

Pre-Calculus II - Final Exam Booklet #2  
Key

\* Chapter 5 - Radicals

$$\begin{aligned} 36. \quad & 7\sqrt{7} - 6\sqrt{12} - (4\sqrt{28} + 4\sqrt{3}) \\ & 7\sqrt{7} - 6 \cdot 2\sqrt{3} - 4 \cdot 2\sqrt{7} - 4\sqrt{3} \\ & 7\sqrt{7} - 12\sqrt{3} - 8\sqrt{7} - 4\sqrt{3} \\ & -\sqrt{7} - 16\sqrt{3} \end{aligned}$$

$$37. \quad \sqrt[5]{64n^{10}m^{15}} = \sqrt[5]{2^6 n^{10} m^{15}} = \boxed{2n^2 m^3 \sqrt[5]{2}}$$

$$\begin{aligned} 38. \quad & V = \pi r^2 h \\ & \frac{576\pi}{64\pi} = \frac{\pi r^2 (64)}{64\pi} \end{aligned}$$

$$\sqrt{9} = \sqrt{r^2} \quad r = \sqrt{9} \quad \boxed{r = 3 \text{ cm}}$$

$$\begin{aligned} 39. \quad & -7\sqrt{6} (-6\sqrt{5} - 2\sqrt{6}) \\ & 42\sqrt{30} + 14\sqrt{36} \\ & 42\sqrt{30} + 14(6) \\ & 42\sqrt{30} + 84 \quad \text{or} \quad \boxed{84 + 42\sqrt{30}} \end{aligned}$$

$$40. \quad A = L \times W$$

$$A = (3\sqrt{7} + 4\sqrt{2})(3\sqrt{7} - 4\sqrt{2})$$

$$A = 3\sqrt{7}(3\sqrt{7}) + 3\sqrt{7}(-4\sqrt{2}) + 4\sqrt{2}(3\sqrt{7}) + 4\sqrt{2}(-4\sqrt{2})$$

$$= 9\sqrt{49} - 16\sqrt{4}$$

$$= 9(7) - 16(2)$$

$$= 63 - 32 = \boxed{31}$$

$$41. \frac{2\sqrt{21} - 3\sqrt{7}}{\sqrt{7}} + \frac{4\sqrt{3} - 8}{\sqrt{4}}$$

$$\frac{2\sqrt{\cancel{7}} \cdot \sqrt{3} - 3\sqrt{\cancel{7}}}{\sqrt{\cancel{7}}} + \frac{4\sqrt{3} - 8}{2}$$

$$= 2\sqrt{3} - 3 + 2\sqrt{3} - 4$$

$$= \boxed{4\sqrt{3} - 7}$$

$$42. \sqrt{4x} - 5 = 6$$

$$4x \geq 0$$

$$\boxed{x \geq 0}$$

$$(\sqrt{4x})^2 = (11)^2$$

$$\frac{4x}{4} = \frac{121}{4}$$

$$\boxed{x = \frac{121}{4}}$$

check:  $\sqrt{4\left(\frac{121}{4}\right)} - 5 = 6$

$$\sqrt{121} - 5 = 6$$

$$11 - 5 = 6$$

$$6 = 6 \checkmark$$

$$43. \sqrt{x+3} = \sqrt{2x+8}$$

restrictions:  $x+3 \geq 0$

$$x \geq -3$$

$$2x+8 \geq 0$$

$$\boxed{x \geq -4}$$

$$(\sqrt{x+3})^2 = (\sqrt{2x+8})^2$$

$$x+3 = 2x+8$$

$$-x - 8 = -x - 8$$

$$-5 = x$$

$x = -5$  does not meet the restrictions

$\Rightarrow$  No solutions

$$44. -4 - \sqrt{4-x} = 6$$

$$4-x \geq 0$$

$$-4 \quad -4$$

$$\frac{-x \geq -4}{-1 \quad -1}$$

$$\boxed{x \leq 4}$$

\* Chapter 6 - Rational Expressions and Equations

45.  $\frac{12}{x^2-4}$        $x^2-4 \neq 0$   
 $\boxed{x^2 \neq 4}$   
 $\boxed{x \neq \pm 2}$

46.  $\frac{5(4x^2 - y^2)}{2x^2 - 15xy - 8y^2} = \frac{5(2x+y)(2x-y)}{(2x+y)(x-8y)}$

$2x^2 - 15xy - 8y^2$   
 $2x^2 - 16xy + xy - 8y^2$   
 $2x(x-8y) + y(x-8y)$   
 $(2x+y)(x-8y)$

\* restrictions:  
 $2x+y \neq 0$      $x-8y \neq 0$   
 $y \neq -2x$      $y \neq \frac{1}{8}x$

