Algebra I Review

Flip Book

1. $9(1-2x) = -3(x+1)$

$9 - 18x = -3x - 3$

$9 - 15x = -3$

$\frac{-15x}{-15} = \frac{-12}{-15}$

$x = \frac{4}{5}$

2. $-\frac{3}{4}(16x+8) = 19 - (10x-3)$

$-12x - 6 = 19 - 10x + 3$

$-12x - 6 = -10x + 22$

$-2x - 6 = 22$

$-2x = 28$

$x = -14$

3. $\frac{5x-18-(x+9)}{2} = (3-4x)2$

$5x - 18 - x - 9 = 6 - 8x$

$4x - 27 = 6 - 8x$

$12x - 27 = 6$

$\frac{12x}{12} = \frac{33}{12}$

$x = \frac{11}{4}$

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

$7(2x-1) = 3(4x+1)$

$14x - 7 = 12x + 3$

$2x - 7 = 3$

$\frac{2x}{2} = \frac{10}{2}$

$x = 5$

PRODUCT RULE	POWER RULE	QUOTIENT RULE	NEGATIVE EXPONENTS	ZERO EXPONENT
$x^a \cdot x^b =$ x^{a+b}	$(x^a)^b =$ $x^{a \cdot b}$	$\frac{x^a}{x^b} =$ x^{a-b}	$x^{-a} =$ $\frac{1}{x^a}$	$x^0 =$ 1

When adding or subtracting expressions with exponents, simply combine like terms!

5 $-5x^3 \cdot 4x^4$

$-20x^7$

6 $(-2m^3n)^2 \cdot 7mn^4$

$4m^6n^2 \cdot 7mn^4$

$28m^7n^6$

7 $\frac{52c^{12}}{4c^2} - 2c^7 \cdot 4c^3$

$13c^{10} - 8c^{10}$

$5c^{10}$

8 $\frac{10w \cdot 2w^2}{24w^8} =$ $\frac{20w^3}{24w^8} =$ $\frac{5}{6w^5}$

9 $(-3a^2b^3)^6 - 25a^{12}b^{18}$

$729a^{12}b^{18} - 25a^{12}b^{18}$

$704a^{12}b^{18}$

10 $(9m^{-4})^2 \cdot \frac{1}{3}m^6$

$81m^{-8} \cdot \frac{1}{3}m^6$

$27m^{-2} =$ $\frac{27}{m^2}$

11 $\frac{4x^5}{x^2} \cdot \left(\frac{x^1}{x^2}\right)^3 =$ $4x^3 \cdot (x^{-1})^3$

$4x^3 \cdot x^{-3}$

$4x^0 = 4 \cdot 1$

$= 4$

EXPONENTS

Directions: Simplify each expression. Write all irrational answers in simplest radical form.

12. $\sqrt{49}$ → 7

13. $\sqrt{361}$ → 19

14. $\sqrt{\frac{1}{16}}$ → $\frac{1}{4}$

15. $\sqrt{80}$ → $\sqrt{16 \cdot 5}$ → $4\sqrt{5}$

16. $2\sqrt{360}$ → $2\sqrt{36 \cdot 10}$ → $2 \cdot 6\sqrt{10}$ → $12\sqrt{10}$

17. $\sqrt{243}$ → $\sqrt{81 \cdot 3}$ → $9\sqrt{3}$

18. $4\sqrt{384}$ → $4\sqrt{64 \cdot 6}$ → $4 \cdot 8\sqrt{6}$ → $32\sqrt{6}$

19. $\sqrt{6} \cdot \sqrt{30}$ → $\sqrt{180}$ → $\sqrt{36 \cdot 5}$ → $6\sqrt{5}$

20. $3\sqrt{8} \cdot 5\sqrt{50} = 15\sqrt{400}$ → $= 15 \cdot 20$ → $= 300$

21. $\frac{\sqrt{112}}{\sqrt{4}} = \sqrt{28}$ → $= \sqrt{4 \cdot 7}$ → $= 2\sqrt{7}$

