Academic Algebra 1 Name KEY

Final Exam Sample Review Problems

Date _____ Period ____

Solve and Check each equation.

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

$6x - 7 = 7x + 2$

$-6x \quad -6x$

$-7 = x + 2$

$-2 \quad -2$

$x = -9$

* Remember to always use your calc. to check in the original equation.

2) $-4 - 2n = -2(n - 1) + 2$

$-2N - 4 = -2N + 2 + 2$

$-2N - 4 = -2N + 4$

$+2N \quad +2N$

$-4 \neq 4$

N = NO SOLUTION

* WHEN THE VARIABLE DROPS OUT

① AND NUMBERS NOT EQUAL
N = NO SOLUTION

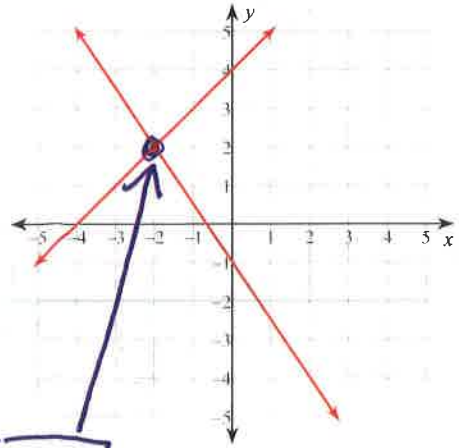
② AND NUMBERS ARE EQUAL
N = ALL REAL #'S

Chapter 7

Solve each system by graphing. Check!

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

$y = x + 4$ $m = 1/1$ $b = 4$



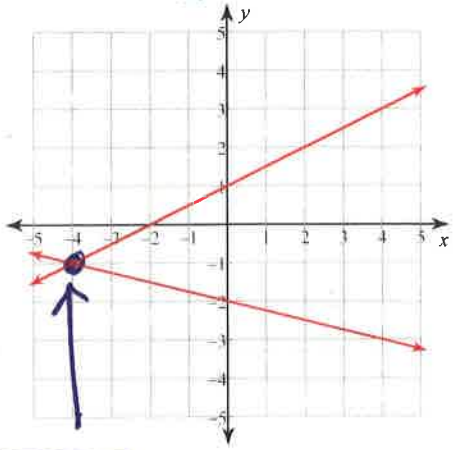
(–2, 2)

↑ OR → $x = -2$, $y = 2$

SOLUTION

4) $x + 4y = -8$ → $y = -\frac{1}{4}x - 2$

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



(–4, –1)

↑ SOLUTION OR → $x = -4$, $y = -1$

STEPS

① PUT EQ'S IN $y = mx + b$

② GRAPH

$m = \frac{\text{RISE}}{\text{RUN}}$ slope

b = y intercept (0, b)

③ THE SOLUTION IS WHERE LINES INTERSECT

④ Check Solution IN BOTH original EQ's.

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

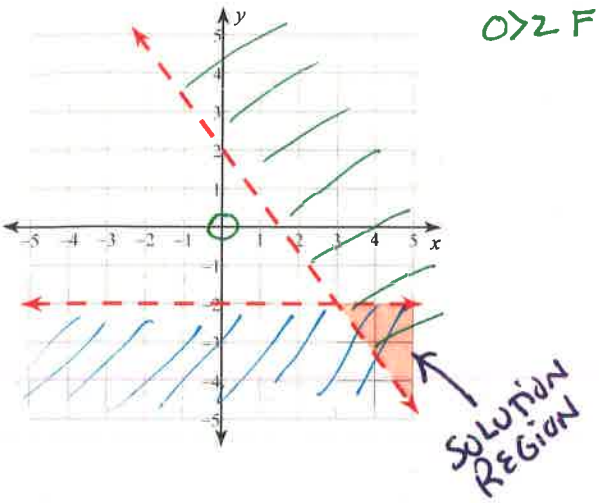
5) $y < -2$

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

USE (0,0) TO TEST WHICH SIDE TO GRAPH

→ T(0,0) $0 > -\frac{4}{3}(0) + 2$

$0 > 2$ F

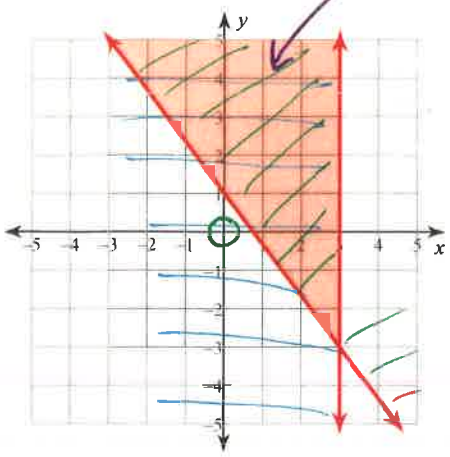


6) $x \leq 3$

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

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

SOLUTION REGION



DOTTED LINES → $<, >$

SOLID LINES → $\leq, \geq$

Solve by substitution. Check!

