First Name:_____   Last Name:_____

L58&59 – Cumulative Review

Q1: Simplify $x^2(3x^4)^2$

$$x^2 \cdot 3^2 \cdot x^8$$

$$3^2 x^{10}$$

$$\boxed{9x^{10}}$$

Q2: Simplify $\dfrac{(x^2 y^3 * x^6)^2}{x^5}$ $= \dfrac{(x^8 y^3)^2}{x^5} = \dfrac{x^{16} y^6}{x^5} = \boxed{x^{11} y^6}$

Q3: Simplify $(x^{-2} y^5)^{-2}$ using only positive exponents

$$x^{+4} y^{-10} = \boxed{\dfrac{x^4}{y^{10}}}$$

Q4: Simplify $\dfrac{(2x^2)^{-3} x^4}{2x^{-5}}$ using only positive exponents

$$\dfrac{2^{-3} x^{-6} x^4}{2x^{-5}} = \dfrac{x^4 \cdot x^5}{2 \cdot 2^3 \cdot x^6} = \dfrac{x^9}{2^4 x^6} = \dfrac{x^3}{2^4} = \boxed{\dfrac{x^3}{16}}$$

Part 3: Chapter 4 - Rational Laws

Q5: Simplify $\dfrac{x^{\frac{1}{2}}}{x^{-\frac{2}{3}}}$ using only positive exponents

$$\frac{x^{\frac{1}{2}} \cdot x^{\frac{2}{3}}}{1} = x^{\frac{1}{2} + \frac{2}{3}} = x^{\frac{3}{6} + \frac{4}{6}} = \boxed{x^{7/6}}$$

Q6: Simplify $\dfrac{\left(x^{\frac{1}{3}}\right)^{-\frac{3}{4}}}{x^{-\frac{5}{6}}}$ using only positive exponents

$$\frac{x^{-1/4}}{x^{-5/6}} = \frac{x^{5/6}}{x^{1/4}} = x^{\frac{5}{6} - \frac{1}{4}} = x^{\frac{10}{12} - \frac{3}{12}} = \boxed{x^{7/12}}$$
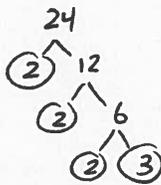
Part 4: Chapter 4 - Entire to Mixed Radicals

Q7: Convert $\sqrt{24x^5y^4}$ to a mixed radical

$$\sqrt{2 \cdot 2 \cdot 3 \cdot x^2 \cdot x^2 \cdot x \cdot y^2 \cdot y^2}$$

$$2 \cdot x \cdot x \cdot y \cdot y \sqrt{2 \cdot 3 \cdot x}$$
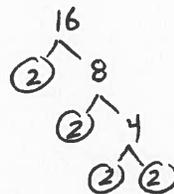
$$\boxed{2x^2y^2\sqrt{6x}}$$

24
(2) 12
(2) 6
(2) (3)

Q8: Convert $\sqrt[3]{16x^8y^2z^6}$ to a mixed radical

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

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

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

16
(2) 8
(2) 4
(2) (2)

Part 5: Chapter 4 - Mixed to Entire Radicals

Q9: Convert $5x^2y\sqrt{5x}$ to an entire radical

$$\sqrt{(5x^2y)^2}\sqrt{5x}$$

$$\sqrt{25x^4y^2}\sqrt{5x}$$

$$\sqrt{125x^5y^2}$$

Q10: Convert $4x^2y\sqrt[3]{2x^2y}$ to an entire radical

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

$$\sqrt[3]{64x^6y^3}\sqrt[3]{2x^2y}$$

$$\sqrt[3]{128x^8y^4}$$

Part 6: Chapter 4 - Radicals to Exponents, Exponents to Radicals

Q11: Convert $5x^2\sqrt[3]{5x}$ to an exponent

$$5x^2(5x)^{1/3}$$

$$5x^2 \cdot 5^{1/3} \cdot x^{1/3}$$

$$5^{1+1/3} \cdot x^{2+1/3}$$

$$\boxed{5^{4/3} \cdot x^{7/3}}$$

Q12: Convert $7^{\frac{2}{3}}x^{\frac{4}{3}}$ to a mixed radical

$$7^{2/3} \cdot x^{4/3}$$

$$(7^2 \cdot x^4)^{1/3}$$

$$\sqrt[3]{7^2 \cdot x^4}$$

$$\sqrt[3]{7^2 x^3 \cdot x}$$

$$x\sqrt[3]{7^2 \cdot x} \quad \text{or} \quad \boxed{x\sqrt[3]{49x}}$$

Part 7: Chapter 4 - Exponential Growth and Decay

Q13: Initially there are 200 bacteria in a sample. Every 5 hours the bacteria double. How many bacteria after 18 hours?

