Math 2200 **Chapter 5 Review** **Name: _______________**

Part I: **Multiple Choice. Write the correct answer in the space provided at the end of this section.**

1. What is the simplest form of $\sqrt[3]{54x^5y^6z^8}$?

   (A) $2xy^2z^2\sqrt[3]{3x^2z^2}$

   (B) $3x^2y^3z^4\sqrt[3]{6x}$

   (C) $3xy^3z^2\sqrt[3]{2x^2z^2}$

   (D) $3xy^2z^2\sqrt[3]{2x^2z^2}$

$\sqrt[3]{54}$ $\sqrt[3]{x^5}$ $\sqrt[3]{y^6}$ $\sqrt[3]{z^8}$

$6\cdot 9$

$2\cdot(3\;\;3\cdot 3)$

$\sqrt[3]{3^3\cdot 2}$

$3\sqrt[3]{2}$

$\sqrt[3]{(x\cdot x\cdot x)x\cdot x}$

$\sqrt[3]{x^3}\cdot x\cdot x$

$x\sqrt[3]{x^2}$

$y^{\frac{6}{3}}$

y^2

$z^{\frac{8}{3}}$

$z^{\frac{6}{3}+\frac{2}{3}}$

$z^2\cdot z^{\frac{2}{3}}$

$z^2\sqrt[3]{z^2}$

$3xy^2z^2\sqrt[3]{2x^2z^2}$

2. Simplify completely: $\frac{2}{7}\sqrt{98}-\frac{3}{2}\sqrt{8}+\frac{4}{5}\sqrt{50}$

   (A) $3\sqrt{2}$

   (B) $5\sqrt{2}$

   (C) $9\sqrt{2}$

   (D) $28\sqrt{2}$

$= \frac{2}{7}\sqrt{49}\sqrt{2} - \frac{3}{2}\sqrt{4}\sqrt{2} + \frac{4}{5}\sqrt{25}\sqrt{2}$

$= \frac{2}{\cancel{7}}\cdot\cancel{7}\sqrt{2} - \frac{3}{\cancel{2}}\cdot\cancel{2}\sqrt{2} + \frac{4}{\cancel{5}}\cdot\cancel{5}\sqrt{2}$

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

$= 3\sqrt{2}$

3. Simplify completely: $\dfrac{6\sqrt{12x^{16}}}{2\sqrt{18x^9}}$

   (A) $x\sqrt{16}$

   (B) $x^3\sqrt{6x}$

   (C) $\frac{3}{2}x^3\sqrt{3x}$

   (D) $\frac{3}{2}x^3\sqrt{6x}$

$= 3\sqrt{\dfrac{12x^{16}}{18x^9}}$

$= 3\sqrt{\dfrac{2x^7}{3}}$

$= \dfrac{3\sqrt{2x^7}\cdot\sqrt{3}}{\sqrt{3}\cdot\sqrt{3}}$

$= \dfrac{\cancel{3}\sqrt{6x^7}}{\cancel{3}}$

$= \sqrt{6(x\cdot x)(x\cdot x)(x\cdot x)x}$

$= \sqrt{\cancel{x^2}\,\cancel{x^2}\,\cancel{x^2}\cdot 6x}$

$= x\cdot x\cdot x\sqrt{6x}$

$= x^3\sqrt{6x}$

4. An incorrect simplification is provided. In which step does the **first** error occur?

Simplify: $\dfrac{\sqrt{3}+\sqrt{5}}{\sqrt{3}-\sqrt{5}}$

Solution: Step 1: $\dfrac{\sqrt{3}+\sqrt{5}}{\sqrt{3}-\sqrt{5}} \cdot \dfrac{\sqrt{3}+\sqrt{5}}{\sqrt{3}+\sqrt{5}}$

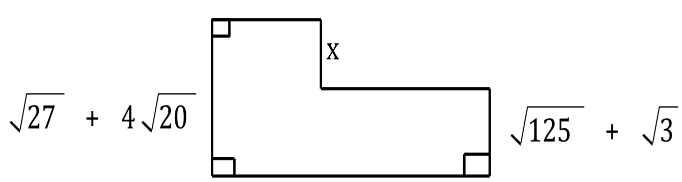
Step 2: $\dfrac{\sqrt{9}+\sqrt{25}}{\sqrt{9}-\sqrt{25}}$ $\qquad \dfrac{\sqrt{9}+2\sqrt{15}+\sqrt{25}}{\sqrt{9}-\sqrt{25}}$

Step 3: $\dfrac{3+5}{3-5}$

Step 4: 4

(A) 1
(B) 2
(C) 3
(D) 4

5. Determine a simplified expression for the value of $\boldsymbol{x}$:



(A) $2\sqrt{3}+\sqrt{5}$
(B) $2\sqrt{3}+3\sqrt{5}$
(C) $4\sqrt{3}+\sqrt{5}$
(D) $4\sqrt{3}+3\sqrt{5}$