7) $y = -4x + 28$

$-2x + 5y = 8$

X Y

(6, 4)

$-2x + 5(-4x + 28) = 8$

$-2x - 20x + 140 = 8$

$-22x + 140 = 8$

$-140 \quad -140$

$\frac{-22x}{-22} = \frac{-132}{-22}$

$x = 6$

FIND Y: $y = -4(6) + 28$

$y = -24 + 28$

$y = 4$

Solve each system by elimination. Check!

8) $-x + 3y = -7$ → $-x + 3y = -7$

$(-5x + 3y = 13) \cdot -1$ → $5x - 3y = -13$ ↓ +

X Y

(−5, −4)

$\frac{4x}{4} = \frac{-20}{4}$

$x = -5$

FIND Y

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

$25 + 3y = 13$

$-25 \quad -25$

$\frac{3y}{3} = \frac{-12}{3}$

$y = -4$

9) $(4x - 3y = 10) \times 3$ → $12x - 9y = 30$

$(3x - 4y = 11) \times -4$ → $-12x + 16y = -44$ ↓

X Y

(1, −2)

$\frac{7y}{7} = \frac{-14}{7}$

$y = -2$

FIND X

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

$4x + 6 = 10$

$-6 \quad -6$

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

$x = 1$

Chapter 8

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

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

$-32x^{11}y^7$ mult #'s (4)(-4)(2) For variables, add exponents

11) $(-3pm^0)^3$ = $(-3)^3 p^3 m^{0\cdot 3}$ = $-27p^3$ DISTRIBUTE 3 and mult exponents $m^0 = 1$

12) $(-3a^2b^0)^4$ = $(-3)^4 a^8 b^0$ = $81a^8$

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

14) $\frac{-4x^3y^2}{-2x^2y^2}$ ① divide #'s $\frac{-4}{-2}$ ② For variables, subtract exponents

$2x$

15) $\left(\frac{x^{-3}y^2}{2x^4}\right)^4$ = $\frac{y^8}{16x^{28}}$ ↓ distribute $\frac{x^{-12}y^8}{2^4x^{16}}$ = $\frac{y^8}{16x^{16}x^{12}}$ make pos. exp. add exp's

16) $\left(\frac{x^3}{-2yx^3}\right)^{-2}$ = Simplify $\left(\frac{1}{-2y}\right)^{-2}$ = Distribute $\frac{1}{(-2)^{-2}y^{-2}}$ = $4y^2$

Make positive exp. by moving to NUM. or DEN.

17) $\left(\frac{-x^3y^2}{-2x^2}\right)^3$ → simplify $\left(\frac{xy^2}{2}\right)^3$ = $\frac{x^3y^6}{8}$ distribute 3, $2^3 = 8$

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

19) $(x^2y^3)^2 \cdot (2x^4)^4$

$x^4y^6 \cdot 2^4x^{16}$ = $x^4y^6 \cdot 16x^{16}$ = $16x^{20}y^6$

20) $\frac{2x \cdot x^4y^3}{(xy^2)^3}$ = $\frac{2x^5y^3}{x^3y^6}$ = $\frac{2x^2}{y^3}$

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

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

NEG #'s REQUIRE ( )'s

22) $(-4)^4 \cdot (-4)^2$

$(-4)^6$ ← Same base → add exponents

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

2^{16}

24) $\frac{(-4)^4}{(-4)^1}$

$(-4)^3$ ← Same base → subtract exponents

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

4^2

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

4^7

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. H → L exp w/ constant last

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

$4n^3 + 5n^2 - n + 5$

Combine LIKE TERMS

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

$4k + 3$

Simplify each difference. Write in standard form.

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

$2x - 6$

$-4 + 4x^2 - x + 3x - 2 - 4x^2 =$

① rewrite as an addition problem

② write polynomial from H → L exponent. Constant last.

