \left(\frac{1}{s}\right)^{5} \cdot \left(\frac{1}{s}\right)^{2}$

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

Name : _____ Score : _____

Teacher : _____ Date : _____

Exponents and Division

Simplify. Your answer should contain only positive exponents.

1) $\frac{3g^{-5}c^{2}}{9g^{4}c^{-4}} = \frac{c^{6}}{3g^{9}}$

2) $\frac{4g^{-6}}{3g^{6}} = \frac{4}{3g^{12}}$

3) $\frac{8s^{-4}z^{-3}}{6sz^{-6}} = \frac{4z^{3}}{3s^{5}}$

4) $\frac{s}{s^{-6}} = s^{7}$

5) $\frac{2y^{5}g^{4}}{9yg^{2}} = \frac{2y^{4}g^{2}}{9}$

6) $\frac{g^{6}}{g^{2}} = g^{4}$

7) $\frac{8^{3}}{8^{5}} = \frac{1}{8^{2}} = \frac{1}{64}$

8) $\frac{5h^{-4}}{6h} = \frac{5}{6h^{5}}$

9) $\frac{ny}{4n^{5}y^{6}} = \frac{1}{4n^{4}y^{5}}$

10) $\frac{8c}{7c^{-5}} = \frac{8c^{6}}{7}$

11) $\frac{8^{6}}{8} = 8^{5} = 32768$

12) $\frac{5k^{5}}{4k^{6}z^{4}} = \frac{5}{4kz^{4}}$

Name : _____ Score : _____

Teacher : _____ Date : _____

Exponents with Multiplication and Division

Simplify. Your answer should contain only positive exponents.

1) $\frac{br}{9b^4r^5}$ $= \frac{1}{9b^3r^4}$

2) $\frac{7^2}{7^{-4}}$ $= 7^6 = 117649$

3) $6cn^{-3} \cdot 7c^{-4}n^2$ $42c^{-3}n^{-1} = \frac{42}{c^3n}$

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

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

6) $4k \cdot 6k^6$ $24k^7$

7) $\frac{5gw^{-4}}{3g^{-5}w^2}$ $= \frac{5g^6}{3w^6}$

8) $\frac{6d^2c^3}{8d^6c^5}$ $= \frac{3}{4d^4c^2}$

9) $\frac{3y^6s^5}{4ys^3}$ $= \frac{3y^5s^2}{4}$

10) $3b^5 \cdot 9b^{-5} \cdot 8b^{-2}$ $216b^{-2} = \frac{216}{b^2}$

11) $\left(\frac{5}{9}\right)^4 \cdot \left(\frac{5}{9}\right)^5$ $\left(\frac{5}{9}\right)^9 = \frac{1953125}{387420489}$

12) $g^5 \cdot g^{-3} \cdot g^{-5}$ $g^{-3} = \frac{1}{g^3}$

Name : _____ Score : _____

Teacher : _____ Date : _____

Operations with Exponents

Simplify the exponents.

1) $\left(\frac{8}{9}\right)^4 \cdot \left(\frac{8}{9}\right)^2 \cdot \left(\frac{8}{9}\right)^5$

$\left(\frac{8}{9}\right)^{11} = \frac{8589934592}{3.13 \times 10^{10}}$

2) $6b^3 \cdot 2b^5$

$12b^8$

3) $\left(\frac{5^5}{5}\right)^2 = (5^4)^2 = 5^8$

$= 390625$

4) $(4rb^4)^2$ $16r^2b^8$

5) $(4b^2 \cdot 2b^3)^2$

$(8b^5)^2 = 64b^{10}$

6) $\left(\frac{8n}{6n^5}\right)^2 = \left(\frac{4}{3n^4}\right)^2 = \frac{16}{9n^8}$

7) $\frac{yh}{3y^{-2}h^{-5}} = \frac{y^3h^6}{3}$

8) $\left(\frac{wg}{9w^5g^2}\right)^3 = \left(\frac{1}{9w^4g}\right)^3$

$\frac{1}{729w^{12}g^3}$

9) $(3b^2 \cdot b^3)^3$

$(3b^5)^3 = 27b^{15}$

10) $\frac{4b^6}{8b} = \frac{b^5}{2}$

11) $6w \cdot 4w^{-5} = 24w^{-4} = \frac{24}{w^4}$

12) $\frac{8^3}{8^4} = \frac{1}{8}$

Name : _____ Score : _____

Teacher : _____ Date : _____

Powers of Products

Simplify the exponents.

