

PRE-CALCULUS/TRIGONOMETRY 3 PREREQUISITE HANDOUT

PART 1: Combining Like Terms

1.) $(2x^2 + 1) + (3x^2 + 6x - 2)$

$5x^2 + 6x - 1$

3.) $(2x^2y - 6y) - (4x^2 + 2y)$

$2x^2y - 6y - 4x^2 - 2y$

$2x^2y - 8y - 4x^2$

2.) $(3xy + 6x) - (3y + 6xy)$

$3xy + 6x - 3y - 6xy$

$-3xy + 6x - 3y$

4.) $3xy + 4x - 3y + 6xy - 7x$

$3xy - 3x - 3y + 6xy$

$9xy - 3x - 3y$

PART 2: Solving Linear Equations

5.) $-35(14 - 2m) = -5(8 + m)$

$-490 + 70m = -40 - 5m$

$-450 = -75m$ $m = 6$

7.) $\frac{x}{4} - x = \frac{x}{3} + \frac{1}{2} \cdot 12$

$3x - 12x = 4x + 6$

$-9x = 4x + 6$

$-13x = 6$

$x = \frac{6}{-13}$

6.) $2x + 2(x + 4) = 1 + 3(x + 2)$

$2x + 2x + 8 = 1 + 3x + 6$

$4x + 8 = 7 + 3x$

$x = -1$

8.) $\frac{9x-3}{2} = \frac{3x-6}{9} - \frac{13}{6}$

$9(9x-3) = 2(3x-6) - 3(13)$

$81x - 27 = 6x - 12 - 39$

$81x - 27 = 6x - 51$

$\frac{75x}{75} = \frac{-24}{75}$

$x = -\frac{8}{25}$

PART 3: Distributing and the F.O.I.L Method

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

$x^3 - 3x^2 + 2x - 6$

10.) $(2x + 6)(3x + 4y + 6)$

$6x^2 + 8xy + 12x$

$18x + 24y + 36$

$6x^2 + 8xy + 30x + 24y + 36$

11.) $x(x + 2)(x^2 + 1)$

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

$x^4 + x^2 + 2x^3 + 2x$

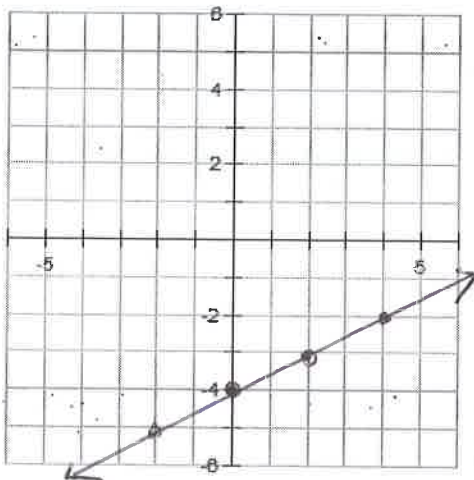
$x^4 + 2x^3 + x^2 + 2x$

12.) $(x^2y - 3y)(2xy + 3y)$

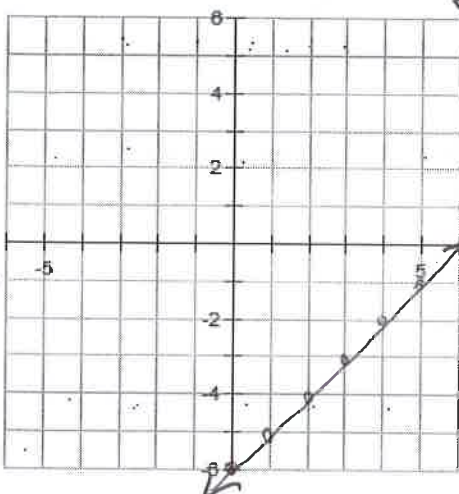
$2x^3y^2 + 3x^2y^2 - 6xy^2 - 9y^2$

PART 4: Graphing Linear Equations

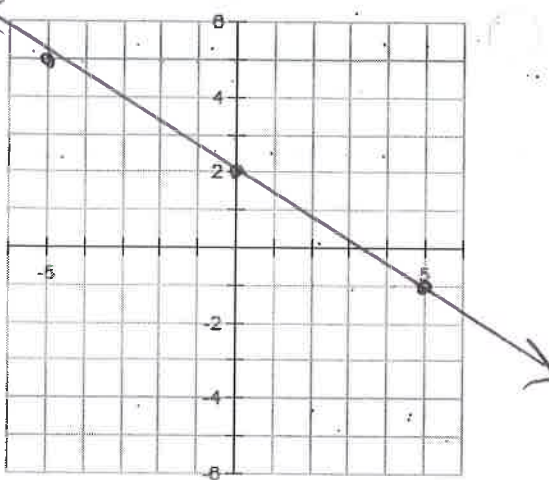
13.) $y = \frac{1}{2}x - 4$



14.) $3x - 3y = 18$ $y = x - 6$



15.) $3x + 5y = 10$ $y = -\frac{3}{5}x + 2$



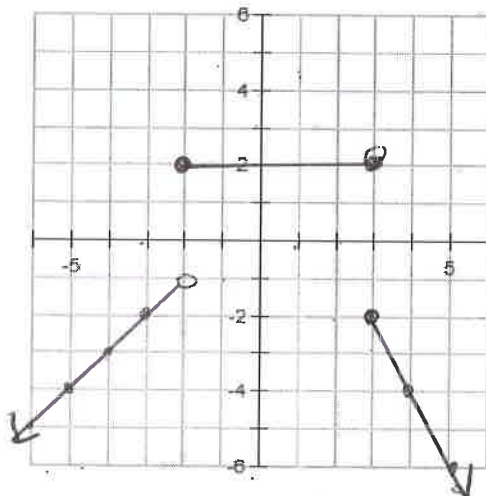
PART 5: Piecewise Functions

$$f(x) = \begin{cases} x + 1, & x < -2 \\ 2, & -2 \leq x < 3 \\ -2x + 4, & x \geq 3 \end{cases}$$

