

Final Exam Sample Review Problems

Solve and Check each equation.

1) $6x - 7 = -(-7x - 2)$

$$\begin{array}{r} 6x - 7 = 7x + 2 \\ -6x \quad -6x \\ \hline -7 = x + 2 \\ -2 \quad -2 \\ \hline -9 = x \end{array}$$

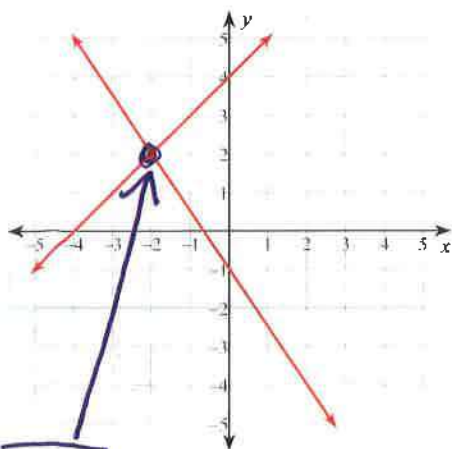
$x = -9$

* Remember to always use
your CALC. TO CHECK IN THE
ORIGINAL EQUATION.

Chapter 7

Solve each system by graphing. Check!

$$\begin{array}{l} 3) \ y = -\frac{3}{2}x - 1 \\ \quad y = x + 4 \end{array} \quad \begin{array}{l} m = -\frac{3}{2} \quad b = -1 \\ m = 1 \quad b = 4 \end{array}$$

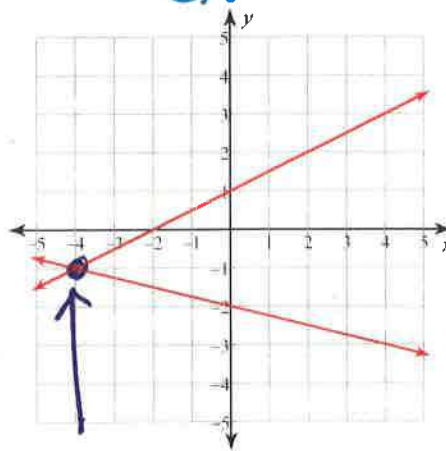


$(-2, 2)$

↑ OR
solution

$$\begin{array}{l} x = -2 \\ y = 2 \end{array}$$

$$\begin{array}{l} 4) \ x + 4y = -8 \\ \quad x - 2y = -2 \end{array} \quad \begin{array}{l} y = -\frac{1}{4}x - 2 \\ y = \frac{1}{2}x + 1 \end{array}$$



$(-4, -1)$

↑
solution OR

$$\begin{array}{l} x = -4 \\ y = -1 \end{array}$$

STEPS

① PUT EQ'S
IN $y = mx + b$

② GRAPH
 $m = \frac{\text{RISE}}{\text{RUN}}$ slope
 $b = y\text{-intercept}$
 $(0, b)$

③ THE
SOLUTION
IS WHERE
LINES
INTERSECT

④ Check
solution in
BOTH original
EQ's.

* WHEN THE VARIABLE
DROPS OUT

① AND NUMBERS NOT EQUAL
 $N = \text{NO SOLUTION}$

② AND NUMBERS ARE
EQUAL
 $N = \text{ALL REAL \#s}$

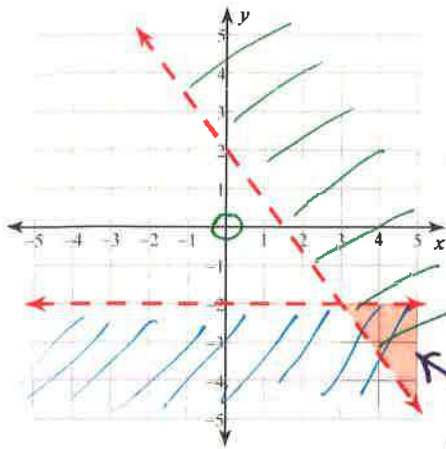
$$-4 \neq 4 \quad N = \text{NO SOLUTION}$$

Graph the system of inequalities and clearly mark the solution region.

