

Algebra I - review

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$$\begin{aligned} 1. \quad & 4(3x+3) - (x-1) + 5(5x-1) \\ & = \underline{12x} + \underline{12} - \underline{x} + \underline{1} + \underline{25x} - \underline{5} \\ & = 36x + 8 \end{aligned}$$

$$2. \quad 2(-9) = -18$$

$$3) \quad 5 - (-12) = 5 + 12 = 17$$

$$4.) \quad -9$$

$$\begin{aligned} 11.) \quad & 8z - 20 = 7z - 2 \\ & z = 18 \end{aligned}$$

$$5.) \quad -2$$

$$\begin{aligned} 12.) \quad & 2x - 6 = 4x + 3 \\ & -2x = 9 \\ & x = -9/2 \end{aligned}$$

$$6.) \quad -x$$

$$7.) \quad 9a + 2b$$

$$\begin{aligned} 13.) \quad & -2a + 1 = -4a + 11 \\ & 2a = 10 \\ & a = 5 \end{aligned}$$

$$\begin{aligned} 8.) \quad & -24y - 36 + 15y - 10 \\ & = -9y - 46 \end{aligned}$$

$$\begin{aligned} 9.) \quad & 2x + 1 = -7 \\ & \underline{\quad -1 \quad -1 \quad} \\ & 2x = -8 \\ & x = -4 \end{aligned}$$

$$14.) \quad 12x^7$$

$$15.) \quad 27x^6$$

$$16.) \quad 2x^5$$

$$\begin{aligned} 10.) \quad & 8y - 10 = -2y + 20 \\ & 10y = 30 \\ & y = 3 \end{aligned}$$

$$\begin{aligned} 17.) \quad & 2x^2 - 8x + 7x - 28 \\ & = 2x^2 - x - 28 \end{aligned}$$

18) $(x-5)(x-5)$ OR you could use formula $(x-5)^2$

$$= x^2 - 5x - 5x + 25$$

$$= x^2 - 10x + 25$$

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

$$= x^2 - 10x + 25$$

19.) $3x^2 - 26x + 16$

20) $(x+3)(x^2+4x-10)$ { multiply everything in 1st parentheses by the 2nd parentheses

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

$$= x^3 + 4x^2 - 10x + 3x^2 + 12x - 30$$

$$= x^3 + 7x^2 + 2x - 30$$

21) $(3x^2 + x - 8) + (x^2 + 5x + 10)$ You are Adding!

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

22) $(x^2 + 3x - 4) - (3x^2 - 5x + 2)$ Subtracting!!

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

$$= -2x^2 + 8x - 6$$

23) $-16p^6$

24.) $(x-2)(x-3)$

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

26) $(x+9)(x-9)$ Difference of 2 squares

$$27. (2x+5)(2x-5) \quad (\text{difference of 2 squares})$$

$$28. 4x^2 + 20x + 25 \quad (\text{this is a perfect square trinomial})$$

$$= (2x+5)^2$$

$$29.) \quad 2x^2 - 7x - 15 \quad \text{Use Grouping}$$

$$\begin{array}{l} \downarrow \quad \swarrow \quad \downarrow \\ = 2x^2 - 10x + 3x - 15 \\ = 2x(x-5) + 3(x-5) \\ = (x-5)(2x+3) \end{array}$$

$$\begin{array}{l} -30 \\ 1 \cdot 30 \\ 2 \cdot 15 \\ 3 \cdot 10 \leftarrow \\ 5 \cdot 6 \end{array}$$

$$30.) \quad 3x^2 + 16x + 21$$

$$= 3x^2 + 7x + 9x + 21$$

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

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

$$\begin{array}{l} 63 \\ 1 \cdot 63 \\ 3 \cdot 21 \\ 7 \cdot 9 \leftarrow \end{array}$$

$$31.) \quad x^2 + 11x + 18$$

$$= (x+9)(x+2)$$

$$\begin{array}{l} 18 \\ 1 \cdot 18 \\ 2 \cdot 9 \leftarrow \\ 3 \cdot 6 \end{array}$$