$$y = a(b)^{x/t}$$
$$y = 200(2)^{18/5}$$
$$y = 200(2)^{3.6}$$
$$y = 200(12.1257...)$$
$$\boxed{y = 2425 \text{ bacteria}}$$

Q14: Initially there are 500g of Carbon-14 in a sample. Every 5730 years the amount of Carbon-14 halves. How much Carbon-14 exists after 12,000 years?

$$y = a(b)^{x/t}$$
$$y = 500(0.5)^{\frac{12000}{5730}}$$
$$y = 500(0.5)^{2.094}$$
$$y = 500(0.23419...)$$
$$\boxed{y = 117.1 \text{ grams of Carbon-14 left}}$$

Part 8: Chapter 5 - Multiplying Polynomials

Q15: Simplify $(x - 5)(2x + 1)$

$$2x^2 + 1x - 10x - 5$$
$$\boxed{2x^2 - 9x - 5}$$

Q16: Simplify $(x - 5)^2 - (x + 2)(x - 3)$

$$(x-5)(x-5) - (x+2)(x-3)$$
$$(x^2 - 5x - 5x + 25) - (x^2 - 3x + 2x - 6)$$
$$(x^2 - 10x + 25) - (x^2 - x - 6)$$
$$x^2 - 10x + 25 \quad -x^2 + x + 6$$
$$\boxed{-9x + 31}$$

Part 9: Chapter 5 - Common Factors

Q17: Common factor $2x^2y - 8xy$

$$2xy(x-4)$$

Q18: Common factor $27x^2(y-3) + 3x(y-3)$

$$3x(y-3)\left[9x+1\right]$$

Part 10: Chapter 5 - Factoring Trinomials (a=1)

Q19: Factor $x^2 + 2x - 24$

$$\Downarrow$$

$$(x-4)(x+6)$$

$$-4 \quad +6$$
$$\square + \square = 2$$
$$\square \times \square = -24$$

1, 24
2, 12
3, 8
4, 6

Q20: Factor $2x^3 + 10x^2 - 48x$

$$2x(x^2 + 5x - 24)$$

$$\Downarrow$$

$$2x(x-3)(x+8)$$

$$-3 \quad +8$$
$$\square + \square = 5$$
$$\square \times \square = -24$$

1, 24
2, 12
3, 8
4, 6

Part 11: Chapter 5 - Factoring Trinomials (a>1)

Q21: Factor $2x^2 + x - 3$

$\Downarrow$

$$2x^2 - 2x + 3x - 3$$

$$(2x^2 - 2x) + (3x - 3)$$

$$2x(x-1) + 3(x-1)$$

$$\boxed{(x-1)(2x+3)}$$

$$\begin{array}{l} -2 \quad + \\ \Box + \Box = 1 \\ \Box \times \Box = -6 \end{array}$$

1,6
2,3

Q22: Factor $6x^2 - 11x - 10$

$\Downarrow$

$$6x^2 + 4x - 15x - 10$$

$$(6x^2 + 4x) + (-15x - 10)$$

$$2x(3x+2) - 5(3x+2)$$

$$\boxed{(3x+2)(2x-5)}$$

$$\begin{array}{l} +4 \quad -15 \\ \Box + \Box = -11 \\ \Box \times \Box = -60 \end{array}$$

1,60
2,30
3,20
4,15
5,12
6,10

Part 12: Chapter 5 - Factoring Special Trinomials

Q23: Factor $9x^2 - 16$

$$(3x + 4)(3x - 4)$$

Q24: Factor $3x^3y - 75xy$

$$3xy(x^2 - 25)$$

$$\boxed{3xy(x+5)(x-5)}$$

Part 13: Chapter 5 - Word Problems

Use the following information to answer Q25-Q26:

A portion of a field is fenced for a dog. The dimensions are given below, in meters.