16.) $f(4) = \underline{-4}$

17.) $f(-3) = \underline{-2}$

18.) $f(1) = \underline{2}$



PART 6: Writing Equations of Lines

19.) Write the equation of the line in slope-intercept form which has a slope of $\frac{1}{2}$ and passes through (6, 4).

$$y = \frac{1}{2}x + b$$

$$4 = \frac{1}{2}(6) + b$$

$$4 = 3 + b$$

$$1 = b$$

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

20.) Write the equation of the line in slope-intercept form which passes through (6, 1) and (8, -4).

$$m = \frac{-4 - 1}{8 - 6} = \frac{-5}{2}$$

$$y = mx + b$$

$$1 = -\frac{5}{2}(6) + b$$

$$1 = -15 + b$$

$$y = -\frac{5}{2}x + 16$$

21.) Write the equation of the line in slope-intercept form that passes through (-2, 0) and is perpendicular to the line whose equation is $y = 3x + 7$.

$$m = -\frac{1}{3} \quad b = \frac{2}{3}$$

$$y = mx + b$$

$$0 = -\frac{1}{3}(-2) + b$$

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

PART 7: Exponent Properties

$$22.) \left(\frac{a^3 b^{-1}}{b^2}\right)^2 = \left(\frac{a^3}{b^3}\right)^2$$

$$\frac{a^6}{b^6}$$

$$23.) (\sqrt[5]{x})^3$$

$$x^{\frac{3}{5}}$$

$$24.) \frac{x^5 y^0 z^3}{xyz^5}$$

$$\frac{x^4}{y z^2}$$

$$25.) 3^4 \cdot 3^4 \cdot 3^3$$

$$3^{4+4+3} = 3^{11}$$

$$26.) (2^{-1})^{-3}$$

$$\left(\frac{1}{2}\right)^{-3}$$

$$2^3 = 8$$

$$27.) \frac{vu^3}{(uv^2)^2 \cdot 2u^3v^2}$$

$$\frac{vu^3}{u^2v^4 \cdot 2u^3v^2} = \frac{vu^3}{2u^5v^6} = \frac{1}{2u^2v^3}$$

PART 8: Simplifying Radicals

$$28.) \sqrt{-96} \sqrt{-1} \sqrt{16} \sqrt{6}$$

$$4i\sqrt{6}$$

$$29.) 6\sqrt{75}$$

$$\sqrt{25} \cdot 3$$

$$6 \cdot 5\sqrt{3} = 30\sqrt{3}$$

$$30.) \sqrt{\frac{12}{5}} = \frac{\sqrt{12}}{\sqrt{5}} = \frac{2\sqrt{3}}{\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}} = \frac{2\sqrt{15}}{5}$$

