MTH-PC Pre-Calculus 10/24 Session 13

1.) Find the distance between the points

$(2, 7)$ $(-7, -5)$ — x_1, y_1 x_2, y_2

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

$$\sqrt{(-7 - 2)^2 + (7 + (+5))^2}$$

$$\sqrt{(-9)^2 + (12)^2}$$

$$\sqrt{81 + 144} = \sqrt{225} = \boxed{15}$$

2.) Find the midpoint between $(8, -6)$ and $(-2, 12)$ — x_1, y_1 x_2, y_2

$$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right) = \left(\frac{8 + (-2)}{2}, \frac{12 + (-6)}{2}\right)$$

$$\left(\frac{6}{2} \quad \frac{6}{2}\right)$$

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

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

3.) $(x + 3)^2 + (y - 8)^2 = 81$ $\quad \sqrt{r^2} = \sqrt{81}$

center: (h, k) radius $= r$

$$\boxed{(-3, 8) \quad r = 9}$$

4.) Equation for circle with center $(2, -4)$ and radius $= 8$.

$$\boxed{(x - 2)^2 + (y + 4)^2 = 64}$$

$x^2 + y^2 + 8x + 2y - 28 = 0$ 1.) 2020 it

$+28 \quad +28$

$(x^2 + \boxed{8}x) + (y^2 + 2y) = 28$

$+16 \quad +1$

$\left(\frac{8}{2}\right)^2 = (4)^2 = 16$ $\qquad \left(\frac{2}{2}\right)^2 = (1)^2 = 1$

$(x^2 + 8x + 16) + (y^2 + 2y + 1) = 45$

$\sqrt{x^2} \quad \sqrt{16} \qquad \sqrt{y^2} \quad \sqrt{1}$

$(x+4)^2 + (y+1)^2 = 45$

Center: $(-4, -1)$ radius: $\sqrt{45} = \sqrt{9}\cdot\sqrt{5}$

$3\sqrt{5}$

2020 it

$3x^2 + 2y^2 - 42x + 32y + 88 = 0$

$-88 = -88$

$(3x^2 - 42x) + (2y^2 + 32y) = -88$

$\frac{}{3} \quad \frac{}{3} \qquad \frac{}{2} \quad \frac{}{2}$

$3(x^2 - 14x) + 2(y^2 + 16y) = -88 + 147 + 128$

$\left(\frac{14}{2}\right)^2 \quad +49 \qquad \left(\frac{16}{2}\right)^2 \quad +64$

$+3(49) \quad +2(64)$

$3(x^2 - 14x + 49) + 2(y^2 + 16y + 64) = 187$

$3(x-7)^2 + 2(y+8)^2 = 187$

Center: $(7, -8)$ radius: $\sqrt{187}$

$$x^2 - 8x + y^2 + 20y + 107 = 0$$
$$-107 \quad -107$$

$$(x^2 - 8x) + (y^2 + 20y) = -107$$

$\left(\frac{-8}{2}\right)^2 = +16$ $\qquad$ $\left(\frac{20}{2}\right)^2 = +100$ $\qquad$ $+16$ $\qquad$ $+100$

$4^2 = 16$ $\qquad$ $10^2 = 100$

$$-107 + 16 + 100 = 9$$

$$(x^2 - 8x + 16) + (y^2 + 20 + 100) = 9$$

$\sqrt{x^2}$ $\qquad$ $\sqrt{16}$

$$(x - 4)^2 + (y + 10)^2 = 9$$

Center: $(4, -10)$ radius: 3

Find the slope

$$\text{slope} = m = \frac{\text{rise}}{\text{run}} = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}$$

$x_2\ y_2$ $\qquad$ $x_1\ y_1$

$(1, 3)$ $\qquad$ $(5, 9)$ $\qquad$ $\frac{3-9}{1-5} = \frac{-6}{-4} = \boxed{\frac{3}{2}}$

$(2, -8)$ $\qquad$ $(6, 4)$ $\qquad$ $\frac{y_2 - y_1}{x_2 - x_1} = \frac{-8-4}{2-6} = \frac{-12}{-4} = \boxed{3}$

Slope - Intercept form

$y = mx + b$

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

y-int $= 4$

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

Point - Slope form: $(x_2 - x_1)m = \frac{y_2 - y_1}{x_2 - x_1}(x_2 - x_1)$

$y_2 - y_1 = m(x_2 - x_1)$

Equation for a line

$m = -\frac{3}{2}$ through $(-4, 2)$ ($x_1 = -4$, $y_1 = 2$)

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

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

$y = mx + b$

$2 = \left(-\frac{3}{2}\right)(-4) + b$

$2 = \frac{12}{2} + b$

$2 = 6 + b$

$-6 \quad -6$

$$b = -4$$

$y = mx + b$

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

Find equation slope = -3 through (-2, 4)

$y = mx + b$

$4 = (-3)(-2) + b$

$4 = 6 + b$

$-6 \quad -6$

$-2 = b$

point-slope form

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

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

$y = mx + b$

$y = -3x - 2$

Equation (4, -2) and (-2, -5)

(x_1, y_1)

$$\text{slope} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-2 + (+5)}{4 + (+2)} = \frac{3}{6} = \frac{1}{2} = m$$

(4, -2)

$y = mx + b$

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

$-2 = 2 + b$

$-2 \quad -2$

$-4 = b$

$y = mx + b$

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