Pre-Calculus 11 Chapter 5 Practice test. Name: KEY

**1.** What is the entire radical form of $-3(\sqrt[3]{2})$?

$-\sqrt[3]{27 \cdot 2}$

**A** $\sqrt[3]{54}$ **B** $\sqrt[3]{-54}$ **C** $\sqrt[3]{-18}$ **D** $\sqrt[3]{18}$

**2.** What is the condition on the variable in $2\sqrt{-7n}$ for the radicand to be a real number?

**A** $n \geq 7$ **B** $n \leq -7$ **C** $n \geq 0$ **D** $n \leq 0$

**3.** What is the simplest form of the sum $-2x\sqrt{6x} + 5x\sqrt{6x}$, $x \geq 0$?

**A** $3\sqrt{6x}$ **B** $6\sqrt{12x}$ **C** $3x\sqrt{6x}$ **D** $6x\sqrt{12}$

**4.** What is the product of $\sqrt{540}$ and $\sqrt{6y}$, $y \geq 0$, in simplest form?

**A** $3y\sqrt{360}$ **B** $6y\sqrt{90}$ **C** $10\sqrt{32y}$ **D** $18\sqrt{10y}$

**5.** Determine any root of the equation, $x + 7 = \sqrt{23 - x}$, where $x \leq 23$.

**A** $x = 13$ **C** $x = 2$ and $13$

**B** $x = -2$ **D** $x = -2$ and $-13$

$x^2 + 14x + 49 = 23 - x$

$x^2 + 15x + 26 = 0$

$(x+13)(x+2) = 0$

**6.** Suppose $\frac{5}{7}\sqrt{\frac{3}{2}}$ is written in simplest form as $a\sqrt{b}$, where $a$ is a real number and $b$ is an integer. What is the value of $b$?

$\frac{5}{7}\sqrt{\frac{3 \cdot 2}{2 \cdot 2}} = \frac{5}{14}\sqrt{6}$

**A** 2 **B** 3 **C** 6 **D** 14

**7.** Order the following numbers from least to greatest:

$3\sqrt{11}, 5\sqrt{6}, 9\sqrt{2}, \sqrt{160}$

$\sqrt{99}, \sqrt{150}, \sqrt{162}, \sqrt{160}$

* $3\sqrt{11}, 5\sqrt{6}, \sqrt{160}, 9\sqrt{2}$

**8.** Express as a radical in simplest form. $\dfrac{(2\sqrt{5n})(3\sqrt{8n})}{1-12\sqrt{2}}$, $n \geq 0$.

multiply by conjugate $(1+12\sqrt{2})$

$$\frac{12n\sqrt{10}\,(1+12\sqrt{2})}{1-288}$$

$$= \frac{12n\sqrt{10}+288n\sqrt{5}}{-287}$$

**9.** Solve $3-x=\sqrt{x^2-5}$. State any extraneous roots that you found. Identify the values of $x$ for which the radical is defined.

$$(3-x)^2 = (\sqrt{x^2-5})^2$$

$$9-6x+x^2 = x^2-5$$

$$9-6x=-5$$

$$9+5=6x$$

$$\frac{7}{3}=x$$

check

$$3-\frac{7}{3} \stackrel{?}{=} \sqrt{\left(\frac{7}{3}\right)^2-5}$$

$$\frac{2}{3} = \sqrt{\frac{49}{9}-\frac{45}{9}} = \sqrt{\frac{4}{9}}$$ ✓

**10.** Solve $(\sqrt{9y+1})^2=(3+\sqrt{4y-2})^2$, $y \geq \frac{1}{2}$. Verify your solution. Justify your method. Identify any extraneous roots that you found.

$$9y+1 = 9+6\sqrt{4y-2}+4y-2$$

$$(5y-6)^2=(6\sqrt{4y-2})^2$$

$$25y^2-60y+36 = 36(4y-2)$$

$$25y^2-60y+36 = 144y-72$$

$$25y^2-204y+108=0$$

$$y=\frac{204\pm\sqrt{(-204)^2-4(25)(108)}}{50}$$

$$=\frac{204\pm\sqrt{30816}}{50}$$

$$=\frac{204\pm 12\sqrt{214}}{50}$$

$$\frac{102+6\sqrt{214}}{25}$$

$$\frac{102-6\sqrt{214}}{25}$$ extraneous root!

Solution: $y=\dfrac{102+6\sqrt{214}}{25}$ ✓

**11.** Michael started to simplify $\sqrt{450}$ by rewriting 450 as a product of prime factors: $\sqrt{2(3)(3)(5)(5)}$. Explain how he can convert his expression to a mixed radical.

After radicand is turned to prime factors, then take out pairs of prime factors $5\cdot 3\sqrt{2(3)(3)(5)(5)} = 15\sqrt{2}$

**12.** You wish to rationalize the denominator in each expression. By what number will you multiply each expression? Justify your answer.

**a)** $\frac{4}{\sqrt{6}} \cdot \frac{\sqrt{6}}{\sqrt{6}}$

$= \frac{4\sqrt{6}}{6}$

$= \boxed{\frac{2\sqrt{6}}{3}}$

**b)** $\frac{22}{\sqrt{y-3}} \cdot \frac{\sqrt{y-3}}{\sqrt{y-3}}$

$= \boxed{\frac{22\sqrt{y-3}}{y-3}}$

**c)** $\frac{2}{\sqrt[3]{7}} \cdot \frac{\sqrt[3]{49}}{\sqrt[3]{49}}$

$= \boxed{\frac{2\sqrt[3]{49}}{7}}$

**13.** A 100-W light bulb operates with a current of 0.5 A. The formula relating current, $I$, in amperes (A); power, $P$, in watts (W); and resistance, $R$, in ohms (Ω), is $I = \sqrt{\frac{P}{R}}$.

**a)** Isolate $R$ in the formula.

$(I)^2 = \left(\sqrt{\frac{P}{R}}\right)^2$

$I^2 = \frac{P}{R}$

$\boxed{R = \frac{P}{I^2}}$

**b)** What is the resistance in the light bulb?

$R = \frac{100}{(0.5)^2} = \frac{100}{0.25} = \frac{400}{0.25} = \boxed{400\,\Omega}$