Warm-ups on 5.4/5.5

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Warm-up – Quiz next Class on 5.4/5.5

① Simplify a) $(\sqrt{15}-\sqrt{5})^2$

$= (\sqrt{15}-\sqrt{5})(\sqrt{15}-\sqrt{5})$

$= 15 + 5 - \sqrt{75} - \sqrt{75}$

$= 20 - 2\sqrt{75} = \boxed{20 - 10\sqrt{3}}$

$\sqrt{75}$: $5 \cdot 5 \cdot 3$

b) $\dfrac{\sqrt[3]{x^2}}{\sqrt[4]{x^9}} = \dfrac{x^{2/3}}{x^{9/4}}$

$= x^{2/3 - 9/4} = x^{\frac{8}{12} - \frac{27}{12}}$

$= x^{-\frac{19}{12}} = \dfrac{1}{x^{19/12}}$

$= \dfrac{1}{\sqrt[12]{x^{19}}} = \boxed{\dfrac{1}{x\sqrt[12]{x^7}}}$

② Rationalize the denominator

a) $\dfrac{\sqrt[4]{x^3}}{\sqrt[4]{5}}$

$\cdot \dfrac{\sqrt[4]{5^3}}{\sqrt[4]{5^3}}$

$= \dfrac{\sqrt[4]{5^3 x^3}}{\sqrt[4]{5^4}} = \boxed{\dfrac{\sqrt[4]{5^3 x^3}}{5}}$

b) $\dfrac{\sqrt{3}-2}{-\sqrt{15}\ominus 7}$

$\cdot \dfrac{-\sqrt{15}+7}{-\sqrt{15}\oplus 7}$ ← conjugate

$= \dfrac{(\sqrt{3}-2)(-\sqrt{15}+7)}{(-\sqrt{15}-7)(-\sqrt{15}+7)}$

$= \dfrac{-\sqrt{45} + 7\sqrt{3} + 2\sqrt{15} - 14}{15 - 49 + 7\sqrt{15} - 7\sqrt{15}}$ ← $\sqrt{45}$: $9 \cdot 5$

$= \boxed{\dfrac{3\sqrt{5} - 7\sqrt{3} - 2\sqrt{15} + 14}{34}}$

$-5 * 5 \Rightarrow (-5)^2 = (5)^2$

(3) Solve and check answers $2x = 3\sqrt{x-1} + 1$

$\Rightarrow (2x-1)^2 = (3\sqrt{x-1})^2$

$(2x-1)(2x-1) = (3\sqrt{x-1})(3\sqrt{x-1})$

$4x^2 - 4x + 1 = 9(x-1)$

$4x^2 - 4x + 1 = 9x - 9$

$4x^2 - 13x + 10 = 0$

$$x = \frac{-(-13) \pm \sqrt{(-13)^2 - 4(4)(10)}}{2(4)}$$

$$x = \frac{13 \pm \sqrt{169-160}}{8} = \frac{13 \pm 3}{8} = 2, \frac{5}{4}$$

check $x = 2$

$2(2) = 3\sqrt{2-1} + 1$

$4 = 3\sqrt{1} + 1$

$4 = 3 + 1$ ✓

$x = \frac{5}{4}$

$2\left(\frac{5}{4}\right) = 3\sqrt{\frac{5}{4} - 1} + 1$

$\frac{5}{2} = 3\sqrt{\frac{1}{4}} + 1$

$\frac{5}{2} = \frac{3}{2} + 1$ ✓