Take Home Quiz # 2

- Justify and show the means by which you arrive at your answers using equations, pictures, calculations, geometry, algebra steps, and/or technology. *You will not receive full credit if your answer is not supported by work that is legible and organized.*
- Place a box around your final answer. *It won't be graded if you do not do this!*
- Make your answers and their presentation in a professional and easily understandable format ... make this your clearest and best work! *Points will be deducted for disorganized, sloppy work.*

8.4

Simplify the expressions

1. $\sqrt{12d^2} + \sqrt{75d^2} - \sqrt{27d^2}$

$$= \sqrt{4d^2}\sqrt{3} + \sqrt{25d^2}\sqrt{3} - \sqrt{9d^2}\sqrt{3}$$

$$= 2d\sqrt{3} + 5d\sqrt{3} - 3d\sqrt{3} = \boxed{4d\sqrt{3}}$$

2. $\sqrt[3]{6x^7y} \cdot \sqrt[3]{9x^4y^{12}} = \sqrt[3]{54x^{11}y^{13}}$

$$= \sqrt[3]{27x^9y^{12}}\sqrt[3]{2x^2y}$$

$$= \boxed{3x^3y^4\sqrt[3]{2x^2y}}$$

3. $(\sqrt{3} + 3\sqrt{5})(\sqrt{3} - 2\sqrt{5})$

$$= \sqrt{3}^2 - 2\sqrt{15} + 3\sqrt{15} - 6\sqrt{5}^2$$

$$= 3 + \sqrt{15} - 6 \cdot 5$$

$$= 3 + \sqrt{15} - 30$$

$$= \boxed{-27 + \sqrt{15}}$$

8.5

Simplify the radical expressions (rationalize the denominator):

4. $\dfrac{(\sqrt{a}+3)}{(\sqrt{a}+4)}\dfrac{(\sqrt{a}-4)}{(\sqrt{a}-4)} = \dfrac{a-4\sqrt{a}+3\sqrt{a}-12}{a-4\sqrt{a}+4\sqrt{a}-16}$

$$= \boxed{\dfrac{a-\sqrt{a}-12}{a-16}}$$

5. $\sqrt[3]{\dfrac{4}{6x}} = \sqrt[3]{\dfrac{2}{3x}}$

$= \dfrac{\sqrt[3]{2}}{\sqrt[3]{3x}} \cdot \dfrac{\sqrt[3]{3^2x^2}}{\sqrt[3]{3^2x^2}} = \dfrac{\sqrt[3]{18x^2}}{\sqrt[3]{3^3x^3}} = \boxed{\dfrac{\sqrt[3]{18x^2}}{3x}}$

6. $\dfrac{3}{\sqrt{2}+3} + \dfrac{5}{\sqrt{2}-3}$

$\dfrac{3}{(\sqrt{2}+3)}\dfrac{(\sqrt{2}-3)}{(\sqrt{2}-3)} + \dfrac{5}{(\sqrt{2}-3)}\dfrac{(\sqrt{2}+3)}{(\sqrt{2}+3)}$

$\dfrac{3\sqrt{2}-9}{2-9} + \dfrac{5\sqrt{2}+15}{2-9} = \dfrac{3\sqrt{2}-9}{-7} + \dfrac{5\sqrt{2}+15}{-7} = \dfrac{8\sqrt{2}+6}{-7}$

$= \boxed{-\dfrac{8\sqrt{2}+6}{7}}$ or $\boxed{\dfrac{-8\sqrt{2}-6}{7}}$

8.6

Solve the radical equations:

7. $\sqrt{3x-2}-5=0$

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

$3x-2=25$

$+2+2$

$\dfrac{3x^7}{3}=\dfrac{27}{3}$

$\boxed{x=9}$

check $\sqrt{3(9)-2}-5=0$

$\sqrt{25}-5=0$

$5-5=0$ ✓

8. $(2x+3)^{\frac{1}{4}}+7=10$

$(2x+3)^{\frac{1}{4}}=3$

$2x+3=3^4$

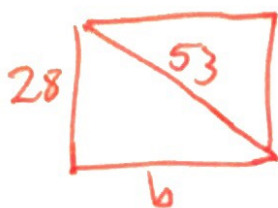$-3-3$

$\dfrac{2x}{2}=\dfrac{78}{2}$

$\boxed{x=39}$

9. Find the length of the segment with endpoints $(-3,5)$ and $(3,15)$ using the distance formula $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$. Write your answers in simplest radical form.

$$d = \sqrt{(3-(-3))^2 + (15-5)^2}$$
$$= \sqrt{6^2 + 10^2} \quad = \sqrt{36+100} = \sqrt{136} = \sqrt{4}\sqrt{34} = \boxed{2\sqrt{34}}$$

10. A 53-inch (diagonal) TV set has a screen with a height of 28 in. What is its width?

$$28^2 + b^2 = 53^2$$
$$784 + b^2 = 2809$$
$$-784 \qquad\qquad -784$$
$$b^2 = 2025$$
$$b = \sqrt{2025} = \boxed{45\,in.}$$

11. Find the product in the form $a + bi$: $(8 - 4i)(3 - 2i)$

$$= 24 - 16i - 12i + 8i^2$$
$$= 24 - 28i + 8(-1)$$
$$= 24 - 28i - 8 = \boxed{16 - 28i}$$

12. Find the quotient in the form $a + bi$: $\dfrac{6-3i}{4+2i}$

$$\frac{(6-3i)}{(4+2i)} \frac{(4-2i)}{(4-2i)} = \frac{24 - 12i - 12i + 6i^2}{16 + 4}$$
$$= \frac{24 - 24i - 6}{20}$$
$$= \frac{18 - 24i}{20}$$
$$= \frac{18}{20} - \frac{24}{20}i$$
$$= \boxed{\frac{9}{10} - \frac{6}{5}i}$$