$x = \sqrt{27} + 4\sqrt{20} - (\sqrt{125} + \sqrt{3})$

$x = \sqrt{9}\sqrt{3} + 4\sqrt{4}\sqrt{5} - \sqrt{25}\sqrt{5} - \sqrt{3}$

$x = 3\sqrt{3} + 8\sqrt{5} - 5\sqrt{5} - \sqrt{3}$

$x = 2\sqrt{3} + 3\sqrt{5}$

6. Write $4x^3y^2\sqrt{5xy}$ as an entire radical.

(A) $\sqrt{20x^7y^5}$

(B) $\sqrt{20x^{10}y^5}$

(C) $\sqrt{80x^7y^5}$

(D) $\sqrt{80x^{10}y^5}$

$= \sqrt{(4x^3y^2)^2} \cdot \sqrt{5xy}$

$= \sqrt{16x^6y^4 \cdot 5xy}$

$= \sqrt{80x^7y^5}$

7. Simplify completely: $\frac{\sqrt{6}}{\sqrt{3}+\sqrt{2}}$

(A) $3\sqrt{2} - 2\sqrt{3}$

(B) $3\sqrt{2} + 2\sqrt{3}$

(C) $\frac{3\sqrt{2} - 2\sqrt{3}}{5}$

(D) $\frac{3\sqrt{2} + 2\sqrt{3}}{5}$

$\frac{\sqrt{6}}{(\sqrt{3}+\sqrt{2})} \frac{(\sqrt{3}-\sqrt{2})}{(\sqrt{3}-\sqrt{2})}$

$= \frac{\sqrt{18}-\sqrt{12}}{3-2}$

$= \frac{\sqrt{9}\sqrt{2} - \sqrt{4}\sqrt{3}}{1}$

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

8. Simplify completely: $\frac{\sqrt[3]{2} \cdot \sqrt[3]{6} \cdot \sqrt[3]{6}}{\sqrt[3]{6} \cdot \sqrt[3]{6} \cdot \sqrt[3]{6}}$

(A) $\frac{\sqrt[3]{3}}{3}$

(B) $\frac{\sqrt[3]{9}}{3}$

(C) $\frac{\sqrt[3]{12}}{6}$

(D) $\frac{\sqrt[3]{72}}{6}$

$= \frac{\sqrt[3]{72}}{6}$

$= \frac{2\sqrt[3]{9}}{6}$

$= \frac{\sqrt[3]{9}}{3}$

$\sqrt[3]{72}$

$8 \cdot 9$

$(2\ 2\ 2)\ 3 \cdot 3$

$\sqrt[3]{2^3\ 3 \cdot 3}$

$2\sqrt[3]{9}$

9. What are the restrictions on x of the solution to the equation $\sqrt{-8-2x} = 7$?

(A) $x \le -4$

(B) $x \ge -4$

(C) $x \le 4$

(D) $x \ge 4$

$-8-2x \ge 0$

$\frac{-2x}{-2} \ge \frac{8}{-2}$

$x \le -4$

10. Solve: $\sqrt{5x} = 6$

(A) $x = \frac{6}{5}$

(B) $x = \frac{6}{\sqrt{5}}$

(C) $x = \frac{36}{25}$

(D) $x = \frac{36}{5}$

$(\sqrt{5x})^2 = (6)^2$

$\frac{5x}{5} = \frac{36}{5}$

$x = 36/5$

11. Solve $\sqrt{7x-5} = \sqrt{x-6}$

(A) $x = -\frac{11}{6}$

(B) $x = -\frac{11}{8}$

(C) $x = -\frac{1}{6}$

(D) $x = -\frac{1}{8}$

$(\sqrt{7x-5})^2 = (\sqrt{x-6})^2$

$7x-5 = x-6$

$7x-x = -6+5$

$\frac{6x}{6} = \frac{-1}{6}$

$x = -1/6$

12. Solve $\sqrt{2x+1} = -5$

(A) $x = -3$

(B) $x = 2$

(C) $x = 12$

(D) no solution

Answers to multiple choice.

1.___ **2.___** **3.___** **4.___** **5.___**

6.___ **7.___** **8.___** **9.___** **10.___**

11.___ **12.___**

Part II: Constructed Response. Answer each question in the space provided.