$$32.) \quad x^2 - x - 20$$

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

$$\begin{array}{l} -20 \\ 1 \cdot 20 \\ 2 \cdot 10 \\ 4 \cdot 5 \end{array}$$

$$33. \quad b^2 + 8b + 15 \\ = (b + 3)(b + 5)$$

$$34. \quad \frac{\cancel{(x+5)}(x-5)}{6\cancel{(x-5)}} \cdot \frac{x-1}{\cancel{x+5}} = \frac{x-1}{6}$$

$$35. \quad \frac{5\cancel{(x-3)}}{3\cancel{(x-3)}} \cdot \frac{4(x+3)}{6\cancel{(x-3)}} = \frac{20}{18} = \frac{10}{9}$$

$$36.) \quad \frac{(x+5)(x-5)}{7} \div \frac{x-5}{21} =$$

$$\frac{(x+5)\cancel{(x-5)}}{7} \cdot \frac{21}{\cancel{x-5}} = 3(x+5)$$

$$37.) \quad \frac{(x-5)(x+2)}{4x} \div \frac{x+3}{x^2} =$$

$$\frac{(x-5)\cancel{(x+2)}}{4x} \cdot \frac{x^2}{\cancel{x+2}} = \frac{x^2(x-5)}{4x} = \frac{x(x-5)}{4}$$

$$38. \quad \frac{9}{15x}$$

$$39. \quad \frac{m^2 - 7m + 12}{m-3} = \frac{(\cancel{m-3})(m-4)}{\cancel{m-3}} = m-4$$

$$40) \quad \frac{4}{x-2} + \frac{3}{x+5} = \frac{\text{LCD is}}{(x-2)(x+5)}$$

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

$$= \frac{4x+20+3x-6}{(x-2)(x+5)} = \frac{7x+14}{(x-2)(x+5)} \stackrel{\text{OR}}{=} \frac{7(x+2)}{(x-2)(x+5)}$$

$$41.) \quad 12\sqrt{5}$$

$$42) \quad \sqrt{9 \cdot 6} = 3\sqrt{6}$$

$$43) \quad 3\sqrt{8} - 4\sqrt{18}$$

$$= 3\sqrt{4 \cdot 2} - 4\sqrt{9 \cdot 2}$$

$$6\sqrt{2} - 12\sqrt{2} = -6\sqrt{2}$$

$$44.) \quad 2\sqrt{5} \cdot 4\sqrt{3} = 8\sqrt{15}$$

$$45.) \quad \text{FOIL} \quad 6 - 3\sqrt{5} + 2\sqrt{5} - \sqrt{25}$$

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

$$= 1 - \sqrt{5}$$

$$46) \quad \frac{3 \cdot \sqrt{2}}{\sqrt{2} \sqrt{2}} = \frac{3\sqrt{2}}{2}$$

Rationalize the denominator
(aka: get the radical out of den.)

47.

$$\frac{5}{2-\sqrt{3}}$$

Use the conjugate to get
radical out of den.
(aka rationalize den)

$$\frac{5}{(2-\sqrt{3})} \cdot \frac{(2+\sqrt{3})}{(2+\sqrt{3})} = \frac{10+5\sqrt{3}}{4-3} = \frac{10+5\sqrt{3}}{1}$$

OR

$$10+5\sqrt{3}$$

48.

$$5\sqrt{32} = {}^4 5\sqrt{16 \cdot 2}$$

$$= 20\sqrt{2}$$

Fastest way

OR

$${}^2 5\sqrt{4 \cdot 8}$$

$$= 10\sqrt{8}$$

$$= {}^2 10\sqrt{4 \cdot 2}$$

$$= 20\sqrt{2}$$

same as answer...
that's not magic...
that's MATHEMATICS



49.