5) $y < -2$

$y > -\frac{4}{3}x + 2$

USE (0,0) TO TEST
WHICH SIDE TO GRAPH
 $\rightarrow T(0,0)$
 $0 > -\frac{4}{3}(0) + 2$
 $0 > 2$ F

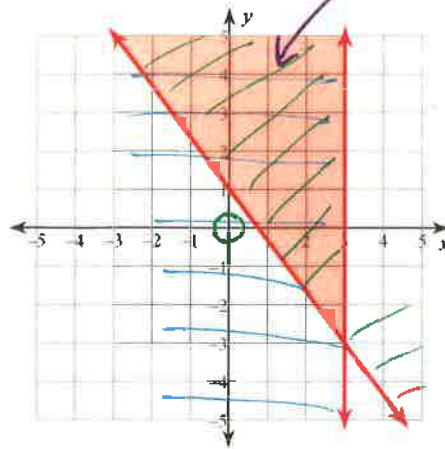


SOLUTION REGION

6) $x \leq 3$

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

$T(0,0)$
 $0 \geq 1$ F



SOLUTION REGION

DOTTED LINES $\rightarrow <, >$
SOLID LINES $\rightarrow \leq, \geq$

Solve by substitution. Check!

7) $y = -4x + 28$

$-2x + 5y = 8$

x, y
 $(6, 4)$

$$\begin{aligned} -2x + 5(-4x + 28) &= 8 \\ -2x - 20x + 140 &= 8 \\ -22x + 140 &= 8 \\ -22x &= -132 \\ x &= 6 \end{aligned}$$

Find y: $y = -4(6) + 28$
 $y = -24 + 28$
 $y = 4$

Solve each system by elimination. Check!

8) $-x + 3y = -7$
 $(-5x + 3y = 13) \cdot -1 \rightarrow 5x - 3y = -13$
 $(-5, -4)$

$$\begin{aligned} -x + 3y &= -7 \\ 5x - 3y &= -13 \\ \hline 4x &= -20 \\ x &= -5 \end{aligned}$$

Find y

$-5(-5) + 3y = 13$

$25 + 3y = 13$
 -25

$3y = -12$
 $y = -4$

9) $(4x - 3y = 10) \times 3 \rightarrow 12x - 9y = 30$
 $(3x - 4y = 11) \times -4 \rightarrow -12x + 16y = -44$
 $(1, -2)$

$$\begin{aligned} 12x - 9y &= 30 \\ -12x + 16y &= -44 \\ \hline 7y &= -14 \\ y &= -2 \end{aligned}$$

Find x

$4x - 3(-2) = 10$

$4x + 6 = 10$
 -6

$4x = 4$
 $x = 1$

Chapter 8

Simplify. Leave answers with reduced improper fractions and only positive exponents.

Distribute 3 and mult exponents

$$10) 4x^4y^2 \cdot -4yx^3 \cdot 2x^4y^4$$

$$\boxed{-32x^{11}y^7}$$

Mult #'s (4)(-4)(2)
For variables,
add exponents

$$12) (-3a^2b^0)^4 = (-3)^4 a^8 b^0$$

$$\boxed{81a^8}$$

$$14) \frac{-4x^3y^2}{-2x^2y^2}$$

① divide #'s $\frac{-4}{-2}$
② For variables,
subtract exponents

$$\boxed{2x}$$

$$16) \left(\frac{x^3}{-2yx^3} \right)^{-2} = \left(\frac{-1}{2y} \right)^{-2} = \frac{1}{(-2)^{-2}y^{-2}}$$

$$\boxed{4y^2}$$

make positive exp. by
moving to num. or den.