13. Rationalize the denominator and simplify: $\frac{\sqrt{6}}{4-\sqrt{2x}}$

$$\frac{\sqrt{6}}{4-\sqrt{2x}}\frac{(4+\sqrt{2x})}{(4+\sqrt{2x})}$$

$$= \frac{4\sqrt{6}+\sqrt{12x}}{16-2x}$$

$$= \frac{4\sqrt{6}+\sqrt{4}\sqrt{3x}}{16-2x}$$

$$= \frac{4\sqrt{6}+2\sqrt{3x}}{16-2x}$$

$$= \frac{2\sqrt{6}+\sqrt{3x}}{8-x}$$

14. State restrictions on the variable and solve. Be sure to check for extraneous roots:

$$n - \sqrt{3-n} = -9$$

$3 - n \geq 0$

$3 \geq n$

$n \leq 3$

$(n+9)^2 = (\sqrt{3-n})^2$

$n^2 + 18n + 81 = 3 - n$

$n^2 + 18n + n + 81 - 3 = 0$

$n^2 + 19n + 78 = 0$

$(n+6)(n+13) = 0$

$\boxed{n = -6}$, $\cancel{n = -13}$

Check:

$-6 - \sqrt{3-(-6)} \stackrel{?}{=} -9$

$-6 - \sqrt{9} = -9$

$-6 - 3 = -9$

$-9 = -9$ ✓

$-13 - \sqrt{3-(-13)} = -9$

$-13 - \sqrt{16} = -9$

$-13 - 4 = -9$

$-17 \neq -9$ X

15. State restrictions on the variable and solve. Be sure to check for extraneous roots:

$$\frac{1}{2}m - \sqrt{13 - m} = -1$$

$13 - m \geq 0$

$13 \geq m$

$m \leq 13$

$2 \cdot \frac{1}{2}m - 2\sqrt{13-m} = 2(-1)$

$m - 2\sqrt{13-m} = -2$

$(m+2)^2 = (2\sqrt{13-m})^2$

$m^2 + 4m + 4 = 4(13-m)$

$m^2 + 4m + 4 = 52 - 4m$

$m^2 + 4m + 4m + 4 - 52 = 0$

$m^2 + 8m - 48 = 0$

$(m+12)(m-4) = 0$

Check: $\cancel{m = -12}$, $\boxed{m = 4}$

$\frac{1}{2}(-12) - \sqrt{13-(-12)} = -1$

$-6 - \sqrt{25} = -1$

$-6 - 5 = -1$

$-11 \neq -1$ X

$\frac{1}{2}(4) - \sqrt{13-(4)} = -1$

$2 - \sqrt{9} = -1$

$2 - 3 = -1$

$-1 = -1$ ✓

16. State restrictions on the variable and solve. Be sure to check for extraneous roots:

$$\sqrt{m+19} + \sqrt{m-2} = 7$$

$m+19 \geq 0$

$m \geq -19$

$m-2 \geq 0$

$m \geq 2$

$(\sqrt{m+19})^2 = (7 - \sqrt{m-2})^2$

$\cancel{m} + 19 = 49 - 14\sqrt{m-2} + \cancel{m} - 2$

$14\sqrt{m-2} = 49 - 19 - 2$

$\dfrac{14\sqrt{m-2}}{14} = \dfrac{28}{14}$

$(\sqrt{m-2})^2 = (2)^2$

$m - 2 = 4$

$m = 4 + 2$

$m = 6$

$(\quad) = (\quad)$

Check:

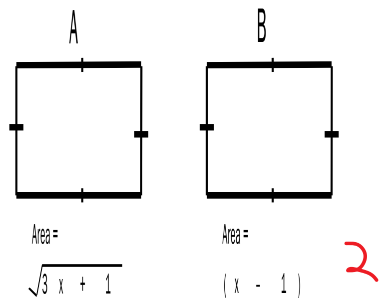
$\sqrt{6+19} + \sqrt{6-2} = 7$

$\sqrt{25} + \sqrt{4} = 7$

$5 + 2 = 7$

$7 = 7$ ✓

17. The areas of congruent squares A and B are represented by $\sqrt{3x+1}$ square units and $(x-1)$ square units, respectively. Algebraically determine the area of each square.



$3x + \cancel{1} = x^2 - 2x + \cancel{1}$

$0 = x^2 - 2x - 3x$

$x^2 - 5x = 0$

$x(x-5) = 0$

$\cancel{x=0}, x = 5$

$\sqrt{3(0)+1} = 0 - 1$

$\sqrt{1} = -1$

$1 \neq -1$

$\sqrt{3(5)+1} = 5 - 1$

$\sqrt{15+1} = 4$

$\sqrt{16} = 4$

$4 = 4$

Area of square is 4 units^2

18. The formula $s = 2\pi\sqrt{\frac{l}{32}}$ represents the swing of a pendulum, where s is the time, in seconds, to swing back and forth, and l is the length of the pendulum, in feet.

(A) Solve the formula for *l*.

$$\frac{s}{2\pi} = \frac{\cancel{2\pi}\sqrt{\frac{l}{32}}}{\cancel{2\pi}}$$

$$\left(\frac{s}{2\pi}\right)^2 = \left(\sqrt{\frac{l}{32}}\right)^2$$

$$32 \cdot \frac{s^2}{4\pi^2} = \frac{l}{\cancel{32}} \cdot \cancel{32}$$

$$\to l = \frac{32s^2}{4\pi^2}$$

$$l = \frac{8s^2}{\pi^2}$$

(B) What is the length of a pendulum that makes one swing in 1.5 s?

$$l = \frac{8(1.5)^2}{\pi^2} = 1.8\text{ ft}$$