40-x

x   x

40-x
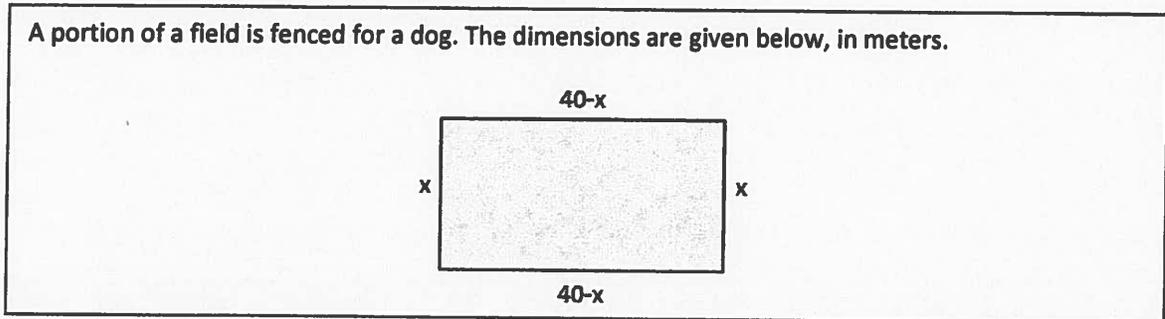
Q25: What is the perimeter of the fence?

$$P = (x) + (40-x) + (x) + (40-x)$$

$$\boxed{P = 80}$$

Q26: What is the area surrounded by the fence?

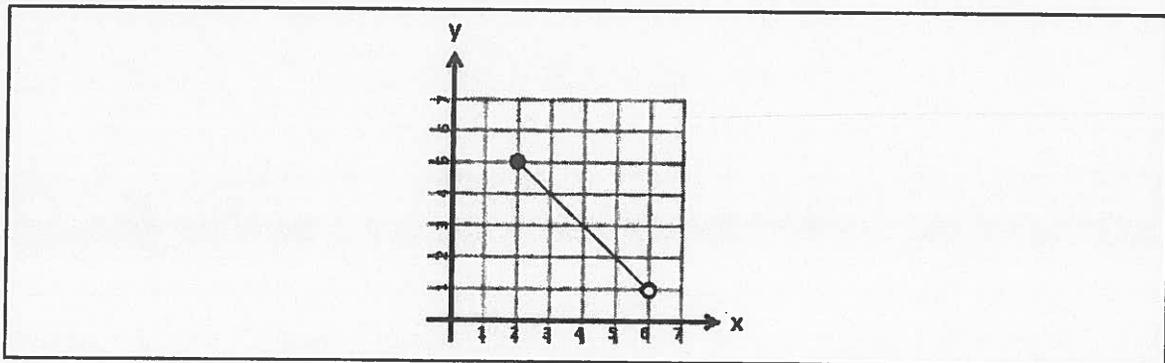$$A = LW$$
$$A = (x)(40-x)$$
$$\boxed{A = 40x - x^2}$$

Part 14: Chapter 6 - Domain and Range

Use the following information to answer Q27-Q28:

Q27: Write the *Domain* in *Set Notation*.

$$\{x \mid 2 \le x < 6, \ x \in \mathbb{R}\}$$

Q28: Write the *Range* in *Interval Notation*.

$$(1, 5]$$

Part 15: Chapter 6 - Function Notation

Use the following information to answer Q29-Q30:

$$f(x) = \tfrac{2}{3}x - \tfrac{5}{3} \qquad\qquad g(x) = \tfrac{1}{2}x - 6$$

Q29: What is $f(7) =$?

$f(7) = \tfrac{2}{3}(7) - \tfrac{5}{3}$

$\quad = \tfrac{14}{3} - \tfrac{5}{3}$

$\quad = \tfrac{9}{3}$

$\boxed{f(7) = 3}$

Q30: If $g(x) = 10$, then $x =$?