$$18) (2xy^4)^{-2} \cdot (-x^{-1}y^{-2})^4 = \frac{(-1)^4 x^{-4} y^{-8}}{2^2 x^2 y^8} = \frac{1}{4x^6y^{16}}$$

$$20) \frac{2x \cdot x^4y^3}{(xy^2)^3}$$

$$\frac{2x^5y^3}{x^3y^6} =$$

$$\boxed{\frac{2x^2}{y^3}}$$

$$\frac{1x^{-4-2}y^{-8-6}}{4} = \frac{1}{4x^6y^{16}}$$

$$\boxed{\frac{1}{4x^6y^{16}}}$$

$$11) (-3pm^0)^3 = (-3)^3 p^3 m^{0 \cdot 3} = \boxed{-27p^3}$$

$$13) (2y^4)^{-4} \cdot (2x^3)^3 = \frac{(2)^{-4}(y^{-16}) \cdot 2^3x^9}{1} = \frac{8x^9}{(2)^4y^{16}}$$

$$15) \left(\frac{x^{-3}y^2}{2x^4} \right)^4 = \frac{y^8}{16x^{28}}$$

↓ distribute
make pos. exp.
add exp's

$$17) \left(\frac{-x^3y^2}{-2x^2} \right)^3 = \frac{x^3y^6}{8}$$

simplify $\left(\frac{xy^2}{2} \right)^3$
distribute 3
 $2^3=8$

$$19) (x^2y^3)^2 \cdot (2x^4)^4 = x^4y^6 \cdot 2^4x^{16} = \boxed{16x^{20}y^6}$$

$$21) \frac{(m^4n^2)^3}{2m^3n^3 \cdot 2m^3} = \frac{m^{12}n^6}{4m^6n^3} = \boxed{\frac{m^6n^3}{4}}$$

Simplify. Write your answer in **exponent form using only positive exponents**. (This means do NOT evaluate).

22) $(-4)^4 \cdot (-4)^2$
 $(-4)^6$ ← Same base → add exponents

24) $\frac{(-4)^4}{(-4)^1}$
 $(-4)^3$ ← Same base → subtract exponents

26) $\frac{4^3}{4^{-4}} = 4^{3-(-4)} = 4^{3+4}$
 4^7

23) $2 \cdot 2^3 \cdot (2^4)^3 = 2^1 \cdot 2^3 \cdot 2^{12}$
 2^{16}

25) $\frac{4^3}{4} = 4^{3-1}$
 4^2

27) $\frac{1}{3^{-4}}$ ← make positive exp.
 3^4

CHAPTER 9. Polynomials and Factoring *Name by degree + Term*

28) 1
 constant monomial

29) $-8x - 10$
 linear binomial

30) $4m^2 - 6m - 8$
 quadratic trinomial

31) $10n^3 - 4$
 cubic binomial

Simplify each sum. Write in standard form.

32) $(2n^2 + 3n + 5) + (3n^2 - 4n + 4n^3)$
 $4n^3 + 5n^2 - n + 5$

33) $(2k + 4k^2 - 2) + (5 + 2k - 4k^2)$
 $4k + 3$

Combine LIKE TERMS

Simplify each difference. Write in standard form.

34) $(-4 + 4x^2 - x) - (-3x + 2 + 4x^2)$
 $2x - 6$
 $-4 + 4x^2 - x + 3x - 2 - 4x^2 =$

35) $(x^3 - 2x - 5x^2) - (-5x^3 + 4 - x)$
 $6x^3 - 5x^2 - x - 4$
 $x^3 - 2x - 5x^2 + 5x^3 - 4 + x$

① Rewrite as an addition problem
 ② Write polynomial from H → L exponent last.

Find each product. Write in standard form.