$$31.) \frac{6}{3\sqrt{8}} = \frac{6}{3 \cdot 2\sqrt{2}} = \frac{6}{6\sqrt{2}}$$

$$\frac{1}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{\sqrt{2}}{2}$$

$$32.) (2\sqrt{3})(3\sqrt{7})$$

$$6\sqrt{21}$$

$$33.) (3\sqrt{10})^2$$

$$3\sqrt{10} \cdot 3\sqrt{10}$$

$$9\sqrt{100} \rightarrow 9 \cdot 10$$

$$90$$

PART 9: Complex Numbers

$$34.) (4 - 3i)(2 + 2i)$$

$$8 + 8i - 6i - 6i^2$$

$$8 + 2i - 6(-1)$$

$$14 + 2i$$

$$35.) \frac{3+2i}{i} \cdot \frac{i}{i}$$

$$\frac{3i+2i^2}{i^2} \rightarrow \frac{3i+2(-1)}{(-1)}$$

$$-3i+2i$$

$$36.) \frac{7-3i}{4+i} \cdot \frac{4-i}{4-i} = \frac{28-7i-12i+3i^2}{16-4i+4i-i^2}$$

$$\frac{28-19i-3}{16+1} \rightarrow \frac{25-19i}{17}$$

PART 10: Factoring Techniques

$$37.) 6x - 12x^2$$

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

$$38.) 16x^2 - 25$$

$$(4x - 5)(4x + 5)$$

$$39.) x^2 - 14x - 32$$

$$(x - 16)(x + 2)$$

$$40.) x^2 - 9x + 20$$

$$(x - 4)(x - 5)$$

$$41.) 4x^2 - 4x - 3$$

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

$$42.) 9x^2 - 13x + 4$$

$$(9x - 4)(x - 1)$$

$$43.) 6x^2 - 13x + 6$$

$$(2x - 3)(3x - 2)$$

$$44.) 5x^2 - 14x + 8$$

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

$$45.) x^3 + 27$$

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

$$46.) (x^5 - 3x^3)(x^2 - 3)$$

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

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

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

PART 11: Solving by Factoring

47.) $4x^2 = 16x$

$$4x^2 - 16x = 0$$

$$4x(x-4) = 0$$

$$4x = 0 \quad x-4 = 0$$

$$x=0 \quad x=4$$

48.) $x^2 - x - 30 = 0$

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

$$x-6 = 0 \quad x+5 = 0$$

$$x=6 \quad x=-5$$

49.) $92 - 42x = 2x^2$

$$2x^2 + 42x - 92 = 0$$

$$2(x^2 - 21x - 46) = 0$$

$$2(x-23)(x+2) = 0$$

$$x=0 \quad x-23 = 0 \quad x+2 = 0$$

$$x=23 \quad x=-2$$

50.) $3x^2 + 13x = -4$

$$3x^2 + 13x + 4 = 0$$

$$(3x+1)(x+4) = 0$$

$$3x+1 = 0 \quad x+4 = 0$$

$$x = -\frac{1}{3} \quad x = -4$$

51.) $\frac{x}{x-3} = \frac{4}{x-4}$

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

$$x^2 - 4x = 4x - 12$$

$$x^2 - 8x + 12 = 0$$

$$(x-6)(x-2) = 0$$

$$x=6 \quad x=2$$

52.) $\frac{x-4}{3} = \frac{x+4}{x+1}$

$$(x+1)(x-4) = 3(x+4)$$

$$x^2 - 3x - 4 = 3x + 12$$

$$x^2 - 6x - 16 = 0$$

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

$$x=8 \quad x=-2$$

PART 12: The Quadratic Formula

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

53.) $5x = 3 - 3x^2$

$$3x^2 + 5x - 3 = 0$$

$$x = \frac{-5 \pm \sqrt{25 - 4(3)(-3)}}{2(3)} = \frac{-5 \pm \sqrt{61}}{6}$$

54.) $x^2 - 2x + 9 = 0$

$$x = \frac{2 \pm \sqrt{4 - 4(1)(9)}}{2}$$

$$x = \frac{2 \pm \sqrt{9 - 36}}{2} \quad x = \frac{2 \pm \sqrt{-27}}{2}$$

55.) $2x^2 - x = 5$

$$2x^2 - x - 5 = 0$$

$$x = \frac{1 \pm \sqrt{1 - 4(2)(-5)}}{2(2)}$$

$$x = \frac{1 \pm \sqrt{41}}{4}$$

56.) $x(x-2) = 4$

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

$$x = \frac{2 \pm \sqrt{4 - 4(1)(-4)}}{2}$$

$$\frac{2 \pm \sqrt{20}}{2} = \frac{2 \pm 2\sqrt{5}}{2} = 1 \pm \sqrt{5}$$

$$x = \frac{2 \pm 3i\sqrt{3}}{2}$$