Notre Dame Prep of Sacred Heart University

Summer Math Packet: IB Math Applications & Interpretation (HL)

Submit by Friday, September 4th, 2026

Name:

Directions: Factor each of the following polynomials completely. If the polynomial cannot be a factor, say that it is prime.

$x^2 - 36 =$	$x^2 + 11x + 10 =$	$4x^2 - 8x + 32 =$
$y^4 + 11y^3 + 30y^2 =$	$4y^2 - 16y + 15 =$	$x(x+3) - 6(x+3) =$

Directions: Apply the indicated operation to the following polynomials. Express your answer as a single polynomial in standard form.

$(x^3 + 3x^2 + 2) + (x^2 - 4x + 4) =$	$(x^3 - 2x^2 + 5x + 10) - (2x^2 - 4x + 3) =$
$6(x^3 + x^2 - 3) - 4(2x^3 - 3x^2) =$	$x(x^2 + x - 4) =$
$(x+3)(x+5) =$	$(x+7)(x-7) =$

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

Directions: Simplify each of the following. Your answer should not have any negative exponents or be written as a decimal.

$(-4)^2 =$	$-4^2 =$	$3^{-6} \cdot 3^4 =$
$(3^{-2})^{-1} =$	$(4xy^2)(3x^{-4}y^5) =$	$(2x)^3(3x)^3 =$
$\sqrt{(-4)^2} =$	$\frac{x^2y^3}{xy^4} =$	$\frac{12x^2y^3z^{-2}}{21xy^2z^3} =$

Directions: Simplify each of the following radicals completely.

$\sqrt{180} =$	$\sqrt{162c^4d^5} =$	$\sqrt{2x^3y}\sqrt{12xy} =$

Directions: Solve each of the following equations. Show all work.

$2(3+2x)=3(x-4)$	$8x-(2x+1)=3x-13$
$\frac{x+1}{3}+\frac{x+2}{7}=$	$(x+7)(x-1)=(x+1)^2$
$x^3+x^2-4x-4=0$	$\sqrt{x+1}=4$

Directions: Solve the following system of equations using the provided process. Show all work.

Graphing: $\begin{cases} y=-x+2 \\ y=x-6 \end{cases}$	Substitution: $\begin{cases} x=y+4 \\ x+7y=20 \end{cases}$	Elimination: $\begin{cases} x+y=2 \\ 2x-y=1 \end{cases}$

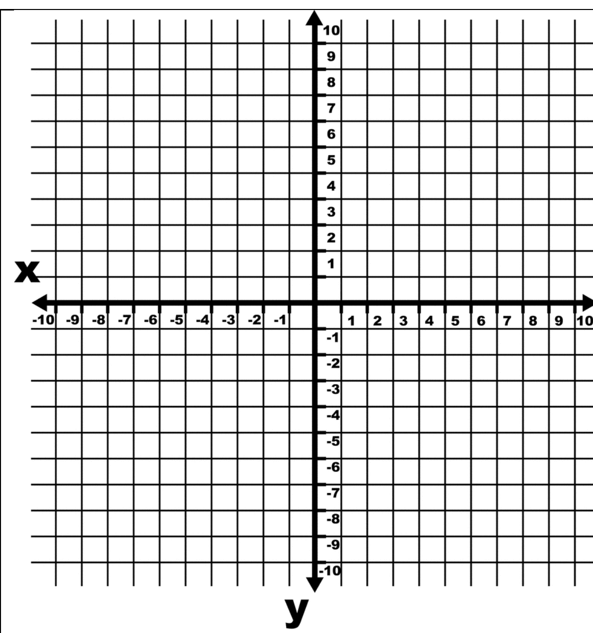
Directions: Write an equation of a line whose both point-slope and slope-intercept form for the line who slope is $-\frac{2}{3}$ and passes through the point $(-6, 2)$.

Point-Slope Form:

Slope-Intercept Form:

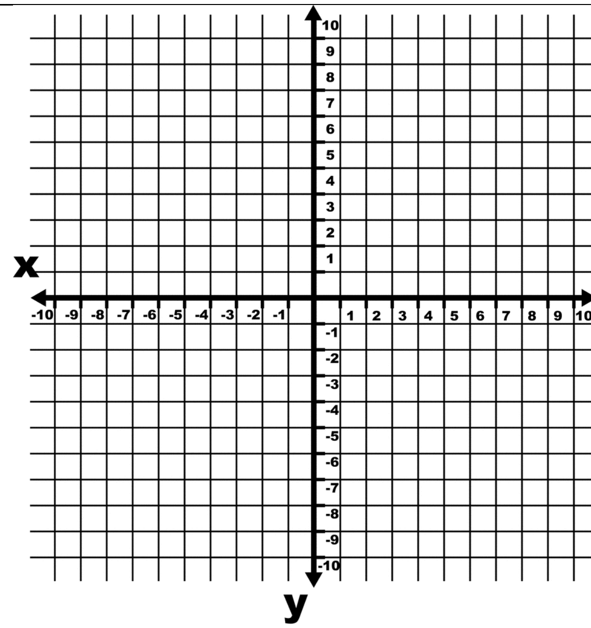
Directions: Convert the following equation to slope-intercept form. Then, state the slope and y-intercept, and then graph the line.