36) $5x(5x - 8)$

$25x^2 - 40x$

37) $(4x - 4)(x - 1) = 4x^2 - 4x - 4x + 4$
 $4x^2 - 8x + 4$

38) $(4x + 2)(4x - 2) = 16x^2 - 8x + 8x - 4$
 $16x^2 - 4$

39) $(6x + 1)^2 \xrightarrow{\text{expand}} (6x + 1)(6x + 1) = 36x^2 + 12x + 6x + 1$
 $36x^2 + 12x + 1$

40) $(5n - 2)^2 \xrightarrow{\text{expand}} (5n - 2)(5n - 2) = 25n^2 - 10n - 10n + 4$
 $25n^2 - 20n + 4$

41) $(8x - 8)(3x^2 + 2x + 8) = 24x^3 + 16x^2 + 64x - 24x^2 - 16x + 64$
 $24x^3 - 8x^2 + 48x - 64$

Factor the polynomial completely

42) $18x^7 - 63x^5 + 9x^4$

$9x^4(2x^3 - 7x + 1)$

STEP 1 -
ALWAYS
FACTOR THE
GCF (COMMON
FACTOR)

43) $10x^2 + 11x - 6$

$(5x - 2)(2x + 3)$
 $-4x$
 $+15x$

44) $x^2 - 10x + 16$

$(x - 2)(x - 8)$

45) $v^2 - v - 12$

$(v - 4)(v + 3)$

46) $b^2 - 16$

$(b + 4)(b - 4)$

47) $9x^2 - 25$

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

Perfect SQ
minus
perfect SQ

48) $16x^2 + 24x + 9$

$(4x+3)^2$ or
 $(4x+3)(4x+3)$

49) $4k^2 - 20k + 25$

$(2k-5)^2$
 $(2k-5)(2k-5)$

50) $20x^3 - 15x^2 - 16x + 12$

Factor by Grouping (4 terms)
 $\swarrow$ GCF $\searrow$ GCF
 $5x^2(4x-3) - 4(4x-3)$
 $\swarrow$ GCF
 $(4x-3)(5x^2-4)$

51) $24p^3 + 8p^2 - 24p - 8$

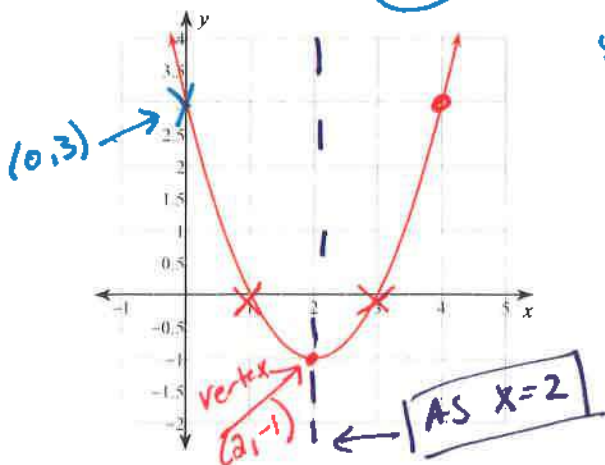
$8[3p^3 + p^2 - 3p - 1]$
 $8[p^2(3p+1) - 1(3p+1)]$
 $8(3p+1)(p^2-1)$
 $8(3p+1)(p+1)(p-1)$

- ① Factor GCF
- ② 4 terms Factor by Grouping
- ③ Keep factoring

Chapter 10 - Quadratics

Sketch the graph of each function. Clearly mark 5 points. Label the axis of symmetry, vertex, y-intercept and x-intercepts.