$g(x) = \tfrac{1}{2}x - 6$

$10 = \tfrac{1}{2}x - 6$

$\quad +6 \qquad\quad +6$

$16 = \tfrac{1}{2}x$

$\times 2 \quad \times 2$

$\boxed{32 = x}$

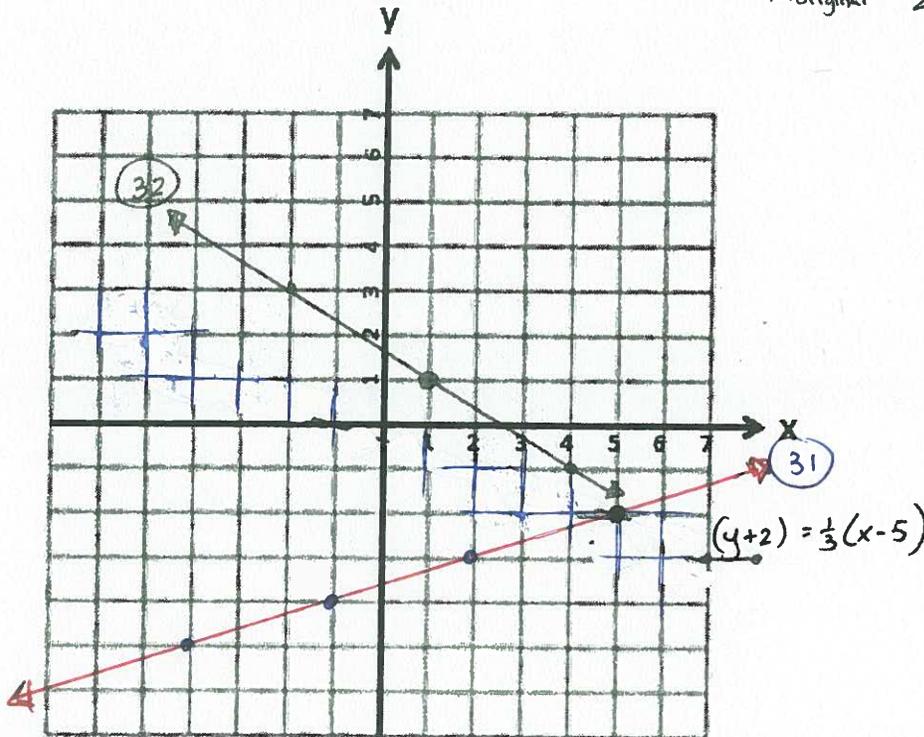## Part 16: Chapter 7 – Graphing

Q31: Graph the line $(y + 2) = \tfrac{1}{3}(x - 5)$

$(y - 2) = \tfrac{1}{3}(x - +5)$

Point $(5, -2)$

Q32: Graph the line perpendicular to $y = \tfrac{3}{2}x + 1$ that passes through the point (1,1).

$M_{original} = \tfrac{3}{2} \qquad M_{perp} = -\tfrac{2}{3}$

$(y+2) = \tfrac{1}{3}(x-5)$

Part 17: Chapter 7 – Algebra

Q33: Convert $y = -\frac{1}{3}x + 4$ into *General Form*.

$+\frac{1}{3}x \qquad +\frac{1}{3}x$

$\frac{1}{3}x + 1y = 4$

$\phantom{\frac{1}{3}x + 1y} -4 \quad -4$

$\frac{1}{3}x + 1y \; -4 = 0$

$\times 3 \quad \times 3 \quad \times 3 \quad \times 3$

$\boxed{1x + 3y - 12 = 0}$

Q34: A line passes through the points (5,2) and (8,-4). Write the equation of the line in *Slope y-Intercept* form.