$$3x + 2y = 6$$

Slope-Intercept Form: Slope y-intercept	

Directions: Find the x and y intercepts of the line. Then graph the line.

$$6x - 4y = 24$$

x-intercept y-intercept	

Directions: Find an equation for the lines with the given properties. Express your answer in both point-slope and slope-intercept form.

a) Parallel to the line $y = 2x$ and contains the point $(-1, 2)$.

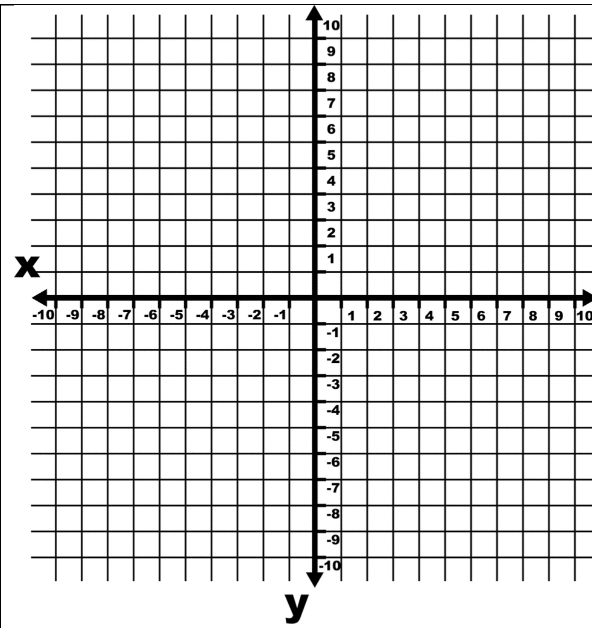
b) Perpendicular to the line $y = \frac{1}{2}x + 4$ and contains the point $(1, -2)$.

Directions: Graph the following functions below. Find at least five points. Those five points should contain the x and y intercepts. Label those points.

a) $y = x^2 - 1$

x-intercept(s)

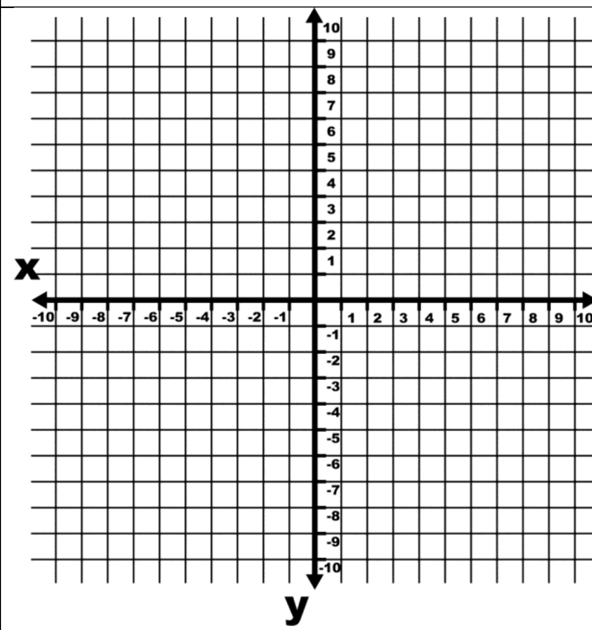
y-intercept(s)



b) $y = 2|x|$

x-intercept(s)

y-intercept(s)



Directions: Determine a relationship between the x and y variables. Then write an equation that accurately represents the relationship

Relation 1:

x	0	1	2	3	4
y	0	5	10	15	20

Equation:

Relation 2:

$$\{(3,0),(2,-1),(1,-2),(0,-3)\}$$

Equation:

Directions: State the domain and range of each of the following functions.