$$\begin{array}{r} -2\sqrt{3} + 3\sqrt{27} - 10\sqrt{12} \\ + 3\sqrt{9 \cdot 3} - 30\sqrt{4 \cdot 3} \\ \hline -2\sqrt{3} + 9\sqrt{3} - 20\sqrt{3} \end{array}$$

need "like
radicals"in order to
Add

$$= -13\sqrt{3}$$

50)

$$-7x - 8y = 10 \quad \text{(m by 2)}$$

$$2x + 6y = 12 \quad \text{(m by 7)}$$

$$\underline{-14x - 16y = 20}$$

$$14x + 12y = 84$$

$$\underline{-4y = 104}$$

$$y = -26$$

so x...

$$2x + 6(-26) = 12$$

$$2x - 156 = 12$$

$$2x = 168$$

$$x = 84$$

$$(84, -26)$$

51.

$$\begin{array}{r} 2x + 3y = 25 \\ (-x + 2y = 12) \end{array} \quad (\text{Mult. by 2})$$

$$\begin{array}{r} 2x + 3y = 25 \\ -2x + 4y = 24 \\ \hline 7y = 49 \\ y = 7 \end{array}$$

$$y = 7$$

now... find x

$$\begin{aligned} \rightarrow 2x + 3(7) &= 25 \\ 2x + 21 &= 25 \\ 2x &= 4 \\ x &= 2 \end{aligned}$$

write answer as ordered pair

$$(2, 7)$$

52.

$$\begin{array}{r} 3x - 2y = 19 \\ x + y = 8 \end{array} \quad \text{Mult. by 2}$$

$$\begin{array}{r} 3x - 2y = 19 \\ 2x + 2y = 16 \\ \hline 5x = 35 \\ x = 7 \end{array}$$

plug in... to find y

$$\begin{aligned} 3(7) - 2y &= 19 \\ 21 - 2y &= 19 \\ -2y &= -2 \\ y &= -1 \end{aligned}$$

$$(7, -1)$$

OR you could use subs.

$$\begin{array}{r} 3x - 2y = 19 \\ x + y = 8 \end{array} \rightarrow \boxed{y = -x + 8}$$

$$\begin{aligned} 3x - 2(-x + 8) &= 19 \\ 3x + 2x - 16 &= 19 \\ 5x - 16 &= 19 \\ 5x &= 35 \\ x &= 7 \end{aligned}$$

now find y...

same answer $\rightarrow (7, -1)$

that's not MAGIC... THAT'S MATHEMATICS! 😊

53. $(2, -4) (5, 9)$

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{9 - (-4)}{5 - 2} = \frac{13}{3}$$

OR $m = \frac{-4 - 9}{2 - 5} = \frac{-13}{-3} = \frac{13}{3}$

Same answer

54. $m = 2/3$

55. $3x + 5y = 10$

$$5y = -3x + 10$$

$$y = -\frac{3}{5}x + 2$$

$$m = -3/5$$

56. $-2x + y = 4$

let $x=0$ $-2(0) + y = 4$
 $y = 4$ $(0, 4)$

let $y=0$ $-2x + 0 = 4$
 $-2x = 4$
 $x = -2$ $(-2, 0)$

57. $(6, -2)$ $m = 6$

if you use point-slope

$$y - y_1 = m(x - x_1)$$

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

$$y + 2 = 6x - 36$$

slope-int. $\rightarrow y = 6x - 38$

standard $\rightarrow -6x + y = -38$

$$\rightarrow 6x - y = 38$$

Same answer...

That's not
MAGIC...

THAT'S
mathematics

if you start with $y = mx + b$

$$y = mx + b \quad (\text{find } \underline{b})$$

$$-2 = 6(6) + b$$

$$-2 = 36 + b$$

$$-38 = b$$

write equation $y = 6x - 38$

58. (1, 8) (3, -2)

We need the slope!

$$m = \frac{8 - -2}{1 - 3} = \frac{10}{-2} = -5$$

2 CHOICES

pt. slope

OR

slope-intercept

$$y - y_1 = m(x - x_1)$$

$$y = mx + b$$

$$y - 8 = -5(x - 1)$$

$$8 = (-5)(1) + b$$

$$y - 8 = -5x + 5$$

$$8 = -5 + b$$

*

$$y = -5x + 13$$

$$13 = b$$

or standard form

$$5x + y = 13$$

same
answer...

write equation

$$y = -5x + 13$$

THAT'S NOT MAGIC...