22. $\frac{6\sqrt{120}}{\sqrt{15}} = 6\sqrt{8}$ → $= 6\sqrt{4 \cdot 2}$ → $= 6 \cdot 2\sqrt{2}$ → $= 12\sqrt{2}$

23. $\frac{\sqrt{3}}{\sqrt{8}} \cdot \frac{\sqrt{8}}{\sqrt{8}} = \frac{\sqrt{24}}{8} = \frac{\sqrt{4 \cdot 6}}{8}$ → $= \frac{\sqrt{6}}{4}$

24. $\sqrt{10} + \sqrt{10} =$ → $2\sqrt{10}$

25. $3\sqrt{50} + \sqrt{98}$ → $3\sqrt{25 \cdot 2} + \sqrt{49 \cdot 2}$ → $15\sqrt{2} + 7\sqrt{2}$ → $22\sqrt{2}$

26. $\sqrt{63} + 4\sqrt{20} - \sqrt{7}$ → $\sqrt{9 \cdot 7} + 4\sqrt{4 \cdot 5} - \sqrt{7}$ → $3\sqrt{7} + 8\sqrt{5} - \sqrt{7}$ → $2\sqrt{7} + 8\sqrt{5}$

27. $\sqrt[3]{8}$ → 2

28. $\sqrt[3]{125}$ → 5

29. $\sqrt[3]{\frac{27}{512}}$ → $\frac{3}{8}$

RADICALS

Directions: Simplify each expression.

30 $(7x-4x^2-19)+(3x+14-2x^2)$

$-6x^2+10x-5$

31 $(28+8w^3-9w)-(10w+w^2-2w^3+1)$

$10w^3-w^2-19w+27$

32 $(6k-5)(2k-3)$

$12k^2-18k-10k+15$

$12k^2-28k+15$

33 $(4x-1)(4x+1)$

$16x^2+4x-4x-1$

$16x^2-1$

34 $(3x+1)^2-5(4x-1)$

$(3x+1)(3x+1)-20x+5$

$9x^2+3x+3x+1-20x+5$

$9x^2-14x+6$

35 $(a+6)(a^2-4a+2)$

$a^3-4a^2+2a+6a^2-24a+12$

$a^3+2a^2-22a+12$

36 $\frac{15x^7y^2-6x^3y}{3xy}$

$5x^6y-2x^2$

37 $\frac{8k^3+18k^2-2k}{-2k}$

$-4k^2-9k+1$

38 The length and width of a rectangle can be expressed as $(3x + 1)$ and $(2x - 7)$. Write an expression to represent the perimeter and an expression to represent the area.

Perimeter:

$2(3x+1)+2(2x-7)$

$6x+2+4x-14 = 10x-12$

Area:

$(3x+1)(2x-7)$

$6x^2-21x+2x-7$

$6x^2-19x-7$

39 The side length of a cube can be represented by the expression $(x - 5)$. Write an expression to represent the volume of the cube.

$V = (x-5)^3$

$= (x-5)(x-5)(x-5)$

$= (x^2-10x+25)(x-5)$

$= x^3-5x^2-10x^2+50x+25x-625$

$= x^3-15x^2+75x-625$

POLYNOMIALS

GCF	DIFFERENCE OF SQUARES	BASIC TRINOMIAL	SLIP & SLIDE TRINOMIAL
Always check FIRST!!	$a^2-b^2=$ $(a+b)(a-b)$	x^2+bx+c (c, b)	~~SLIP & SLIDE~~ BOX method! ax^2+bx+c ($a\cdot c$, f_1, f_2, b)

Polynomials that can't be factored at all are called PRIME

Directions: Factor each polynomial completely.

