Algebra Review for GEOMETRY HONORS

Leave all answers as an EXACT answer. Do not round! This means you will have rational answers ($\frac{a}{b}$), radical answers ($\sqrt{a}$), and answers in terms of π (aπ). In Geometry Honors you will be required to leave your answers as EXACT values unless you use right triangle trigonometry (SOH-CAH-TOA). That means 90+% of your answers will be exact answers. It is important to practice number sense for this reason.

Objective 1: Solving equations.

1) Solve each equation.

a) $-158 = 7 + 3(1 - 7x)$

$-165 = 3(1-7x)$

$-55 = 1-7x$

$-56 = -7x$

$\boxed{8 = x}$

b) $164 = 4 - 20n$

$160 = -20n$

$\boxed{-8 = n}$

c) $-8(-2r - 3) = -36 + 6r$

$16r + 24 = -36 + 6r$

$10r + 24 = -36$

$10r = -60$

$\boxed{r = -6}$

d) $5 + 4(6m - 3) = -39 + 8m$

$5 + 24m - 12 = -39 + 8m$

$-7 + 24m = -39 + 8m$

$-7 + 16m = -39$

$16m = -32$

$\boxed{m = -2}$

e) $\frac{4}{n-5} = \frac{10}{n+11}$

$10(n-5) = -4(n+11)$

$10n - 50 = -4n - 44$

$14n - 50 = -44$

$14n = 6$

$\boxed{n = \frac{6}{14} = \frac{3}{7}}$

f) $\frac{x+6}{x-12} = \frac{10}{2}$

$2(x+6) = 10(x-2)$

$x+6 = 5(x-2)$

$x+6 = 5x-10$

$6 = 4x-10$

$16 = 4x$

$\frac{16}{4} = \boxed{4 = x}$

g) $\frac{2}{3}x + \frac{1}{2}x = \frac{3}{4}$

$\frac{4}{6}x + \frac{3}{6}x = \frac{3}{4}$

$\frac{6}{7} \cdot \frac{7}{6}x = \frac{3}{4} \cdot \frac{6}{7}$

$\boxed{x = \frac{18}{28} = \frac{9}{14}}$

h) $\frac{x}{2} + 1 = \frac{5}{4}$

$\frac{x}{2} + \frac{4}{4} = \frac{5}{4}$

$2 \cdot \frac{x}{2} = \frac{1}{4} \cdot 2$

$\boxed{x = \frac{2}{4} = \frac{1}{2}}$

2) Solve the literal equations for the variable specified.

a) $d = rt$; solve for t

$\frac{d}{r} = \frac{rt}{r}$

$\boxed{t = \frac{d}{r}, \ r \neq 0}$

b) $P = 2w + 2l$; solve for w

$-2l \quad -2l$

$\frac{P-2l}{2} = \frac{2w}{2}$

$\boxed{w = \frac{P-2l}{2} \text{ OR } w = \frac{P}{2} - l}$

c) $V = \frac{1}{3}\pi r^2 h$; solve for h

$\frac{V}{\pi r^2} = \frac{\frac{1}{3}\pi r^2 h}{\pi r^2}$

$3 \cdot \frac{V}{\pi r^2} = \frac{1}{3}h \cdot 3$

$\boxed{h = \frac{3V}{\pi r^2}, \ r \neq 0}$

d) $y = \frac{c - ax}{b}$; solve for x

$yb = c - ax$

$-c \quad -c$

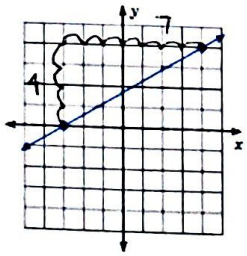
$yb - c = -ax$

$\boxed{\frac{yb - c}{-a} = x, \ a \neq 0}$

Objective 2: Linear equations.

3) Find the slope of the line.

