Indices and Surds Homework Answers

1.) a) $x^9/x^3 = x^{9-3} = \underline{\underline{x^6}}$

b) $(\sqrt{x})^6 = (x^{1/2})^6 = x^{1/2 \times 6} = \underline{\underline{x^3}}$

c) $(3x^5)^2 = 3^2(x^5)^2 = \underline{\underline{9x^{10}}}$

d) $\sqrt[3]{8}/x^6 = \dfrac{\sqrt[3]{8}}{\sqrt[3]{x^6}} = \dfrac{2}{(x^6)^{1/3}} = \underline{\underline{\dfrac{2}{x^2}}}$

e) $x^{-3}/x^{-5} = x^{-3-(-5)} = \underline{\underline{x^2}}$

2.) a) $x^4 = 256 \Rightarrow \underline{\underline{x = 4}}$

b) $x^{-3/4} = 8 \Rightarrow \dfrac{1}{x^{3/4}} = 8 \Rightarrow x^{3/4} = \dfrac{1}{8} \Rightarrow x = \left(\dfrac{1}{8}\right)^{\frac{4}{3}} = \left(\sqrt[3]{\dfrac{1}{8}}\right)^4$

$= \left(\dfrac{1}{2}\right)^4 = \underline{\underline{\dfrac{1}{16}}}$

c) $2^{2x+1} = \dfrac{1}{16} \qquad 2^{-4} = \dfrac{1}{16} \Rightarrow 2x+1 = -4$

$\Rightarrow 2x = -5 \Rightarrow x = \underline{\underline{-5/2}}$

3) a) $\sqrt{162} = \sqrt{81 \times 2} = \sqrt{81}\sqrt{2} = \underline{\underline{9\sqrt{2}}}$

b) $(3+\sqrt{5})(2-2\sqrt{5}) = 6 + 2\sqrt{5} - 6\sqrt{5} + (\sqrt{5})(-2\sqrt{5}) = 6 - 4\sqrt{5} - 10 = \underline{\underline{-4-4\sqrt{5}}}$

c) $\dfrac{6}{9-\sqrt{7}} = \dfrac{6}{9-\sqrt{7}} \dfrac{9+\sqrt{7}}{9+\sqrt{7}} = \dfrac{54+6\sqrt{7}}{81-7} = \underline{\underline{\dfrac{54+6\sqrt{7}}{74}}} = \underline{\underline{\dfrac{27+3\sqrt{7}}{37}}}$

d) $\sqrt{20} + 3\sqrt{180} - 5\sqrt{45} = \sqrt{4 \times 5} + 3\sqrt{36 \times 5} - 5\sqrt{9 \times 5}$

$= \sqrt{4}\sqrt{5} + 3\sqrt{36}\sqrt{5} - 5\sqrt{9}\sqrt{5} = 2\sqrt{5} + 18\sqrt{5} - 15\sqrt{5} = \underline{\underline{5\sqrt{5}}}$

4) a) $\dfrac{1}{2} \times 3\sqrt{5} \times 2\sqrt{7} = 3\sqrt{5}\sqrt{7} = 3\sqrt{35}$

either form OK

b.) $c = \sqrt{(3\sqrt{5})^2 + (2\sqrt{7})^2}$

$= \sqrt{45 + 28}$

$= \sqrt{73}$