40) $28w+12$

$4(7w+3)$

41) a^3b-3a^2b

$a^2b(a-3)$

42) $36x^5y^3z-54xy^2$

$18xy^2(2x^4yz-3)$

43) $9m^2-49$

$(3m+7)(3m-7)$

44) $5x^2-80$

$5(x^2-16)$

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

45) $3y-75x^2y$

$3y(1-25x^2)$

$3y(1+5x)(1-5x)$

46) $x^2+16x+63$

$(x+9)(x+7)$

47) $n^2-3n-70$

$(n-10)(n+7)$

48) $c^2-13c-48$

$(c-16)(c+3)$

49) $5x^2+5x-60$

$5(x^2+x-12)$

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

50) $2p^2-24p+72$

$2(p^2-12p+36)$

$2(p-6)^2$

51) $-x^2-11x-30$

$-1(x^2+11x+30)$

$-1(x+5)(x+6)$

52) $2m^2-13m+6$

$m^2-13m+12$

$(m-\frac{12}{2})(m-\frac{1}{2})$

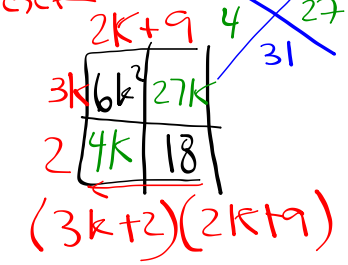
$(m-6)(2m-1)$

53) $6k^2+31k+18$

GCF

$6\cdot 18=108$

$4+27=31$



$(3k+2)(2k+9)$

54) $4h^2-20h+25$

$h^2-20h+100$

$(h-\frac{10}{2}5)(h-\frac{10}{2}5)$

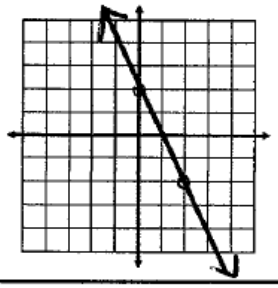
$(2h-5)^2$

FACTORING POLYNOMIALS

SLOPE-INTERCEPT FORM	STANDARD FORM	SLOPE FORMULA	POINT-SLOPE FORMULA
$y = mx + b$ (slope, y-intercept)	$Ax + By = C$	$m = \frac{y_2 - y_1}{x_1 - x_2}$	$y - y_1 = m(x - x_1)$

Directions: Graph each equation below

55) $y = -\frac{4}{3}x + 2$

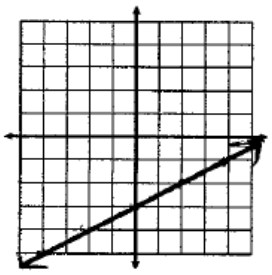


56) $x - 2y = 6$

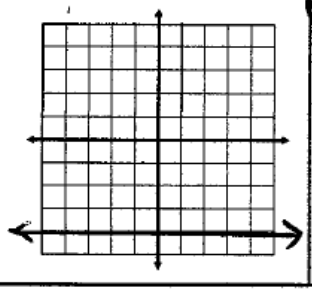
$-x \quad -x$

$\frac{-2y}{-2} = \frac{-x}{-2} + \frac{6}{-2}$

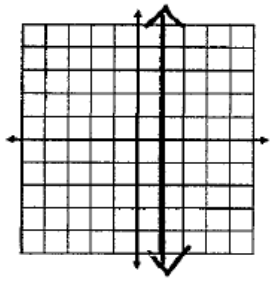
$y = \frac{1}{2}x - 3$



57) $y = -4$



58) $x = 1$



Directions: Find the slope of the line passing through the given points.

59) (-4, -9) and (2, 6)

$m = \frac{6-(-9)}{2-(-4)} = \frac{15}{6} = \boxed{\frac{5}{2}}$

60) (-10, 6) and (-3, -1)

$m = \frac{-1-6}{-3-(-10)} = \frac{-7}{7} = \boxed{-1}$

61) (3, -2) and (-1, -2)

$m = \frac{-2-(-2)}{-1-3} = \frac{0}{-4} = \boxed{0}$

62) (5, -4) and (5, 8)

$m = \frac{8-(-4)}{5-5} = \frac{12}{0} = \boxed{\text{undefined}}$

Directions: For questions 60-61, write the equation of the line in slope-intercept form using the given information.

63) passes through (-6, 1); slope = 1/4

$y - 1 = \frac{1}{4}(x + 6)$

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

$+1 \quad +1$

$\boxed{y = \frac{1}{4}x + \frac{5}{2}}$

64) passes through (-2, 13) and (2, -7)

$m = \frac{-7-13}{2+2} = \frac{-20}{4} = -5$

$y - 13 = -5(x + 2)$

$y - 13 = -5x - 10$

$+13 \quad +13$

$\boxed{y = -5x + 3}$

65) Give an example of a line that is parallel and a line that is perpendicular to the line $x + 3y = 10$.