THAT'S MATHEMATICS!

59.) $2x + 3y = 10$ $6x - 4y = 15$

need to find m

$$2x + 3y = 10$$

$$3y = -2x + 10$$

$$y = -\frac{2}{3}x + \frac{10}{3}$$

$$m = -\frac{2}{3}$$

$$6x - 4y = 15$$

$$-4y = -6x + 15$$

$$y = \frac{6}{4}x - \frac{15}{4}$$

$$y = \frac{3}{2}x - \frac{15}{4}$$

$$m = \frac{3}{2}$$

these are perpendicular
b/c the slopes are opposite reciprocals

60) $x^2 + 3x = -10$

$$x^2 + 3x + 10 = 0$$

$$(x + 5)(x + 2) = 0$$

so...

$$x + 5 = 0$$

$$x = -5$$

OR $x + 2 = 0$

$$x = -2$$

$$\{-2, -5\}$$

(61.) $m^2 = 49$

Factor.

2 ways

$$m^2 - 49 = 0$$

$$(m+7)(m-7) = 0$$

OR

Use Square Root Prop.

$$m^2 = 49$$

$$\sqrt{m^2} = \sqrt{49}$$

$$m = \pm 7$$

So...

$$m+7=0$$

$$m = -7$$

OR $m-7=0$

$$m = 7$$

$$\{-7, 7\}$$

$$\{-7, 7\}$$

SAME ANSWER

(62.) $y = (x-2)^2 - 9$ ← this is in vertex form

Vertex $(2, -9)$

x-intercepts:

(let $y=0$)

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

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

$$\sqrt{9} = \sqrt{(x-2)^2}$$

$$\pm 3 = x-2$$

$$\boxed{2 \pm 3 = x}$$

$$2+3 = x \text{ OR } 2-3 = x$$

$$5 = x$$

$$-1 = x$$

$(5, 0)$ and $(-1, 0)$

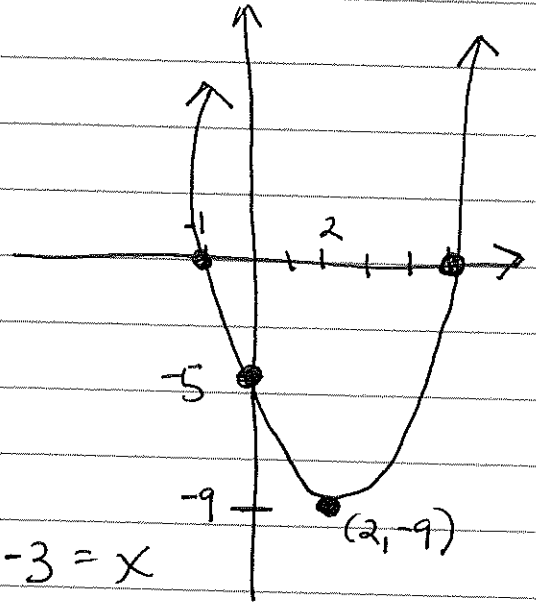
y-intercept (let $x=0$)

$$y = (0-2)^2 - 9$$

$$y = 4 - 9$$

$$y = -5$$

$(0, -5)$



63.)

$$y = x^2 + 8x + 7$$

↖ this is in
standard form

vertex : let $x = \frac{-b}{2a}$

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

now find y:

$$\begin{aligned} y &= (-4)^2 + 8(-4) + 7 \\ &= 16 - 32 + 7 \\ &= -9 \end{aligned}$$

* vertex is $(-4, -9)$

* x-intercepts (let $y=0$)

$$0 = x^2 + 8x + 7$$

$$0 = (x+7)(x+1)$$

$$\text{so ... } x+7=0$$

$$x = -7$$

$$(-7, 0)$$

$$x+1=0$$

$$x = -1$$

$$(-1, 0)$$

* y-intercept (let $x=0$)

$$y = 0^2 + 8(0) + 7$$

$$y = 7$$

$$(0, 7)$$