$\frac{\text{rise}}{\text{run}}$

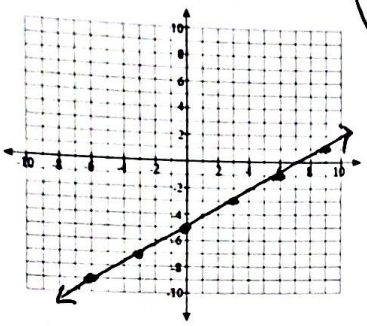


$\boxed{m = \frac{4}{7}}$

4) Graph the following equations on the coordinate planes provided. Be familiar with graphing any form of a line.

a) $y = \frac{2}{3}x - 5$ (m, b (y-int))

(This is slope-intercept form)



$4x - 6y = -24$

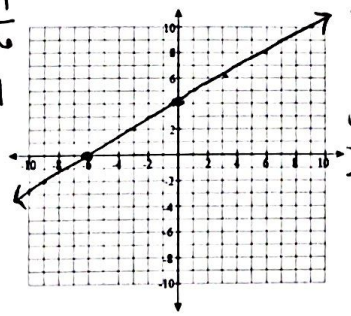
$\frac{-6y}{-6} = \frac{-4x}{-6} - \frac{24}{-6}$

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

OR

b) $4x - 6y = -24$

(This is standard form)



x-int:

$4x - 6(0) = -24$

$4x = -24$

$x = -6$

y-int:

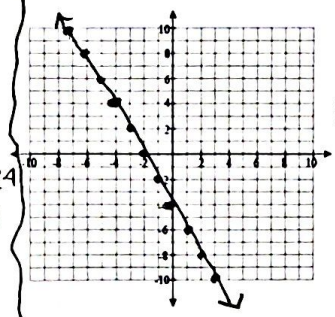
$4(0) - 6y = -24$

$-6y = -24$

$y = 4$

c) $y - 4 = -2(x+4)$ (slope)

(This is point-slope form)



point $(-4, 4)$

OR

$y - 4 = -2(x+4)$

$y - 4 = -2x - 8$

$y = -2x - 4$

5) Write the equation of the line in slope-intercept form using the given information.

a) slope = $\frac{3}{4}$; y-intercept is (0, -5)

$\boxed{y = \frac{3}{4}x - 5}$

b) slope = -3 and passes through (4, -3)

$\boxed{y + 3 = -3(x-4)}$ OR $y = mx + b$

$-3 = -3(4) + b$

$-3 = -12 + b$

$9 = b$

$\boxed{y = -3x + 9}$

c) slope = $\frac{2}{3}$ and passes through (-3, 5)

$\boxed{y - 5 = \frac{2}{3}(x+3)}$ OR $y = mx + b$

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

$5 = -2 + b$

$7 = b$

$\boxed{y = \frac{2}{3}x + 7}$

d) passes through (-2, 4) and (0, -1)

$m = \frac{4 - -1}{-2 - 0} = \frac{5}{-2}$

y-int.

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

Objective 3: Systems of Linear Equations

6) Solve each system of equations by the substitution method.

a)

$y = 2x + 5$

$3x - y = 4$

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

$3x - 2x - 5 = 4$

$x - 5 = 4$

$x = 9$

$y = 2(9) + 5$

$y = 18 + 5$

$y = 23$

$\boxed{(9, 23)}$

b)

$8x + 3y = 26$

$2x = y - 4 \rightarrow y = 2x + 4$

$8x + 3(2x+4) = 26$

$8x + 6x + 12 = 26$

$14x + 12 = 26$

$14x = 14$

$x = 1$

$y = 2(1) + 4$

$y = 2 + 4$

$y = 6$

$\boxed{(1, 6)}$

7) Solve each system of equations by the elimination method.

a)

$3x + 4y = 9$

$\oplus\ -3x - 2y = -3$

$2y = 6$

$y = 3$

$3x + 4(3) = 9$

$3x + 12 = 9$

$3x = -3$

$x = -1$

$\boxed{(-1, 3)}$

b)

$4x - 6y = -26 \rightarrow$

$2[-2x + 3y = 13] \rightarrow$

$\oplus\ 4x - 6y = -26$

$-4x + 6y = 26$

$0 = 0$

$\boxed{\text{Identity; infinitely many solns}}$

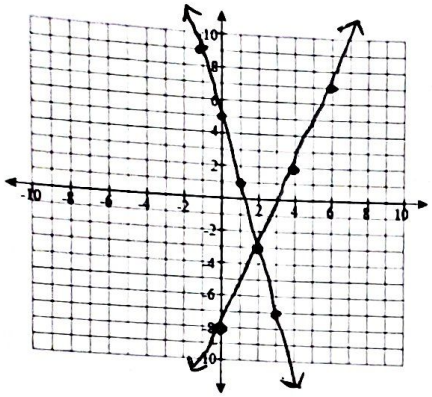
8) *Solve each system of equations by the graphing method.*

a)