$\frac{5(2x+y)(2x-y)}{(2x+y)(x-8y)} = \boxed{\frac{5(2x-y)}{(x-8y)}}$

47.  $\frac{-3x+12}{32-8x}$

$32-8x \neq 0$   
 $+8x \quad +8x$

$= \frac{-3(x-4)}{-8(x-4)}$

$\frac{32 \neq 8x}{8} \quad \boxed{x \neq 4}$

$= \boxed{\frac{3}{8}}$

48.  $\frac{6x^{\frac{6}{9}}}{3x^{\frac{2}{3}}} \cdot \frac{x^{\frac{2}{9}}}{9x^{\frac{1}{9}}} = \frac{2x^{\frac{6}{9}}}{1} \cdot \frac{x^{\frac{2}{9}}}{9} = \boxed{\frac{2x^{\frac{8}{9}}}{9}}$

$$49. \frac{12x^{12}}{4x^3} \div \frac{x^8}{24x^6} = \frac{12x^{12}}{4x^3} \cdot \frac{24x^6}{x^8}$$

$$= \frac{288x^{18}}{4x^1} = \boxed{72x^7}$$

$$50. \frac{6a^4b^7}{(3ab)^2} \cdot \frac{(a^4b^7)^2}{(3ab^4)^3}$$

$$\frac{6a^4b^7}{9a^2b^2} \cdot \frac{a^8b^{14}}{27a^3b^{12}} = \frac{2a^2b^5}{3} \cdot \frac{a^5b^2}{27}$$

$$= \boxed{\frac{2a^7b^7}{81}}$$

$$51. \frac{4x^8y^5}{(2xy)^3} \div \frac{(x^8y^5)^3}{(2xy^8)^4}$$

$$= \frac{4x^{\frac{5}{8} \cdot 2}y^8}{28x^3y^3} \div \frac{x^{\frac{20}{24}}y^{15}}{16x^{11}y^{3217}}$$

$$= \frac{x^5y^2}{2} \cdot \frac{16y^{17}}{x^{20}} = \frac{16x^5y^{19}}{12x^{295}} = \boxed{\frac{8y^{19}}{x^{15}}}$$

$$52. \frac{x^2+6x}{2x^2+15x+27} \cdot \frac{x+3}{x^2-36}$$

$$\begin{matrix} \neq -3, \frac{-9}{2} \\ \neq 6 \end{matrix} \frac{x(x+6)}{(x+3)(2x+9)} \cdot \frac{x+3}{(x+6)(x-6)}$$

$$= \boxed{\frac{x}{(2x+9)(x-6)}}$$

$$2x^2+15x+27$$

$$2x^2+6x+9x+27$$

$$2x(x+3)+9(x+3)$$

$$(x+3)(2x+9)$$

$$53. \frac{x^2 - 5x - 24}{x^2 - 11x + 24} \div \frac{2x^2 + 7x + 3}{x^2 + x - 12}$$

$$\frac{(x-8)(x+3)}{(x-8)(x-3)} \div \frac{(2x+1)(x+3)}{(x+4)(x-3)}$$

$$\frac{(x-8)(x+3)}{(x-8)(x-3)} \cdot \frac{(x+4)(x-3)}{(2x+1)(x+3)} = \boxed{\frac{x+4}{2x+1}}$$

$2x^2 + 7x + 3$   
 $2x^2 + 6x + 1x + 3$   
 $2x(x+3) + 1(x+3)$   
 $(x+3)(2x+1)$

$x \neq -4, 3, 8, -\frac{1}{2}$

$$54. \frac{6xy - 8}{x^2 y^2} + \frac{-3 - 7xy}{7xy} \left( \frac{xy}{xy} \right) \quad \boxed{x \neq 0, y \neq 0}$$

$$= \frac{7(6xy - 8)}{7x^2 y^2} + \frac{xy(-3 - 7xy)}{7x^2 y^2}$$

$$= \frac{42xy - 56 - 3xy - 7x^2 y^2}{7x^2 y^2} = \boxed{\frac{-7x^2 y^2 + 39xy - 56}{7x^2 y^2}}$$

$$55. \frac{x+8}{x^2+9x+20} + \frac{x+5}{x^2+7x+12}$$

$$= \frac{x+8}{(x+4)(x+5)} \left( \frac{x+3}{x+3} \right) + \frac{x+5}{(x+3)(x+4)} \left( \frac{x+5}{x+5} \right)$$

$$\frac{(x+8)(x+3) + (x+5)(x+5)}{(x+4)(x+5)(x+3)}$$

$$= \frac{x^2 + 8x + 3x + 24 + x^2 + 5x + 5x + 25}{(x+4)(x+5)(x+3)}$$

$$= \frac{2x^2 + 21x + 49}{(x+4)(x+5)(x+3)} \quad \text{or} \quad \frac{(2x+7)(x+7)}{(x+4)(x+5)(x+3)}$$

$$56. \frac{x}{x+1} = \frac{4-x}{x^2-3x-4} + \frac{6}{x-4}$$

$$\boxed{x \neq 4, -1}$$

$$\left[ \frac{x}{x+1} = \frac{4-x}{(x-4)(x+1)} + \frac{6}{x-4} \right] \cdot (x+1)(x-4)$$

$$x(x-4) = 4-x + 6(x+1)$$

$$x^2 - 4x = 4 - x + 6x + 6$$

$$x^2 - 4x = 5x + 10$$

$$-5x - 10 - 5x - 10$$

$$x^2 - 9x - 10 = 0$$

$$(x-10)(x+1) = 0$$

$$x = 10, -1 \quad \therefore \boxed{x = 10}$$

not allowed