Pre-Calculus 11 **Chapter 5 Review** **Score: _____**

Name: _____KEY_____ **Date: _____**

1. Simplify.

a) $\sqrt{54x^3y^4}$ $=3xy^2\sqrt{6x}$	b) $\sqrt[3]{192x^6y^{10}z^{13}}$ $=4x^2y^3z^4\sqrt[3]{3yz}$
c) $\sqrt[4]{81p^9q^{14}r^{22}}$ $=3p^2q^3r^5\sqrt[4]{pq^2r^2}$	d) $\sqrt[5]{32x^{11}y^{22}z^{33}}$ $=2x^2y^4z^6\sqrt[5]{xy^2z^3}$

2. Simplify.

a) $-4\sqrt{3}+12\sqrt{5}-8\sqrt{5}+9\sqrt{3}$ $=5\sqrt{3}+4\sqrt{5}$	b) $7\sqrt{12}-\sqrt{72}-\sqrt{75}+5\sqrt{18}$ $=14\sqrt{3}-6\sqrt{2}-5\sqrt{3}+15\sqrt{2}$ $=9\sqrt{3}+9\sqrt{2}$
c) $5\sqrt[3]{135x}-3\sqrt[3]{192x^2}-6\sqrt[3]{40x}+2\sqrt[3]{375x^2}$ $=15\sqrt[3]{5x}-12\sqrt[3]{3x^2}-12\sqrt[3]{5x}+10\sqrt[3]{3x^2}$ $=3\sqrt[3]{5x}-2\sqrt[3]{3x^2}$	d) $\frac{x\sqrt[3]{27x^2}}{5}+\frac{6\sqrt[3]{x^4}}{5}-\frac{4\sqrt[3]{8x^5}}{5}-\frac{3x\sqrt[3]{64x}}{5}$ $=\frac{3x\sqrt[3]{x^2}}{5}+\frac{6x\sqrt[3]{x}}{5}-\frac{8x\sqrt[3]{x^2}}{5}-\frac{12x\sqrt[3]{x}}{5}$ $=-x\sqrt[3]{x^2}-\frac{6x\sqrt[3]{x}}{5}$

3. Multiply and Simplify.

a) $\sqrt{98x}\times\sqrt{180x^3}$ $=\left(7\sqrt{2x}\right)\left(6x\sqrt{5x}\right)=42x^2\sqrt{10}$	b) $2\sqrt{5xy^3}\times\sqrt{10x^3y^2}$ $=\left(2y\sqrt{5xy}\right)\left(xy\sqrt{10x}\right)=10x^2y^2\sqrt{2y}$

c) $4\sqrt[3]{24x^5y^9z^{13}} \times 5\sqrt[3]{3x^3y^5z^4}$ $= 20\sqrt[3]{8\times 9x^8y^{14}z^{17}} = 40x^2y^4z^5\sqrt[3]{9x^2y^2z^2}$	d) $5\sqrt[4]{162c^5n^7p^6} \times 6\sqrt[4]{80c^9n^6p^5}$ $= 180c^3n^3p^2\sqrt[4]{10c^2np^3}$

4. Divide and Simplify.

a) $\dfrac{5\sqrt{6d^5h^7}}{7\sqrt{2d^2h^3}}$ $= \dfrac{5dh^2\sqrt{3d}}{7}$	b) $\dfrac{5\sqrt{10x^2y^3}}{\sqrt{60x^7y^2}}$ $= \dfrac{5\sqrt{y}}{x^2\sqrt{6x}} = \dfrac{5\sqrt{6xy}}{6x^3}$
c) $\dfrac{5x\sqrt[3]{35x^3y^5}}{15y\sqrt[3]{14x^4y^3}}$ $= \dfrac{\sqrt[3]{20x^2y^2}}{6y}$	d) $\dfrac{8xy\sqrt[3]{21x^2y^5z^3}}{6x^2z\sqrt[3]{28x^4y^7z^5}}$ $= \dfrac{2\sqrt[3]{6xyz}}{3x^2z^2}$

5. Expand and Simplify.

a) $\sqrt{2}\left(3\sqrt{6} - \sqrt{40}\right)$ $= 6\sqrt{3} - 4\sqrt{5}$	b) $2\sqrt{x}\left(\sqrt{45x^4} + 3\sqrt{18x} - 4\sqrt{3x^6}\right)$ $= 6x^2\sqrt{5x} + 18x\sqrt{2} - 8x^3\sqrt{3x}$
c) $2\sqrt[3]{3x^2}\left(5x\sqrt[3]{9x^5} + 4\sqrt[3]{18x^7}\right)$ $= 30x^2\sqrt[3]{x} + 24x^3\sqrt[3]{2}$	d) $5xy\sqrt[3]{2x^2y}\left(\sqrt[3]{12x^4y^4} - 3x\sqrt[3]{20x^3y^5} + 6y\sqrt[3]{36x^7y^{10}}\right)$ $= 10x^3y^2\sqrt[3]{3y^2} - 30x^3y^2\sqrt[3]{5x^2y} + 60x^4y^5\sqrt[3]{9y^2}$