$y = -4x + 5$

$y = 5/2x - 8$

$\boxed{(2,-3)}$

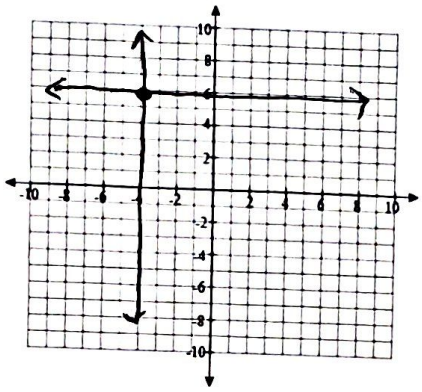


b)

$x = -4$

$y = 6$

$\boxed{(-4,6)}$



Objective 4: Quadratic equations and expressions.

9) *Factor the expression completely.*

a) $v^2 - 19v + 90$

$\boxed{(v-10)(v-9)}$

b) $5a^2 + 38a - 63 = \boxed{(a+9)(5a-7)}$

-315

45 -7

38

$5a^2+45a-7a-63$

$5a(a+9) - 7(a+9)$

c) $5p^2 - 4p$

$\boxed{p(5p-4)}$

d) $36x^2 + 68xy - 120y^2 = 4(9x^2+17xy-30y^2)$

$= \boxed{4(x+3y)(9x-10y)}$

-270

27 -10

17

$9x^2+27xy+10xy-30y^2$

$9x(x+3y) - 10y(x+3y)$

10) *Solve the quadratic equation or proportion by factoring and using the zero product property. Hint: Use the AC method.* MUST EQUAL ZERO FIRST!

a) $x^2 + 6x + 8 = 0$

$(x+2)(x+4)=0$

$x+2=0$ $\boxed{x=-2}$

$x+4=0$ $\boxed{x=-4}$

b) $x^2 + 5x + 6 = -x^2 - 3x$ → $2x^2+8x+6=0$

$+x^2 \quad +3x \qquad +x^2 \quad +3x$

$2(x^2+4x+3)=0$

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

$x+3=0$ $\boxed{x=-3}$

$x+1=0$ $\boxed{x=-1}$

c) $3x^2 + 7x - 8 = -10$

$3x^2+7x+2=0$

6

6 1

7

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

$3x(x+2) \quad 1(x+2)$

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

$3x+1=0$ $\boxed{x=-\frac{1}{3}}$

$x+2=0$ $\boxed{x=-2}$

d) $2x^2 - 4x + 2 = 0$

$2(x^2-2x+1)=0$

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

$x-1=0$

$\boxed{x=1}$

e) $\frac{x+2}{5} = \frac{4}{x+1}$

$(x+2)(x+1)=20$

$x^2+x+2x+2=20$

$x^2+3x+2=20$

$x^2+3x-18=0$

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

$\boxed{x=-6}$ $\boxed{x=3}$

f) $\frac{2}{x-3} = \frac{x-2}{6}$

$(x-3)(x-2)=12$

$x^2-2x-3x+6=12$

$x^2-5x+6=12$

$x^2-5x-6=0$

$(x-6)(x+1)=0$

$\boxed{x=6}$ $\boxed{x=-1}$

11) *Solve for x using the quadratic formula. Hint:* $x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$

a) $x^2 - 3x + 1 = 0$

$a=1 \quad b=-3 \quad c=1$

$x = \frac{3 \pm \sqrt{(-3)^2 - 4(1)(1)}}{2(1)}$

$x = \frac{3 \pm \sqrt{5}}{2}$

$\boxed{x = \frac{3 \pm \sqrt{5}}{2}}$

b) $5x^2 + 2x - 2 = 0$

$a=5 \quad b=2 \quad c=-2$

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

$x = \frac{-2 \pm \sqrt{44}}{10} = \frac{-2 \pm 2\sqrt{11}}{10} = \boxed{\frac{-1 \pm \sqrt{11}}{5}}$