52) $y = x^2 - 4x + 3$ $A=1$ $B=-4$ $C=3$
 $\uparrow$ y-int

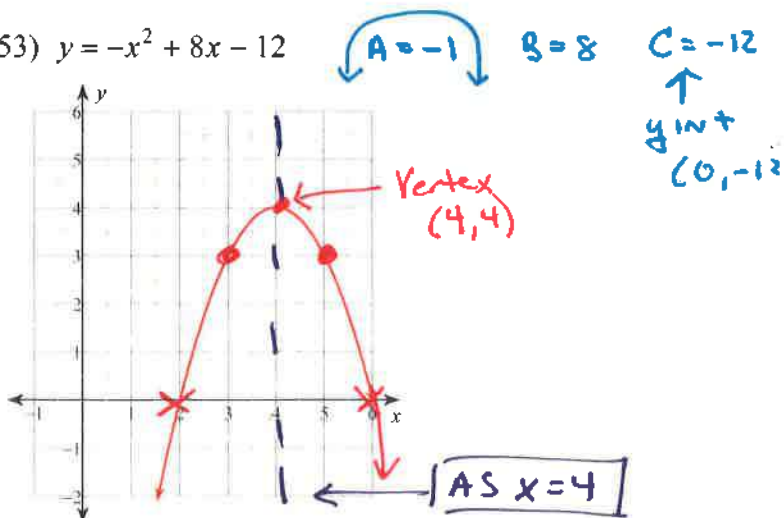


Find Axis of Symmetry

AS: $x = \frac{-B}{2A} = \frac{4}{2(1)} = 2$ $\boxed{x=2}$

			V		
x	0	1	2	3	4
y	3	0	-1	0	3

53) $y = -x^2 + 8x - 12$

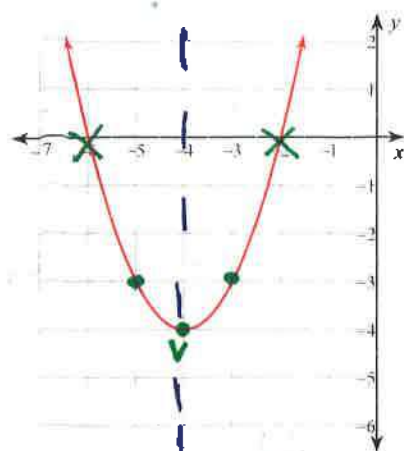


AS: $x = \frac{-B}{2A} = \frac{-8}{2(-1)} = 4$ $\boxed{x=4}$

			V		
x	2	3	4	5	6
y	0	3	4	3	0

Solve Quadratic Function by graphing. Sketch the graph of each function. Clearly mark 5 points. Label the x-intercepts. Clearly state the solutions.

54) $y = x^2 + 8x + 12$ $A=1$ $B=8$ $C=12$

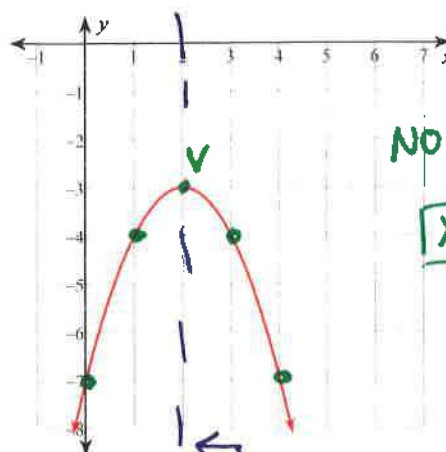


$\boxed{X = -2, -6}$ ← SOLUTIONS

A.S. $X = \frac{-8}{2(1)}$ $\boxed{X = -4}$

$\begin{array}{r|rrrrrr} X & -6 & -5 & -4 & -3 & -2 \\ \hline Y & 0 & -3 & -4 & -3 & 0 \end{array}$

55) $y = -x^2 + 4x - 7$ $A=-1$ $B=4$ $C=-7$



NO X INTERCEPT

$\boxed{X = \text{NO SOLUTION}}$

A.S. $X = \frac{-4}{2(-1)} = \frac{-4}{-2}$ $\boxed{X = 2}$

$\begin{array}{r|rrrrrr} X & 0 & 1 & 2 & 3 & 4 \\ \hline Y & -7 & -4 & -3 & -4 & -7 \end{array}$

Solve each equation with the quadratic formula. Round solutions to 2 decimals.

