Math 114
Radicals & Rational Exponents Review

[1] Write in scientific notation.

[a] 10,000,000,000 [b] 238,000,000 [c] 0.000000032

[2] Write in standard notation.

[a] 4.12×10^{-6} [b] 9.27×10^{5}

[3] Simplify.

[a] $(b^3)^7$ [b] $g^5 g^7$ [c] $\dfrac{k^{13}}{k^5}$

[4] Simplify. (Your answer should use only positive exponents.)

[a] m^{-6} [b] $r^{-5}s^3$ [c] $3v^{-7}$

[5] Write using fractional and/or negative exponents, and simplify.

[a] $\sqrt[5]{j^8}$ [b] $\left(\sqrt[4]{e}\right)^{11}$ [c] $\sqrt{w^5}$ [d] $\left(\sqrt{f}\right)^9$

[e] $\sqrt[7]{z}$ [f] $\left(\dfrac{1}{\sqrt{u}}\right)^5$

[6] Simplify. You may write your answers using either radicals or fractional exponents.

[a] $\sqrt{98}$ [b] $\sqrt{108}$ [c] $\sqrt{q^{14}}$ [d] $\sqrt[6]{h^{24}}$

[e] $\left(c^{\frac{2}{3}}\right)^{\frac{6}{5}}$ [f] $t^{\frac{2}{5}}t^{\frac{1}{3}}$ [g] $\dfrac{a^{\frac{2}{3}}}{a^{\frac{1}{5}}}$ [h] $\left(49y^{-6}\right)^{\frac{1}{2}}$

[i] **DELETED** [j] **DELETED** [k] $5\sqrt{7}+8\sqrt{7}$ [l] $2\sqrt{6}-7\sqrt{6}$

[m] $\sqrt{108}-\sqrt{48}$ [n] $\sqrt{50x^7}-3x\sqrt{8x^5}$ [o] $\sqrt{30}\sqrt{18}$ [p] $m^6 m^{\frac{2}{3}}$

[q] $r^{\frac{3}{4}}r$ [r] $\sqrt{3}\left(4\sqrt{3}-\sqrt{6}\right)$ [s] $\left(\sqrt{2}+2\sqrt{3}\right)\left(4\sqrt{3}-\sqrt{6}\right)$

[7] Rationalize the denominator, and simplify.

[a] $\dfrac{1}{3\sqrt{5}}$ [b] $\dfrac{4}{7\sqrt{6}}$ [c] $\dfrac{6}{\sqrt{7}+3}$

[8] Divide. Rationalize the denominator and simplify, if possible.

[a] $\dfrac{\sqrt{72}}{\sqrt{9}}$ [b] $\dfrac{\sqrt{5}}{\sqrt{60}}$

[9] Divide. Write your answer using fractional exponents.

[a] $\dfrac{s^2}{\sqrt[4]{s}}$ [b] $\dfrac{\sqrt[3]{v}}{\sqrt[5]{v}}$

[10] Solve. Check your answers for full credit.

[a] $\sqrt[3]{j}=3$ [b] $\sqrt[5]{6u-9}=\sqrt[5]{5-u}$ [c] $\sqrt{4f-7}=11$ [d] $4+3\sqrt{w}=13$

[e] $17-2\sqrt{1-3z}=9$ [f] $q+\sqrt{q+11}=1$

[11] Simplify. Write your answers using radicals.

[a] $\sqrt{72h^7}$ [b] $\sqrt{20c^8t^{11}y^6}$ [c] $\sqrt{20a^7}\sqrt{15a^8}$

[d] $\left(5-\sqrt{3y}\right)\left(5+\sqrt{3y}\right)$ [e] $\dfrac{\sqrt{3}}{\sqrt{64d^6j}}$

[12] Find the distance between the points $(-2,7)$ and $(-5,-2)$.

[13] Find the equations of the following circles.

[a] center = (–4, –3), radius = 2 [b] center = (–2, 5), radius = 6

[14] Find the centers and radii of the following circles.

[a] $(x-7)^2+(y+4)^2=25$ [b] $(x-6)^2+(y-8)^2=100$

[c] $x^2+y^2-6x+8y-24=0$ [d] $x^2+y^2+4x+10y+12=0$

ANSWERS

[1] [a] 1×10^{10} [b] 2.38×10^{8} [c] 3.2×10^{-8}

[2] [a] 0.00000412 [b] 927,000

[3] [a] b^{21} [b] g^{12} [c] k^8

[4] [a] $\dfrac{1}{m^6}$ [b] $\dfrac{s^3}{r^5}$ [c] $\dfrac{3}{v^7}$

[5] [a] $j^{\frac{8}{5}}$ [b] $e^{\frac{11}{4}}$ [c] $w^{\frac{5}{2}}$ [d] $f^{\frac{9}{2}}$ [e] $z^{\frac{1}{7}}$

[f] $u^{-\frac{5}{2}}$

[6] [a] $7\sqrt{2}$ [b] $6\sqrt{3}$ [c] q^7 [d] h^4 [e] $c^{\frac{4}{5}}$

[f] $t^{\frac{11}{15}}$ [g] $a^{\frac{7}{15}}$ [h] $7y^{-3}$ [i] DELETED [j] DELETED

[k] $13\sqrt{7}$ [l] $-5\sqrt{6}$ [m] $2\sqrt{3}$ [n] $-x^3\sqrt{2x}$ [o] $6\sqrt{15}$

[p] $m^{\frac{20}{3}}$ [q] $r^{\frac{7}{4}}$ [r] $12-3\sqrt{2}$ [s] $24-6\sqrt{2}-2\sqrt{3}+4\sqrt{6}$

[7] [a] $\dfrac{\sqrt{5}}{15}$ [b] $\dfrac{2\sqrt{6}}{21}$ [c] $9-3\sqrt{7}$

[8] [a] $2\sqrt{2}$ [b] $\dfrac{\sqrt{3}}{6}$

[9] [a] $s^{\frac{7}{4}}$ [b] $v^{\frac{2}{15}}$

[10] [a] $j = 27$ [b] $u = 2$ [c] $f = 32$ [d] $w = 9$ [e] $z = -5$
[f] $q = -2$

[11] [a] $6h^3\sqrt{2h}$ [b] $2c^4t^5y^3\sqrt{5t}$ [c] $10a^7\sqrt{3a}$ [d] $25 - 3y$ [e] $\dfrac{\sqrt{3j}}{8d^3j}$

[12] $3\sqrt{10} \approx 9.487$

[13] [a] $(x+4)^2 + (y+3)^2 = 4$ [b] $(x+2)^2 + (y-5)^2 = 36$

[14] [a] center = (7, –4), radius = 5 [b] center = (6, 8), radius = 10
[a] center = (3, –4), radius = 7 [b] center = (–2, –5), radius = $\sqrt{17}$