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

$6x^3 - 5x^2 - x - 4$

$x^3 - 2x - 5x^2 + 5x^3 - 4 + x$

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) $(6x + 1)^2$ expand $(6x+1)(6x+1) =$ $36x^2 + 6x + 6x + 1$

$36x^2 + 12x + 1$

40) $(5n - 2)^2$ 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) $10x^2 + 11x - 6$ (1, 10, 2, 5) (1, 6, 2, 3)

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

$-4x$

$+15x$

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) $9x^2 - 25$ Perfect SQ minus perfect SQ

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

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)

GCF GCF

$5x^2(4x-3) - 4(4x-3)$

GCF

$(4x-3)(5x^2-4)$

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

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

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

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

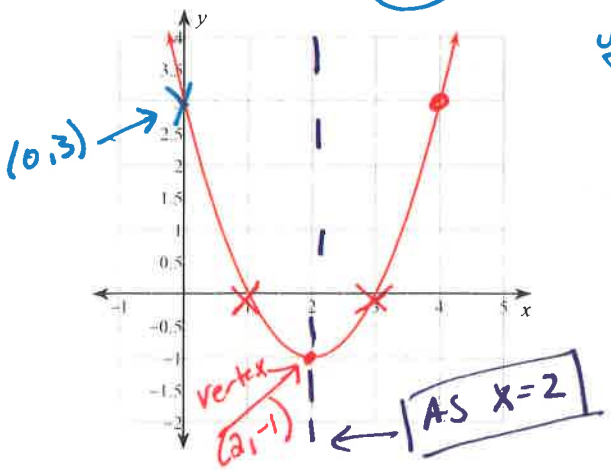
$8(3p+1)(p+1)(p-1)$

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 ↑ y int



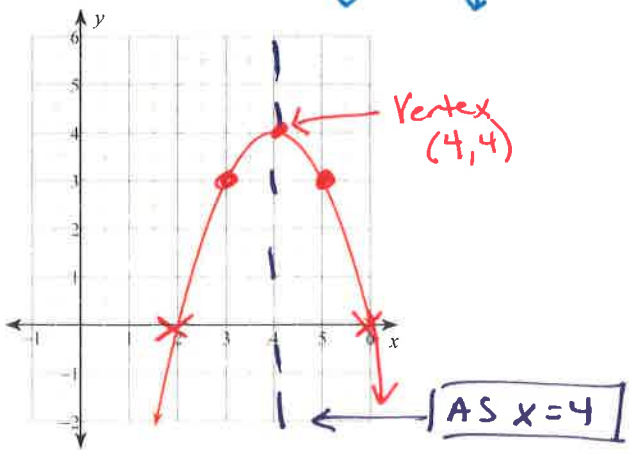
FIND AXIS OF SYMMETRY

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

V

X	0	1	2	3	4
y	3	0	-1	0	3

53) $y = -x^2 + 8x - 12$ A = −1 B = 8 C = −12 ↑ y int (0, −12)



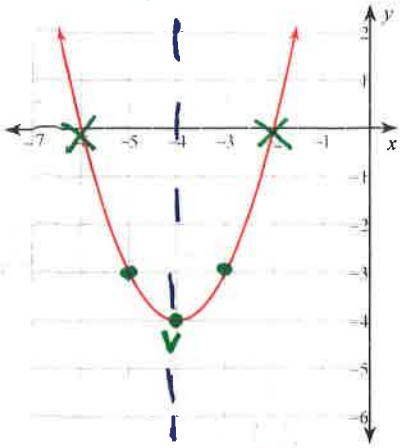
AS: $x = \frac{-B}{2A} = \frac{-8}{2(-1)} = \frac{8}{-2}$ $x = 4$

