TH-PC Pre-Calculus 11/18

1.) Find the distance between the points $(2,7)$ and $(-7,-5)$

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

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

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

$$\sqrt{9^2 + 12^2}$$

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

$$= 15$$

2.) Find the midpoint between the points $(8,-6)$ and $(-2,12)$

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

$$\left(\frac{8+(-2)}{2}, \frac{-6+12}{2}\right)$$

$$\left(\frac{6}{2}, \frac{6}{2}\right) = \boxed{(3,3)}$$

3.) What is the equation of a circle with radius = 8 and center $(2,-4)$?

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

4.) $(x+3)^2 + (y-8)^2 = 81$

$r = 9$

$\sqrt{81}$

center: $(-3, 8)$

$$x^2 + y^2 + 8x + 2y - 28 = 0$$
$$\quad\quad\quad\quad\quad\quad\quad\quad +28 \quad +28$$

Find the equation of the circle... By completing the square

$$(x^2 + 8x + 16) + (y^2 + 2y) = 28$$

$\left(\frac{8}{2}\right)^2$ $\quad$ $\left(\frac{2}{2}\right)^2$ $\quad$ $+16$ $\quad$ $+1$ $\quad$ $+16 \; +1$

4^2

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

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

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

center: $(-4,-1)$ $\quad$ radius $= \sqrt{45} = \sqrt{9}\sqrt{5} = 3\sqrt{5}$

Find the slope

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

$x_1 \; y_1$ $\quad$ $x_2 \; y_2$

$(1, 3)$ $\quad$ $(5, 9)$

$$\frac{9-3}{5-1} = \frac{6 \div 2}{4 \div 2} = \boxed{\frac{3}{2}}$$

1.) $(2, -8)$ $\quad$ $(6, 4)$

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

Slope - Intercept Form: $y = mx + b$

slope $= \frac{2}{3}$ y-int: 4

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

Point - Slope Form $y - y_1 = m(x - x_1)$

1.) Find the equation of a line $m = -\frac{3}{2}$ through $(-4, 2)$

$y = mx + b$

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

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

$2 = 6 + b$

$-6 \quad -6$

$b = -4$

$y = mx + b$

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

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

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

$y - 2 = -\frac{3}{2}x - 6$

$+2 \qquad +2$

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

Find equation of line with slope $= -3$ through $(-2, 4)$

$y = mx + b$

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

$4 = 6 + b$

$-6 \quad -6$

$b = -2$

$y = mx + b$

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

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

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

$y - 4 = -3x - 6$

$+4 \qquad +4$

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

Line through $(4,-2)$ and $(-2,-5)$

1.) Find the slope

2.) $m =$ ____ take a point $(,)$

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

$(4,-2)$

$y = mx + b$ or $y - y_1 = m(x - x_1)$

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

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

$y = mx + b$

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

$-2 = 2 + b$

$-2 \quad -2$

$b = -4$

Parallel lines have equal slope

Perpendicular lines have opposite inverse slope

Parallel line to $y = 4x + 3$ that goes through the point $(2,5)$

$m = 4$

$y = mx + b$

$5 = (4)(2) + b$

$5 = 8 + b$

$-8 \quad -8$

$-3 = b$

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

Line perpendicular to $3x + 2y = 12$

that goes through the $(1, 6)$

$$3x + 2y = 12$$
$$-3x \qquad -3x$$

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

$$\frac{2y}{2} = \frac{-3x}{2} + \frac{12}{2}$$

opposite inverse

$$\frac{-3}{2} \rightarrow \left(\frac{3}{2}\right) \longrightarrow \frac{2}{3} = m$$

$$y = \frac{-3}{2}x + 6$$

$$\boxed{y = \frac{2}{3}x + \frac{16}{3}}$$

$$y = mx + b$$

$$6 = \left(\frac{2}{3}\right)(1) + b$$

$$6 = \frac{2}{3} + b$$
$$-\frac{2}{3} \quad -\frac{2}{3}$$

$$6 = \frac{18}{3}$$

$$\frac{18}{3} - \frac{2}{3} = \frac{16}{3} = b$$