Unit 1 -Functions and Their Graphs

Section 1.1

Distance Formula

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

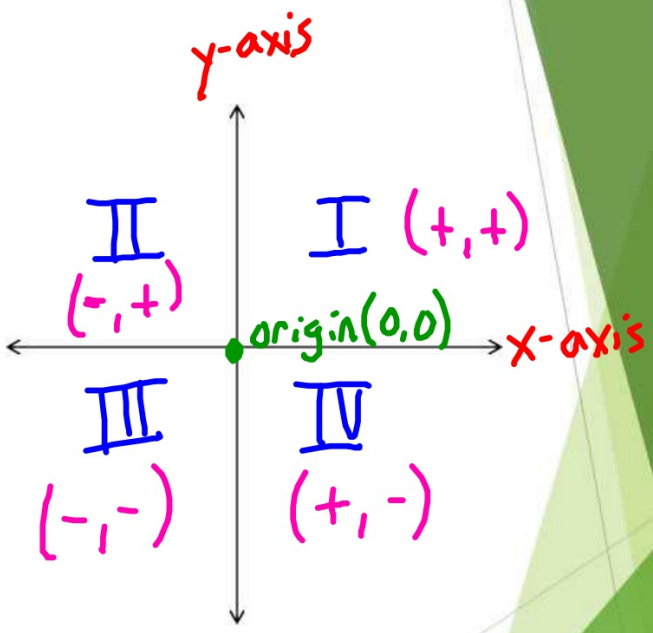
Midpoint Formula

$$Midpoint = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$

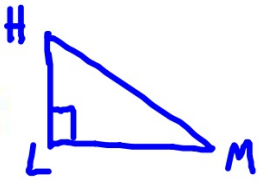
Coordinate Plane

Name:

1. 4 Quadrants
2. x and y-axis
3. positive and negative in quad
4. origin



Coordinate Geometry



1. If ΔHLM has vertices H(-3, 2), L (2, 1) and M (3, 6).

   Show that the triangle is a right, isosceles triangle.

Right Δ

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

$m = \frac{6-1}{3-2} = \frac{5}{1} = 5$

✓

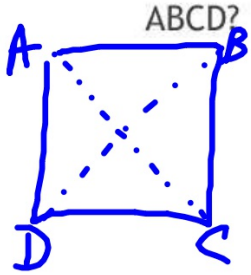
$HL = \sqrt{(1-2)^2 + (2+3)^2}$

$HL = \sqrt{1+25} = \sqrt{26}$

$LM = \sqrt{(6-1)^2 + (3-2)^2}$

$\sqrt{25+1} = \sqrt{26}$

2. If Quad ABCD has vertices A (-3, -1), B (-6, 2), C (-2, 6), and D (1, 3), show the diagonals bisect each other and are congruent. What is the most specific name for quad ABCD?



Mdpt AC: $\left(\frac{-3+-2}{2}, \frac{-1+6}{2}\right)$

$\left(-\frac{5}{2}, \frac{5}{2}\right)$

Mdpt BD: $\left(\frac{-6+1}{2}, \frac{2+3}{2}\right)$

$\left(-\frac{5}{2}, \frac{5}{2}\right)$

Dist AC:

$= \sqrt{(-2+3)^2+(6+1)^2}$

$= \sqrt{1+49} = \sqrt{50}$

$= 5\sqrt{2}$

Dist. BD

$= \sqrt{(1+6)^2+(3-2)^2}$

$= \sqrt{49+1} = \sqrt{50}$

$= 5\sqrt{2}$

Section 1.2

Write a linear equation given the following information.