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



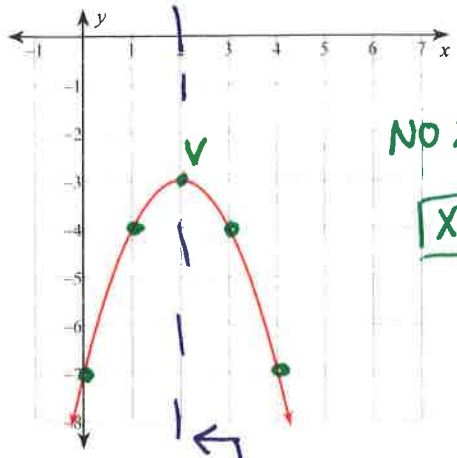
SOLUTIONS

$X = -2, -6$

AS $X = \frac{-8}{2(1)}$ $X = -4$

X	-6	-5	-4	-3	-2
Y	0	-3	-4	-3	0

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



NO X INTERCEPT

X= NO SOLUTION

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

X	0	1	2	3	4
Y	-7	-4	-3	-4	-7

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

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

N= 1.69, –0.69

A=6 B=-6 C=-7

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

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

$X = \frac{6+\sqrt{204}}{12}$ $X = 1.69$

$X = \frac{6-\sqrt{204}}{12}$ $X = -.69$

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

m= 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 #

M = NO SOLUTION

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

{1.5, –1}

PUT IN STD FORM $Ax^2+Bx+C=0$

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

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

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

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

$$x = \frac{3+15}{12} \qquad x = \frac{3-15}{12}$$

$x = 1.5$ $\qquad$ $x = -1$

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

{2.33, –6}

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

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

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

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

$$x = \frac{-11+25}{6} \qquad x = \frac{-11-25}{6}$$

$x = \frac{14}{6} = \frac{7}{3}$ $\qquad$ $x = -6$

$x = 7/3$ OR $x \approx 2.33$ OR $x = 2\frac{1}{3}$

Solve each equation by factoring.

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

{–8, –5}

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

$x+8=0 \qquad x+5=0$

$x=-8 \qquad x=-5$

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

{8, 2}

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

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

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

$N-2=0 \qquad N-8=0$

$N=2 \qquad N=8$

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

{0, –5, 6}

FACTOR

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

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

$7x=0 \qquad x-6=0 \qquad x+5=0$

$x=0 \qquad x=6 \qquad x=-5$

63) $x^2 - 4 = 0$

{–2, 2}

FACTOR

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

$x-2=0 \qquad x+2=0$

$x=2 \qquad x=-2$

Simplify. Leave in simple radical form.

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

$6\sqrt{5}$

T.P. FACTOR LADDER

2	180
2	90
5	45
3	9
	3

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

$-9\sqrt{5}$

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

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

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

$-9\sqrt{5}$

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

$10\sqrt{3}$

$= \sqrt{300}$

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

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

$20+5\sqrt{30}$

OR

$5\sqrt{30}+20$

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

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

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

order does not matter

Simplify. Leave in simple radical form.

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

$\dfrac{3\sqrt{6}}{2}$

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

$2\sqrt{2}$

Solve each equation. Remember to check for extraneous solutions.

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

$\dfrac{5}{5}\quad\dfrac{5}{5}$

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

$x=9$

ISOLATE $\sqrt{\ }$

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

$+20\quad+20$

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

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

$x=100$

Simplify each expression. Leave as an improper fraction.

76) $\frac{8n^2+64n}{n+8}$ Factor → $\frac{8N(N+8)}{(N+8)}$ → $8n$

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

State the excluded values for each.

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

{8}

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

{–2}

Simplify each expression.

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

OR $\frac{7}{4}x$

81) $\frac{10n^3}{2n}\div\frac{7}{6n}=\frac{10N^3}{2N}\cdot\frac{6N}{7}=\frac{60N^4}{14N}$ → $\frac{30n^3}{7}$

OR $\frac{30}{7}N^3$

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

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

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

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

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

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

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

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

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

$n-4 \;\overline{)\; n^3+3n^2-23n-20}$

$\pm(n^3-4n^2)$

$7n^2-23n$

$\pm(7n^2-28n)$

$5n-20$

$-(5n-20)$

0

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

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 $4x^2$

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

$4x-x^2=4$ ← rewrite in $Ax^2+Bx+C=0$

$x^2-4x+4=0$ ← factor (or QF)

$(x-2)(x-2)=0$ ← Set each factor $=0$ AND SOLVE

$x-2=0$

$\boxed{x=2}$

C: $\frac{1}{2}-\frac{1}{4}=\frac{1}{2^2}$ ← Check

$\frac{1}{4}=\frac{1}{4}$ ✓

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

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

$x^2+3=4x^2$ ← SINCE NO X-TERM THEN SOLVE BY ISOLATING x^2

$-x^2 \quad -x^2$

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

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

$\boxed{x=\pm 1}$ ← Remember to take $\pm$

C: $2/3=2/3$ ✓ C: $2/3=2/3$ ✓