$\qquad\qquad\qquad\qquad\qquad x_1 \; y_1 \quad x_2 \; y_2$

$m = \dfrac{y_2 - y_1}{x_2 - x_1} = \dfrac{-4-2}{8-5} = \dfrac{-6}{3} = -2$

$\qquad\qquad\qquad\qquad\qquad\qquad\qquad 2 = -10 + b$

$\qquad\qquad\qquad\qquad\qquad\qquad\qquad +10 \qquad +10$

$y = mx + b$

$y = -2x + b \quad$ Use $(5,2)$

$\qquad\qquad\qquad\qquad\qquad\qquad\qquad 12 = b$

$2 = -2(5) + b$

$\boxed{y = -2x + 12}$

Part 18: Chapter 8 – Solving Systems of Equations using Graphing

Q35: Find the solution to the system of equations:

$y = \frac{3}{2}x - 1 \qquad y = -\frac{1}{2}x + 4$

$y = \frac{3}{2}x - 1$

$\text{soln is } (2.5, 2.8)$

Q36: Find the solution to the system of equations:

$5x - 3y + 15 = 0 \qquad y = -\frac{1}{2}x - 2$

$5x + 15 = 3y$

$\frac{5}{3}x + 5 = y$

$y = \frac{5}{3}x + 5$

$5x - 3y + 15 = 0$

$y = -\frac{1}{2}x - 2$

Part 19: Chapter 9 – Solving Systems of Equations using Algebra

Q37: Solve using Substitution:

$$x + 3y - 9 = 0 \qquad y = -2x + 8$$

$x + 3y - 9 = 0$

$x + 3(-2x + 8) - 9 = 0$

$x - 6x + 24 - 9 = 0$

$-5x + 15 = 0$

$\; -15 \;\; -15$

$-5x = -15$

$\div(-5) \;\; \div(-5)$

$x = 3$

$y = -2x + 8$

$y = -2(3) + 8$

$y = -6 + 8$

$y = 2$

$\boxed{\text{Soln is } (3, 2)}$

Q38: Solve using Elimination:

$$x - y - 2 - 0 \qquad 3x + 2y - 4 = 0$$

$2(x - y - 2 = 0) \rightarrow$

$3x + 2y - 4 = 0$

$2x - 2y - 4 = 0$

$+(3x + 2y - 4 = 0)$

$\overline{5x - 8 = 0}$

$5x - 8 = 0$

$ +8 \;\; +8$

$5x = 8$

$\div 5 \;\; \div 5$

$x = 8/5 \rightarrow$

$x - y - 2 = 0$

$(8/5) - 1y - 2 = 0$

$ +1y \;\;\;\; +1y$

$\frac{8}{5} - 2 = y$

$-\frac{2}{5} = y \longrightarrow \boxed{\text{Soln is } (8/5, \; -2/5)}$

Part 20: Chapter 9 – Word Problems involving Systems of Equations

Q39: Dan and Dillon go to the fair and buy snacks. Dan buys 3 hotdogs and 2 bags of chips for $7.75. Dillon buys 2 hotdogs and 5 bags of chips for $9.75. What is the cost of a hotdog? What is the cost of a bag of chips?

Let $x = $ hotdog cost

$ y = $ chip cost

$2(3x + 2y = 7.75)$
$3(2x + 5y = 9.75) \rightarrow$

$6x + 4y = 15.50$
$-(6x + 15y = 29.25)$
$\overline{ -11y = -13.75}$
$\div(-11) \quad \div(-11)$
$y = 1.25$

$2x + 5(1.25) = 9.75$
$2x + 6.25 = 9.75$
$ -6.25 \;\; -6.25$
$2x = 3.5$
$\div 2 \;\; \div 2$
$x = 1.75$

$\boxed{\text{Hotdogs cost } \$1.75, \text{ Chips cost } \$1.25.}$

Q40: Sam and Dillon also buy beverages. Dan buys 2 coffees and 1 soda for $2.80. Dillon buys 1 coffee and 4 sodas for $5.25. What is the cost of a coffee? What is the cost of a soda?

Let $x = $ cost of coffee

$ y = $ cost of soda

$2x + 1y = 2.80$
$2(1x + 4y = 5.25) \rightarrow$

$2x + 1y = 2.80$
$-(2x + 8y = 10.50)$
$\overline{ -7y = -7.7}$
$\div(-7) \;\; \div(-7)$
$y = 1.10$

$1x + 4y = 5.25$
$1x + 4(1.10) = 5.25$
$x + 4.40 = 5.25$
$ -4.40 \;\; -4.40$
$x = 0.85$

$\boxed{\begin{array}{l}\text{Cost of coffee is } \$0.85 \\ \text{Cost of soda is } \$1.10\end{array}}$