12) *Solve the equation and express your answer as an EXACT value.*

a) $3^2 + 4^2 = x^2$

$9 + 16 = x^2$

$\sqrt{25} = \sqrt{x^2}$

$\boxed{\pm 5 = x}$

b) $x^2 + 5^2 = 13^2$

$x^2 + 25 = 169$

$\sqrt{x^2} = \sqrt{144}$

$\boxed{x = \pm 12}$

c) $1^2 + x^2 = 3^2$

$1 + x^2 = 9$

$\sqrt{x^2} = \sqrt{8}$

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

d) $x^2 + (7\sqrt{3})^2 = (2x)^2$

$x^2 + 147 = 4x^2$

$147 = 3x^2$

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

$\boxed{x = \pm 7}$

Objective 5: Radical Expressions

13) *Simplify the radical expression completely. Leave your answer in simplest radical form.*

a) $\sqrt{50} = \sqrt{25} \cdot \sqrt{2}$

$= \boxed{5\sqrt{2}}$

b) $\sqrt{600} = \sqrt{100} \cdot \sqrt{6}$

$= \boxed{10\sqrt{6}}$

c) $-2\sqrt{216pq^3r^5} = \boxed{-12qr^2\sqrt{6pqr}}$

$= -2\sqrt{36} \cdot \sqrt{6} \cdot \sqrt{p} \cdot \sqrt{q^2} \cdot \sqrt{q} \cdot \sqrt{r^4} \cdot \sqrt{r}$

$= -2 \cdot 6 \cdot \sqrt{6} \cdot \sqrt{p} \cdot q \cdot \sqrt{q} \cdot r^2 \cdot \sqrt{r}$

d) $-3\sqrt{70x} = \boxed{-3\sqrt{70x}}$

e) $\sqrt{6} \cdot \sqrt{2}$

$= \sqrt{12} = \sqrt{4} \cdot \sqrt{3}$

$= \boxed{2\sqrt{3}}$

f) $\sqrt{3} \cdot \sqrt{3} = \sqrt{9}$

$= \boxed{3}$

g) $\frac{2\sqrt{4}}{\sqrt{64}} = \frac{2 \cdot 2}{8} = \frac{4}{8} = \boxed{\frac{1}{2}}$

h) $\frac{2\sqrt{6}}{5\sqrt{27}} = \frac{2\sqrt{2} \cdot \sqrt{3}}{5 \cdot \sqrt{9} \cdot \sqrt{3}} = \frac{2\sqrt{2}}{5 \cdot 3} = \boxed{\frac{2\sqrt{2}}{15}}$

i) $5\sqrt{5} + 4\sqrt{5} = \boxed{9\sqrt{5}}$

j) $-\sqrt{18} + 2\sqrt{2}$

$-\sqrt{9} \cdot \sqrt{2} + 2\sqrt{2}$

$-3\sqrt{2} + 2\sqrt{2} = \boxed{-1\sqrt{2}}$

k) $\sqrt{13^2} = \boxed{13}$

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

$= 4\sqrt{9}$

$= 4 \cdot 3 = \boxed{12}$

Objective 6: Simplify algebraic expressions.

14) *Simplify each algebraic expression.*

a) $(2x)^2 = (2x)(2x)$
$= \boxed{4x^2}$

b) $(-2x)^2 = (-2x)(-2x)$
$= \boxed{4x^2}$

c) $-(2x)^2 = -(2x)(2x)$
$= \boxed{-4x^2}$

d) $y(3y^2-5y-10)$
$\boxed{3y^3-5y^2-10y}$

e) $(x+4)^2 = (x+4)(x+4)$
$= x^2+4x+4x+16$
$= \boxed{x^2+8x+16}$

f) $(2x^2-3x)(-4x^2+5)$
$-8x^4+10x^2+12x^3-15x$
$\boxed{-8x^4+12x^3+10x^2-15x}$

g) $(x+3)(x-7)$
$x^2-7x+3x-21$
$\boxed{x^2-4x-21}$

h) $\frac{8w}{2} = \frac{\cancel{2}\cdot 4w}{\cancel{2}} = \boxed{4w}$

i) $\frac{5x-10}{15} = \frac{\cancel{5}(x-2)}{\cancel{5}\cdot 3} = \boxed{\frac{x-2}{3}}$

j) $\frac{x+6}{x^2-36} = \frac{\cancel{(x+6)}}{\cancel{(x+6)}(x-6)}$
$= \boxed{\frac{1}{x-6}, \ x \neq 6}$

k) $\frac{33ab-22b}{11b} = \frac{\cancel{11b}(3a-2)}{\cancel{11b}}$
$\boxed{3a-2}$

l) $\frac{5a+5b}{a^2-b^2} = \frac{5\cancel{(a+b)}}{\cancel{(a+b)}(a-b)}$
$= \boxed{\frac{5}{a-b}, \ a \neq b}$