56) $6n^2 - 6n - 7 = 0$

$N = 1.69, -0.69$

$A=6$ $B=-6$ $C=-7$

$X = \frac{6 \pm \sqrt{36 - 4(6)(-7)}}{2(6)}$

$X = \frac{6 \pm \sqrt{204}}{12}$

$X = \frac{6 + \sqrt{204}}{12}$

$\boxed{X = 1.69}$

$X = \frac{6 - \sqrt{204}}{12}$

$\boxed{X = -0.69}$

57) $8m^2 - 5m + 1 = 0$

$m = \text{No solution.}$

$A=8$ $B=-5$ $C=1$

$m = \frac{5 \pm \sqrt{25 - 4(8)(1)}}{2(8)}$

$m = \frac{5 \pm \sqrt{-7}}{16}$

You can not take SQ ROOT OF A NEGATIVE #

$\boxed{M = \text{NO SOLUTION}}$

$$58) 6x^2 = 9 + 3x$$

$\{1.5, -1\}$

$$6x^2 - 3x - 9 = 0$$

$$A=6 \quad B=-3 \quad C=-9$$

$$X = \frac{3 \pm \sqrt{9 - 4(6)(-9)}}{2(6)}$$

$$X = \frac{3 \pm \sqrt{225}}{12}$$

$$X = \frac{3+15}{12}$$

$$X = 1.5$$

$$X = \frac{3-15}{12}$$

$$X = -1$$

Solve each equation by factoring.

$$60) x^2 + 13x + 40 = 0$$

$\{-8, -5\}$

$$(x+8)(x+5) = 0$$

$$x+8=0$$

$$x = -8$$

$$x+5=0$$

$$x = -5$$

$$62) 7x^3 - 7x^2 - 210x = 0$$

$\{0, -5, 6\}$

FACTOR

$$7x(x^2 - x - 30) = 0$$

$$7x(x-6)(x+5) = 0$$

$$7x = 0$$

$$x = 0$$

$$x-6=0$$

$$x = 6$$

$$x+5=0$$

$$x = -5$$

$$59) 3x^2 - 42 = -11x$$

$\{2.33, -6\}$

$$3x^2 + 11x - 42 = 0$$

$$A=3 \quad B=11 \quad C=-42$$

$$X = \frac{-11 \pm \sqrt{121 - 4(3)(-42)}}{2(3)}$$

$$X = \frac{-11 \pm \sqrt{625}}{6}$$

$$X = \frac{-11+25}{6}$$

$$X = \frac{14}{6} = \frac{7}{3}$$

$$X = \frac{7}{3} \text{ or } x \approx 2.33$$

$$X = \frac{-11-25}{6}$$

$$X = -6$$

$$\text{or } x = 2\frac{1}{3}$$

$$61) n^2 - 10n = -16$$

$\{8, 2\}$

POT IT IN $Ax^2 + Bx + C = 0$

$$n^2 - 10n + 16 = 0$$

$$(n-2)(n-8) = 0$$

$$n-2=0$$

$$n = 2$$

$$n-8=0$$

$$n = 8$$

$$63) x^2 - 4 = 0$$

$\{-2, 2\}$

FACTOR

$$(x-2)(x+2) = 0$$

$$x-2=0$$

$$x = 2$$

$$x+2=0$$

$$x = -2$$

Chapter 11 - Radicals

Simplify. Leave in simple radical form.