1) $(7rw^2)^2$ $49r^2w^4$

2) $(3w^6b)^2$ $9w^{12}b^2$

3) $(6g^3)^3$ $216g^9$

4) $(3w^2 \cdot 4w^2)^3$ $(12w^4)^3 = 1728w^{12}$

5) $(4n^3 \cdot n \cdot 3)^2$ $(12n^4)^2 = 144n^8$

6) $(2k \cdot 4k^3)^3$ $(8k^4)^3 = 512k^{12}$

7) $(2h^6w^5)^2$ $4h^{12}w^{10}$

8) $(3w^2 \cdot w^2 \cdot 4w)^3$ $(12w^5) = 1728w^{15}$

9) $(3d^2 \cdot 4d)^2$ $(12d^3)^2 = 144d^6$

10) $(4d^2 \cdot d)^3$ $(4d^3)^3 = 64d^9$

11) $(3z^3 \cdot 4z \cdot z^2)^2$ $(12z^6)^2 = 144z^{12}$

12) $(b \cdot 2b^2 \cdot b^2)^3$ $(2b^5)^3 = 8b^{15}$

13) $(4z \cdot 2z^3 \cdot z^2)^3$ $(8z^6)^3 = 512z^{18}$

14) $(r \cdot 3r^2)^2$ $(3r^3)^2 = 9r^6$

Name : _____ Score : _____

Teacher : _____ Date : _____

Powers of Products and Quotients

Simplify the exponents.

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

2) $(2w^2 \cdot w^3 \cdot 3w)^3$ $(6w^6)^3 = 216w^{18}$

3) $(2z^2 \cdot 4z^3 \cdot z)^3$ $(8z^6)^3 = 512z^{18}$

4) $(3h^3 \cdot h)^3$ $(3h^4)^3 = 27h^{12}$

5) $(5r^5w^3)^4$ $625r^{20}w^{12}$

6) $(7hc^2)^3$ $343h^3c^6$

7) $\left(\frac{3^3}{3}\right)^2$ $(3^2)^2 = 3^4 = 81$

8) $\left(\frac{8^2}{8^3}\right)^3$ $\left(\frac{1}{8}\right)^3 = \frac{1}{512}$

9) $\left(\frac{5r^5}{7r}\right)^2$ $\left(\frac{5r^4}{7}\right)^2 = \frac{25r^8}{49}$

10) $\left(\frac{d}{d^6}\right)^3$ $\left(\frac{1}{d^5}\right)^3 = \frac{1}{d^{15}}$

11) $\left(\frac{y^5}{y^6}\right)^2$ $\left(\frac{1}{y}\right)^2 = \frac{1}{y^2}$

12) $\left(\frac{6k}{4k^6}\right)^2$ $\left(\frac{3}{2k^5}\right)^2 = \frac{9}{4k^{10}}$

Name : _____ Score : _____

Teacher : _____ Date : _____

Powers of Quotients

Simplify the exponents.

1) $\left(\frac{9c^6k^5}{7ck^4}\right)^2$ $\left(\frac{9c^5k}{7}\right)^2 = \frac{81c^{10}k^2}{49}$

2) $\left(\frac{7d^4}{5d^6}\right)^2$ $\left(\frac{7}{5d^2}\right)^2 = \frac{49}{25d^4}$

3) $\left(\frac{5y^6}{8y^3z^4}\right)^2$ $\left(\frac{5y^3}{8z^4}\right)^2 = \frac{25y^6}{64z^8}$

4) $\left(\frac{2w}{8w^4}\right)^3$ $\left(\frac{1}{4w^3}\right)^3 = \frac{1}{64w^9}$

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

6) $\left(\frac{gc}{8g^6c^5}\right)^2$ $\left(\frac{1}{8g^5c^4}\right)^2 = \frac{1}{64g^{10}c^8}$

7) $\left(\frac{3ny^4}{9n^3y^2}\right)^2$

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

9) $\left(\frac{8n^3h^4}{7n^2h^6}\right)^2$ $\left(\frac{8n}{7h^2}\right)^2 = \frac{64n^2}{49h^4}$

10) $\left(\frac{7^3}{7}\right)^2$ $= (7^2)^2 = 7^4$

11) $\left(\frac{z}{z^3}\right)^3$ $= \left(\frac{1}{z^2}\right)^3 = \frac{1}{z^6}$

12) $\left(\frac{3n^2}{8n}\right)^2$ $\left(\frac{3n}{8}\right)^2 = \frac{9n^2}{64}$