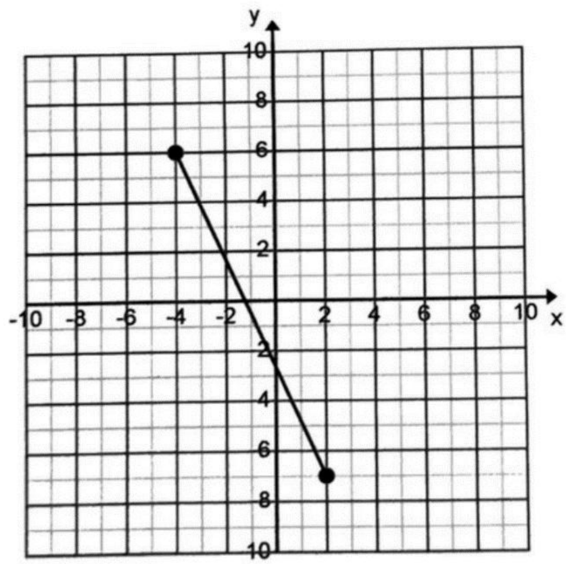
a) $\{(3,4), (-1,2), (2,-3), (5,0)\}$

Domain:

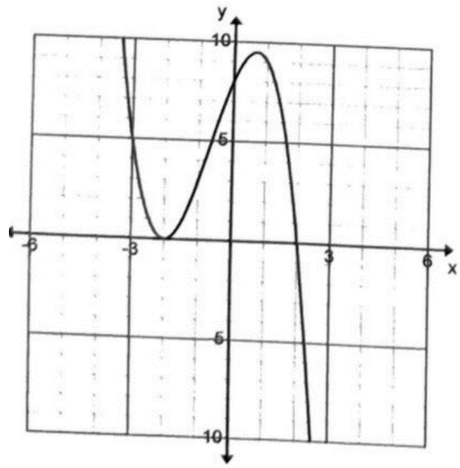
Range:

b) Domain:

Range:



Directions: List all intercepts of the following graph.



X-Intercept(s):

Y-Intercept(s):

Directions: Evaluate the values given the following functions.

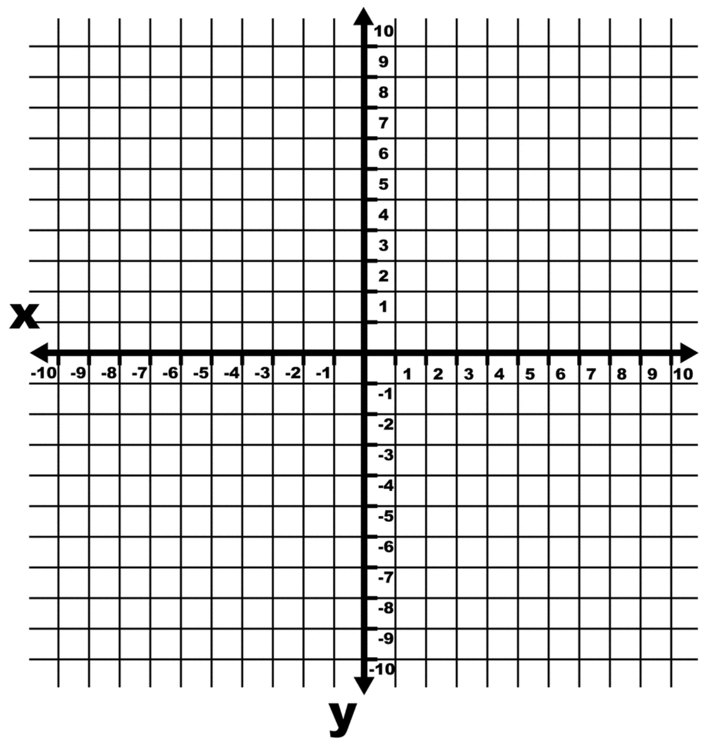
$$f(x) = 3x - 7; g(x) = x^2 + 5x - 2; h(x) = \frac{2x+1}{x-3}; d(x) = \begin{cases} 2x+1, & x < 0 \\ x^2 - 4, & x \geq 0 \end{cases}$$

$f(2)$	$f(-4)$
$g(-1)$	$g(0)$
$h(5)$	$d(2)$

Directions: Plot each point to create the triangle ABC, then verify that the triangle is a right triangle. After, find the area of the triangle and state the six trigonometric ratios associated with the triangle. For the trig, treat angle $\angle ACB$ as your reference angle.

$$A = (-2,5); B = (1,3); C = (-1,0)$$

sin (x)	$\csc(x)$
$\cos(x)$	$\sec(x)$
$\tan(x)$	$\cot(x)$



Directions: Find the distance between the points $(0,0)$ and $(2, 5)$ using the distance formula

$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

Directions: Find the midpoint between the points $(3, -4)$ and $(5, 4)$ using the midpoint formula

$M = (\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2})$