6. Expand and Simplify.

a) $\left(\sqrt{5}+\sqrt{3}\right)\left(\sqrt{5}-\sqrt{3}\right)$ $=2$	b) $\left(2\sqrt{3}-3\sqrt{2}\right)\left(\sqrt{3}+4\sqrt{2}\right)$ $=5\sqrt{6}-18$
c) $\left(2\sqrt{x}-4\sqrt{y}\right)\left(5\sqrt{x}-3\sqrt{y}\right)$ $=10x-26\sqrt{xy}+12y$	d) $\left(2y\sqrt{5x}+6x\sqrt{2y}\right)\left(3y\sqrt{5x}+4x\sqrt{2y}\right)$ $=30xy^2+26xy\sqrt{10xy}+48x^2y$
e) $\left(6\sqrt[3]{4x}-5\sqrt[3]{2x^2}\right)\left(7\sqrt[3]{4x}-3\sqrt[3]{2x^2}\right)$ $=84\sqrt[3]{2x^2}-106x-15x\sqrt[3]{4x}$	f) $\left(x\sqrt[3]{2x^2y}+2y\sqrt[3]{4xy^2}\right)\left(5x\sqrt[3]{2x^2y}-y\sqrt[3]{4xy^2}\right)$ $=5x^3\sqrt[3]{4xy^2}-18x^2y^2-2y^3\sqrt[3]{2x^2y}$

7. Rationalize the denominator.

a) $\dfrac{\sqrt{3}+\sqrt{6}}{\sqrt{2}}$ $=\dfrac{\sqrt{6}+2\sqrt{3}}{2}$	b) $\dfrac{\sqrt{5x}+2\sqrt{3}}{4\sqrt{6x}}$ $=\dfrac{x\sqrt{30}+6\sqrt{2x}}{24x}$
c) $\dfrac{\sqrt[3]{4x^5}-\sqrt[3]{6x^4}}{\sqrt[3]{2x^2}}$ $=x\sqrt[3]{2}-\sqrt[3]{3x^2}$	d) $\dfrac{5\sqrt[3]{9x^2}+x\sqrt[3]{72x^4}}{5\sqrt[3]{3x^5}}$ $=\dfrac{5\sqrt[3]{3}+8x\sqrt[3]{3x^2}}{5x}$

8. Rationalize the denominator.

a) $\dfrac{2\sqrt{3}-5}{\sqrt{3}+4}$ $=\dfrac{26-13\sqrt{3}}{-13}=-2+\sqrt{3}$	b) $\dfrac{3\sqrt{6}+2\sqrt{5}}{2\sqrt{3}-4\sqrt{5}}$ $=\dfrac{18\sqrt{2}+12\sqrt{30}+4\sqrt{15}+40}{-68}$
c) $\dfrac{2\sqrt{5x}-4\sqrt{7}}{3\sqrt{5x}-2\sqrt{7}}$ $=\dfrac{30x-8\sqrt{35x}-56}{45x-28}$	d) $\dfrac{\sqrt{4x}+\sqrt{5y}}{3\sqrt{x}+4\sqrt{5y}}$ $=\dfrac{6x-5\sqrt{5xy}+20y}{9x-80y}$

9. Solve.

a) $\sqrt{4x-7}=5$ $x=8$	b) $-16+5\sqrt{2x+3}=19$ $x=23$
c) $2x-2\sqrt{x^2-2}=4$ $\dfrac{3}{2}=x$	d) $2+\sqrt[3]{4-2x}=-4$ $x=110$
e) $\sqrt{6x-5}-\sqrt{x+4}=2$ $25x^2-146x+105=0$ $x=5$	f) $\sqrt{3x-5}-3=\sqrt{x+2}-2$ $x=7$

10. Solve for the variable indicated.

a) $r=\sqrt{\frac{kq}{E}}$, for q $\frac{Er^2}{k}=q$	b) $t=\sqrt{\frac{2Y-2y-2vt}{a}}$, for v $\frac{at^2-2Y+2y}{2t}=v$
c) $L=\frac{l}{\sqrt{1-\frac{v^2}{c^2}}}$, for v $\pm\sqrt{\frac{c^2\left(L^2-l^2\right)}{L^2}}=v$ Or $v=\sqrt{c^2\left(1-\left(\frac{l}{L}\right)^2\right)}$	d) $E=\frac{kqz}{\left(z^2+R^2\right)^{3/2}}$, for R $R=\pm\sqrt{\left(\frac{kqz}{E}\right)^{2/3}-z^2}$

11. At the scene of an accident, police can estimate the speed a car had been travelling by the length of the skid marks. One formula used for this purpose is $v=-7+8.2\sqrt{d}$, where v is the speed in kilometres per hour and d is the length of the skid mark in metres.
    a. Solve the formula for d.
    b. How long would be the skid marks of a car braking from 90 km/h?
    c. What was the speed of the car if the length of its skid marks were 100m?

a) $\left(\frac{v+7}{8.2}\right)^2=d$

b) $139.93\,m=d$

c) $v=75\,km/h$