64) $\sqrt{180}$ $\sqrt{36} \sqrt{5}$

$6\sqrt{5}$

T.P. FACTOR LADDER

$$\begin{array}{r} 2 \overline{) 180} \\ 2 \overline{) 90} \\ 5 \overline{) 45} \\ 3 \overline{) 9} \\ 3 \end{array}$$

perfect sq
 $2 \cdot 2 \cdot 3 \cdot 3 = 36$

65) $\sqrt{150} = \sqrt{25} \sqrt{6}$

$5\sqrt{6}$

66) $2\sqrt{6} + 3\sqrt{6}$

$5\sqrt{6}$

67) $10\sqrt{6} - 6\sqrt{6}$

$4\sqrt{6}$

Combine
Like radicals
just like
Like TERMS

68) $-3\sqrt{5} - 2\sqrt{45}$

$-9\sqrt{5}$

$-3\sqrt{5} - 2\sqrt{9}\sqrt{5} =$

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

$-3\sqrt{5} - 6\sqrt{5} =$

$-9\sqrt{5}$

69) $\sqrt{20} \cdot \sqrt{15} = \sqrt{20 \cdot 15}$

$10\sqrt{3}$

$= \sqrt{300}$

$= \sqrt{100} \sqrt{3}$

$$70) \sqrt{5}(4\sqrt{5} + 5\sqrt{6}) = 4(5) + 5\sqrt{5 \cdot 6}$$

$$\quad \quad \quad \underline{20 + 5\sqrt{30}}$$

or

$$\underline{5\sqrt{30} + 20}$$

$$71) (\sqrt{5} - \sqrt{2})(\sqrt{5} + \sqrt{4}) = 5 + \sqrt{20} - \sqrt{10} - \sqrt{8}$$

$$\quad \quad \quad \underline{5 + 2\sqrt{5} - \sqrt{10} - 2\sqrt{2}}$$

order does not matter

$$\downarrow \quad \downarrow \quad \downarrow \quad \downarrow$$

$$5 + \sqrt{4}\sqrt{5} - \sqrt{10} - \sqrt{4}\sqrt{2}$$

Simplify. Leave in simple radical form.

$$72) \frac{3\sqrt{3}}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}}$$

$$\quad \quad \quad \underline{\frac{3\sqrt{6}}{2}}$$

$$73) \frac{4}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{4\sqrt{2}}{2}$$

$$\quad \quad \quad \underline{2\sqrt{2}}$$

Solve each equation. Remember to check for extraneous solutions.

$$74) \frac{5\sqrt{x}}{5} = \frac{15}{5}$$

ISOLATE

$$\downarrow$$

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

$$\underline{x = 9}$$

$$75) \frac{-20 + 5\sqrt{x}}{+20} = \frac{30}{+20}$$

$$\frac{5\sqrt{x}}{5} = \frac{50}{5}$$

$$(\sqrt{x})^2 = (10)^2$$

$$\underline{x = 100}$$

Chapter 12 - Rationale Expressions and Equations

Simplify each expression. Leave as an improper fraction.

76) $\frac{8n^2 + 64n}{n + 8}$ *Factor* $\rightarrow \frac{8n(n+8)}{(n+8)}$
 $\frac{8n}{1}$

77) $\frac{28x^2 - 12x}{12x}$ *Factor* $\rightarrow \frac{4x(7x-3)}{4x \cdot 3}$
 $\frac{7x-3}{3}$

State the excluded values for each.

78) $\frac{v^2 - 9v + 8}{v - 8}$ $\rightarrow v - 8 = 0$
 $\{8\}$ $v \neq 8$

79) $\frac{x+2}{7x+14}$ $\rightarrow 7x+14=0$
 $\{-2\}$ $x \neq -2$

Simplify each expression.