Parallel: $y = -\frac{1}{3}x + 8$; Perp: $y = 3x + 4$

$-x \quad -x$

$\frac{3y}{3} = \frac{-x}{3} + \frac{10}{3}$

$y = -\frac{1}{3}x + \frac{10}{3}$

LINEAR EQUATIONS

STANDARD FORM OF A QUADRATIC EQUATION: $y = ax^2 + bx + c$

Directions: Graph each equation below. Give the axis of symmetry, vertex, domain, range, and zeros.

66 $y = x^2 + 10x + 21$

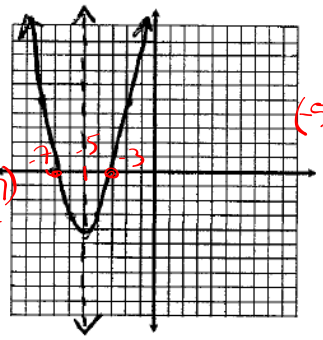
$x = \frac{-10}{2(1)} = -5$ (middle)

x	y
-8	5
-7	0
-6	-3
-5	-4
-4	-3
-3	0
-2	5

$3 \times 7 = 21$, $3 + 7 = 10$

$(x+3)(x+7)$

$-3 \quad -7$



$(-5)^2 + 10(-5) + 21 = -4$

Axis of Symmetry: $x = -5$

Vertex: $(-5, -4)$

Domain: $\mathbb{R}$

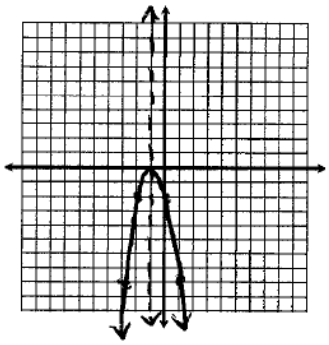
Range: $y \geq -4$

Zeros: $x = \{-7, -3\}$

67 $y = -2x^2 - 4x - 2$

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

x	y
-4	-18
-3	-8
-2	-2
-1	0
0	-2
1	-8
2	-18



Axis of Symmetry: $x = -1$

Vertex: $(-1, 0)$

Domain: $\mathbb{R}$

Range: $y \leq 0$

Zeros: $x = \{-1\}$

Directions: Solve each equation by Factoring.

68 $x^2 + 9x = 70$

$x^2 + 9x - 70 = 0$

$(x+14)(x-5) = 0$

$x+14=0 \quad x-5=0$

$x = -14 \quad x = 5$

$x = \{-14, 5\}$

69 $x^2 - 14x + 60 = 11$

$x^2 - 14x + 49 = 0$

$(x-7)(x-7) = 0$

$x-7=0 \quad x-7=0$

$x = 7 \quad x = 7$

$x = \{7\}$

70 $3x^2 + 35 = 24x - 1$

$3x^2 - 24x + 36 = 0$

$3(x^2 - 8x + 12) = 0$

$3(x-6)(x-2) = 0$

$x-6=0 \quad x-2=0$

$x = 6 \quad x = 2$

$x = \{2, 6\}$

71 $6x^2 = 7 - 11x$

$6x^2 + 11x - 7 = 0$

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

$(x + \frac{14}{-3})(x - \frac{3}{2}) = 0$

$(3x+7)(2x-1) = 0$

$x = \{-\frac{7}{3}, \frac{1}{2}\}$

72 $8x^2 - 2x = 0$

$2x(4x-1) = 0$

$2x = 0 \quad 4x-1 = 0$

$x = 0 \quad x = \frac{1}{4}$

$x = \{0, \frac{1}{4}\}$

73 $7x^2 - 63 = 0$

$7(x^2 - 9) = 0$

$7(x+3)(x-3) = 0$

$x+3=0 \quad x-3=0$

$x = \{-3, 3\}$

QUADRATIC EQUATIONS