

Unit 1 Review

Simplify. Your answer should contain only positive exponents.

1) $-3zx^2y^3 \cdot 3x^2 \cdot -3x^3y^2z^2$

$$27x^7y^5z^3$$

2) $3ac^4 \cdot 3ac^3 \cdot a^3b^3c^4$

$$9a^5b^3c^{11}$$

3) $(-4pm^4)^2$

$$16p^2m^8$$

4) $(2qp^3r^4)^2$

$$4q^2p^6r^8$$

5) $-\frac{4pq}{2m^2p^2q^3}$

$$-\frac{2}{m^2pq^2}$$

6) $\frac{2a^2b^3c^2}{a^4b^2c^2}$

$$\frac{2b}{a^2}$$

7) $-x^3y^4z^2 \cdot (2xy^3z^3)^4$

$$= -xy^4z^2 \cdot 16x^4y^{12}z^{12}$$

$$= -16x^5y^{16}z^{14}$$

$$8) \left(\frac{(2xy^4z^3)^4}{-x^4y^2z^3} \right)^2$$

$$= \left(\frac{16x^4y^{16}z^{12}}{-x^4y^2z^3} \right)^2$$

$$= (-16y^{14}z^9)^2$$

$$= \boxed{256y^{28}z^{18}}$$

$$9) \frac{3yx^4z^4}{2x^3y^2z^4 \cdot -4x^3z^3}$$

$$= \frac{3yx^4z^4}{-8x^6y^2z^7}$$

$$= \boxed{\frac{3}{-8x^2yz^3}}$$

$$10) -\frac{2pq}{(-2m^3p^4q^3)^4 \cdot -2mp^3q^3}$$

$$= \frac{-2pq}{16m^{12}p^{16}q^{12} \cdot -2mp^3q^3}$$

$$= \frac{-2pq}{-32m^{13}p^{19}q^{15}} = \boxed{\frac{1}{16m^{13}p^{18}q^{14}}}$$

Write each expression in exponential form.

$$11) \sqrt[4]{3x} = \boxed{(3x)^{1/4}}$$

$$12) \frac{1}{(\sqrt{10x})^5} = \boxed{(10x)^{-5/2}}$$

Write each expression in radical form.

$$13) n^{5/2} = \boxed{\sqrt{n^5}}$$

$$14) (2n)^{-1/4} = \boxed{\frac{1}{\sqrt[4]{2n}}}$$

Simplify.