80) $\frac{7x^2}{5} \cdot \frac{10}{8x}$ *mult* $\rightarrow \frac{70x^2}{40x}$
 $\frac{7x}{4}$
 $\frac{7}{4}x$

81) $\frac{10n^3}{2n} \div \frac{7}{6n}$ $= \frac{10n^3}{2n} \cdot \frac{6n}{7} =$
 $\frac{30n^3}{7}$
 $\frac{30}{7}n^3$

82) $\frac{v+1}{v-3} - \frac{6}{v-3} = \frac{v+1-6}{v-3}$
 $\frac{v-5}{v-3}$
 $\text{LCD} = v-3$

83) $\frac{x+1}{x+4} + \frac{3x+3}{x+4} = \frac{x+1+3x+3}{x+4}$
 $\frac{4x+4}{x+4}$

84)

$$\left(\frac{2x^2}{2x^2}\right) \frac{3}{x} + \frac{5}{2x^3} = \frac{6x^2}{2x^3} + \frac{5}{2x^3}$$

$$= \boxed{\frac{6x^2 + 5}{2x^3}}$$

85)

$$\left(\frac{5}{5}\right) \frac{3}{y^2} - \frac{2}{5y} \left(\frac{y}{y}\right) = \frac{15}{5y^2} - \frac{2y}{5y^2}$$

$$= \boxed{\frac{15 - 2y}{5y^2}}$$

OR

$$\boxed{\frac{-2y + 15}{5y^2}}$$

Divide.

86) $(6x^5 + 18x^4 + 6x^3) \div 6x^2$

$$\frac{6x^5 + 18x^4 + 6x^3}{6x^2}$$

$$\frac{6x^5}{6x^2} + \frac{18x^4}{6x^2} + \frac{6x^3}{6x^2}$$

$$\downarrow \quad \downarrow \quad \downarrow$$

$$\boxed{x^3 + 3x^2 + x}$$

87) $(n^3 + 3n^2 - 23n - 20) \div (n - 4)$

$$\begin{array}{r} n^2 + 7n + 5 \\ n-4 \overline{) n^3 + 3n^2 - 23n - 20} \\ \underline{-(n^3 - 4n^2)} \\ 7n^2 - 23n \\ \underline{-(7n^2 - 28n)} \\ 5n - 20 \\ \underline{-(5n - 20)} \\ 0 \end{array}$$

$$\boxed{n^2 + 7n + 5}$$

Solve each equation. Remember to check for extraneous solutions.

88) $\left[\frac{1}{x} - \frac{1}{4} = \frac{1}{x^2}\right]$ MULT BY LCD $4x^2$

$$\frac{4x^2}{1} \left(\frac{1}{x}\right) - \frac{4x^2}{1} \left(\frac{1}{4}\right) = \frac{4x^2}{1} \left(\frac{1}{x^2}\right)$$

$$4x - x^2 = 4 \leftarrow \text{rewrite in } Ax^2 + Bx + C = 0$$

$$x^2 - 4x + 4 = 0 \leftarrow \text{factor (or QF)}$$

$$(x-2)(x-2) = 0 \leftarrow \text{Set each factor} = 0 \text{ AND SOLVE}$$

$$x-2=0$$

$$\boxed{x=2}$$

$$C: \frac{1}{2} - \frac{1}{4} = \frac{1}{22}$$

Check

89) $\left[\frac{1}{6} + \frac{1}{2x^2} = \frac{2}{3}\right]$ MULT BY LCD $6x^2$

$$\frac{6x^2}{1} \left(\frac{1}{6}\right) + \frac{6x^2}{1} \left(\frac{1}{2x^2}\right) = \frac{6x^2}{1} \left(\frac{2}{3}\right)$$

$$x^2 + 3 = 4x^2 \leftarrow \text{SINCE NO } x\text{-TERM THEN SOLVE BY ISOLATING } x^2$$

$$\begin{array}{r} x^2 + 3 = 4x^2 \\ -x^2 \quad -x^2 \\ \hline 3 = 3x^2 \end{array}$$

$$\frac{3}{3} = \frac{3x^2}{3}$$

$$\sqrt{x^2} = \sqrt{1}$$

$$\boxed{x = \pm 1}$$

Remember to take $\pm$

$$C: \frac{1}{2} = \frac{1}{2}, C: \frac{2}{3} = \frac{2}{3}$$