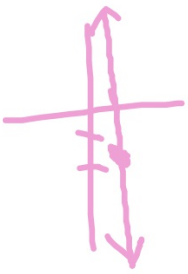
1. $m = \frac{1}{2}$ and b = -1

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

2. m = undefined and through (1, -2)

$y = mx + b$

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



$x = 1$

3. through the point (-1, 3) and m = $\frac{1}{2}$

$y = mx + b$

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

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

$3\frac{1}{2} = b$

$\frac{7}{2} = b$

$y = \frac{1}{2}x + \frac{7}{2}$

4. through the points (5, 1) and (2, 7)

$$m = \frac{7-1}{2-5} = \frac{6}{-3} = -2$$

$y = mx + b$

$1 = -2(5) + b$

$1 = -10 + b$

$11 = b$

$\boxed{y = -2x + 11}$

5. x-intercept of 3 and a y-intercept of -2

$(3,0)\ (0,-2)$

$m = \frac{-2-0}{0-3} = \frac{-2}{-3} = \frac{2}{3}$

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

6. y-intercept of -1 and ⊥ to $3x - 2y = 4$

$b = -1$

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

$-2y = -3x + 4$

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

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

7. through (1, -4) and || to $2x - y = 4$

$-y = -2x + 4$

$y = 2x - 4$

$m = 2$

$y = mx + b$

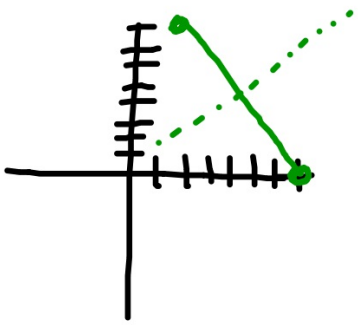
$-4 = 2(1) + b$

$-4 = 2 + b$

$-6 = b$

$y = 2x - 6$

8. the perpendicular bisector of the segment joining the points (7, 0) and (1, 8)



Mdpt: $(4, 4)$

Slope: $m = \frac{8-0}{1-7} = \frac{8}{-6} = \frac{-4}{3} \Rightarrow \frac{3}{4}$

$y = mx + b$

$4 = \frac{3}{4}(4) + b$

$4 = 3 + b$

$1 = b$

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

9. A triangle is located at the vertices R (2, 2), S (5, 5), and T (7, 1).

A. Find the equation of the median from R.

Mdpt $\overline{ST}$: (6, 3) R (2, 2)

$m = \frac{3-2}{6-2} = \frac{1}{4}$

$y = mx + b$

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

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

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

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

B. Find the equation of the altitude from T.

Slope RS $= \frac{5-2}{5-2} = \frac{3}{3} = 1$

$m = -1$, (7, 1)

$y = mx + b$

$1 = -1(7) + b$

$1 = -7 + b$

$8 = b$

$y = -x + 8$

10. A triangle has the vertices A(-3, 2), B(-2, -1), and

C(4, 1).

A. Find the equation of the median from A.

c

Mdpt $\overline{BC} = (1, 0)$, $A(-3, 2)$

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

$y = mx + b$

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

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

$\frac{1}{2} = b$

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

B. Find the equation of the altitude from C.

Slope $\overline{AB} = \frac{-1-2}{-2+3} = \frac{-3}{1} = -3 \Rightarrow m = \frac{1}{3}$, $C(4, 1)$

$y = mx + b$

$1 = \frac{1}{3}(4) + b$

$1 = \frac{4}{3} + b$

$1 - \frac{4}{3} = b = -\frac{1}{3}$

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

Section 1.3

Linear Equations

Slope intercept form

$$y = mx + b$$

Standard form

$$Ax + By = C \text{ or } Ax + By + C = 0$$

$m = -\frac{A}{B}$ | $b = \frac{C}{B}$

x-intercepts always (#, 0)

y-intercepts always (0, #)

Important shapes to know

Parabola

$$y = (x - h)^2 + k$$

Vertex (h, k)

Circle

$$(x - h)^2 + (y - k)^2 = r^2$$

Center (h, K)

radius $= r$

The point (-3, -5) lies on a circle whose center is (1, -2). Find the equation of the circle in standard form.

Center $(1, -2)$
$h \quad k$

$\therefore$ Dist $= \sqrt{(-3-1)^2+(-5+2)^2}$

$= \sqrt{16+9} = \sqrt{25} = 5$

$(x-h)^2+(y-k)^2=r^2$

$(x-1)^2+(y+2)^2=25^2$

p9. #11-20, 24, 26, (32-38 evens), 41, 42

p.22 #7, (10-20 evens), (33, 34, 35 graph only), 59, 62, 67

p.36 #89, 90

p.39 #129-132