15) $\sqrt{80m^6p^5q^9}$

$$= \sqrt{16 \cdot 5 \cdot m^6 \cdot p^4 \cdot p \cdot q^8 \cdot q}$$

$$= 4m^3p^2q^4\sqrt{5pq}$$

16) $5\sqrt{72a^4b^2c^3}$

$$= 5\sqrt{36 \cdot 2 \cdot a^4 \cdot b^2 \cdot c^2 \cdot c}$$

$$= 5 \cdot 6a^2bc\sqrt{2c}$$

$$= 30a^2bc\sqrt{2c}$$

17) $3\sqrt{3} - 2\sqrt{3} - 2\sqrt{2} + 2\sqrt{3}$

$$= 3\sqrt{3} - 2\sqrt{2}$$

18) $3\sqrt{54} + 3\sqrt{6} - \sqrt{24} - 2\sqrt{8}$

$$= 3\sqrt{9 \cdot 6} + 3\sqrt{6} - \sqrt{4 \cdot 6} - 2\sqrt{4 \cdot 2}$$

$$= 3 \cdot 3\sqrt{6} + 3\sqrt{6} - 2\sqrt{6} - 2 \cdot 2\sqrt{2}$$

$$= 9\sqrt{6} + 3\sqrt{6} - 2\sqrt{6} - 4\sqrt{2}$$

$$= 10\sqrt{6} - 4\sqrt{2}$$

19) $-3\sqrt{2} \cdot 4\sqrt{10}$

$$= -12\sqrt{20}$$

$$= -12\sqrt{4 \cdot 5}$$

$$= -12 \cdot 2\sqrt{5}$$

$$= -24\sqrt{5}$$

20) $-3\sqrt{15}(2 + 2\sqrt{10})$

$$= -6\sqrt{15} - 6\sqrt{150}$$

$$= -6\sqrt{15} - 6\sqrt{25 \cdot 6}$$

$$= -6\sqrt{15} - 6 \cdot 5\sqrt{6}$$

$$= -6\sqrt{15} - 30\sqrt{6}$$

21) $(5\sqrt{2} - 3\sqrt{5})(5\sqrt{3} - \sqrt{5})$

$$= 25\sqrt{6} - 5\sqrt{10} - 15\sqrt{15} + 3\sqrt{25}$$

$$= 25\sqrt{6} - 5\sqrt{10} - 15\sqrt{15} + 3 \cdot 5$$

$$= 25\sqrt{6} - 5\sqrt{10} - 15\sqrt{15} + 15$$

22) $\frac{5\sqrt{15}}{3\sqrt{48}} \cdot \frac{\sqrt{48}}{\sqrt{48}}$

$$= \frac{5\sqrt{720}}{3\sqrt{2304}}$$

$$= \frac{5\sqrt{144 \cdot 5}}{3 \cdot 48} = \frac{5 \cdot 12\sqrt{5}}{144}$$

$$= \frac{60\sqrt{5}}{144} = \frac{5\sqrt{5}}{12}$$

$$23) \frac{3\sqrt{5} + 5\sqrt{2}}{2\sqrt{15}} \cdot \frac{\sqrt{15}}{\sqrt{15}}$$

$$= \frac{3\sqrt{75} + 5\sqrt{30}}{2\sqrt{225}} = \frac{3 \cdot 5\sqrt{3} + 5\sqrt{30}}{30}$$

$$= \frac{3\sqrt{25 \cdot 3} + 5\sqrt{30}}{2 \cdot 15} = \frac{15\sqrt{3} + 5\sqrt{30}}{30}$$

$$= \frac{3\sqrt{3} + \sqrt{30}}{6}$$

$$25) \frac{3\sqrt{5} - 5}{2 - 4\sqrt{3}} \cdot \frac{2 + 4\sqrt{3}}{2 + 4\sqrt{3}}$$

$$= \frac{6\sqrt{5} + 12\sqrt{15} - 10 - 20\sqrt{3}}{4 + 8\sqrt{3} - 8\sqrt{3} - 16 \cdot 3}$$

$-16 \cdot 3 = -48$

$$= \frac{6\sqrt{5} + 12\sqrt{15} - 10 - 20\sqrt{3}}{-44} = \frac{3\sqrt{5} + 6\sqrt{15} - 5 - 10\sqrt{3}}{-22}$$

$$27) \frac{10}{3i} \cdot \frac{i}{i}$$

$$= \frac{10i}{3i^2}$$

$$= \frac{10i}{-3}$$

$$29) \frac{(1+7i)(4-4i)}{(4+4i)(4-4i)}$$

$$= \frac{4 - 4i + 28i - 28i^2}{16 - 16i + 16i - 16i^2}$$

$$= \frac{4 + 24i + 28}{16 + 16}$$

$$= \frac{32 + 24i}{32} = \frac{4 + 3i}{4}$$

$$24) \frac{5}{3+4\sqrt{3}} \cdot \frac{3-4\sqrt{3}}{3-4\sqrt{3}}$$

$$= \frac{15 - 20\sqrt{3}}{9 - 12\sqrt{3} + 12\sqrt{3} - 16 \cdot 3}$$

$-16 \cdot 3 = -48$

$$= \frac{15 - 20\sqrt{3}}{-39}$$

$$26) -7 - i + 6 + 3i + 1 + i$$

$$3i$$

$$28) \frac{10+7i}{-8i} \cdot \frac{i}{i}$$

$$= \frac{10i + 7i^2}{-8i^2}$$

$$= \frac{10i - 7}{8}$$