MTH-PC College Algebra Session 15 10/30

1.) Find the equation for a line parallel to $y = -\frac{3}{4}x + 7$ that goes through $(4, -8)$.

parallel lines have equal slope

Given slope: $-\frac{3}{4}$

slope needed $-\frac{3}{4}$

$y = mx + b$

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

$y = mx + b$

$-8 = \left(-\frac{3}{4}\right)(4) + b$

$-8 = -\frac{12}{4} + b$

$-8 = -3 + b$

$+3 \quad +3$

$b = -5$

2.) Find the equation for a line perpendicular to $4x - 2y = 10$ that goes through $(x, y) = (-2, 6)$.

$4x - 2y = 10$

$-4x \quad -4x$

$\frac{-2y}{-2} = \frac{-4x}{-2} + \frac{10}{-2}$

$y = 2x - 5$

slope $= -\frac{A}{B}$

Standard form $Ax + By = C$

Given slope: 2

Needed slope: $-\frac{1}{2} = m$

opposite inverse

$2 \rightarrow -2 \rightarrow -\frac{1}{2}$

$y = mx + b$

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

$6 = 1 + b$

$-1 \quad -1$

$5 = b$

$y = mx + b$

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

3.) A varies directly with b and d and varies inversely with c.

$$A \propto \frac{bd}{c}$$

$$A = \frac{kbd}{c}$$

$$A = k\frac{bd}{c}$$

4.) X varies directly with v and p.

$X = 30$ when $v = 2$ and $p = 5$

Find the equation.

$$X \propto vp$$

$$X = kvp$$

$$30 = k(2)(5)$$

$$\frac{30}{10} = \frac{10k}{10} \qquad k = 3$$

$$X = 3vp$$

Pre-Calculus Chapter 0.5 Practice Test

1.) (8 pts tot, 4 pts each) Calculate the distance between the given points.

a) (-4, 5) and (-9, -7)

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

$$\sqrt{(-9-(-4))^2 + (-7-5)^2}$$

$$\sqrt{(-9+4)^2 + (-12)^2}$$

$$\sqrt{(-5)^2 + (-12)^2}$$

$$\sqrt{25 + 144} = \sqrt{169} = \boxed{13}$$

b) (0, -7) and (-4, -5)

$$\sqrt{98}$$

$$\sqrt{49} \cdot \sqrt{2}$$

$$7\sqrt{2}$$

2.) (8 pts tot, 4 pts each) Find the midpoint of the segment joining the two points.

a) (-3, -1) and (-7, 2)

Average of x's & y's

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

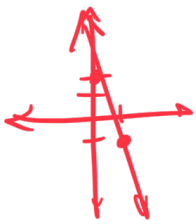
b) (-5, 12) and (7, 16)

$$\left(\frac{-7 + (-3)}{2}, \frac{2 + (-1)}{2}\right)$$

$$\left(\frac{-10}{2}, \frac{1}{2}\right)$$

$$\boxed{\left(-5, \frac{1}{2}\right)}$$

3.) (8 pts tot, 4 pts each) Find the x- and y-intercepts and graph the corresponding lines.

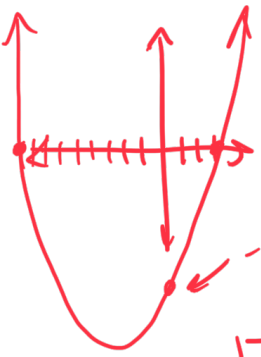


a) $y = -3x + 2$

y-intercept : 2 x-intercept : $\frac{2}{3}$

$y = -3(0) + 2$ $x = 0$ $y = 0$

$y = 2$ $0 = -3x + 2$, -2 -2, $\frac{-2}{-3} = \frac{-3x}{-3}$, $x = \frac{2}{3}$



b) $y = x^2 + 6x - 27$ x-ints → #2

$0 = x^2 + 6x - 27$

$0 = (x + 9)(x - 3)$

x-ints: $-9, 3$

y-int: $x = 0$

$y = (0)^2 + 6(0) - 27$

$y = -27$

4.) (8 pts tot, 4 pts each) Write the equation of the circle in standard form.

a) Center (6, -7)
r = 8

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

$(x-6)^2 + (y+7)^2 = 64$

b) Center (-4, -1)
r = $3\sqrt{5}$

5.) (8 pts tot, 4 pts each) State the center and radius of the circle with the given equation.

a) $(x + 3)^2 + (y - 7)^2 = 81$

Center: $(-3, 7)$

Flip signs

Radius: $\sqrt{81} = 9$

b) $(x + 1)^2 + (y + 2)^2 = 8$

6.) (8 pts tot, 4 pts each) Find the center and radius of the circle.

a) $x^2 + y^2 + 8x + 2y - 28 = 0$

$(x^2 + 8x \;\uparrow) + (y^2 + 2y \;\uparrow) - 28 = 0$

$+16 \quad +1$

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

$4^2 = 16$

$-16 \; -1$

1.) 2020 it

2.) factor a

3.) $\left(\frac{b}{2}\right)^2$

4.) Square Root and complete square

b) $x^2 + y^2 - 2x - 10y + 2 = 0$

$(x^2 + 8x + 16) + (y^2 + 2x + 1) - 45 = 0$

$+45 \; +45$

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

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

Center: $(-4, -1)$

radius $= \sqrt{45}$

$\sqrt{9} \cdot \sqrt{5}$

$3\sqrt{5}$

7.) (8 pts tot, 4 pts each) Find the slope of the line that passes through the given point.

a) (11, -3) and (-2, 6)

$$\text{slope} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{6-(-3)}{-2-11}$$

$$= \frac{6+3}{-2-11} = -\frac{9}{13}$$

b) (-1, -4) and (4, 6)

8.) (8 pts tot, 4 pts each) Write the equation in slope-intercept form. Identify the slope and the y-intercept.

a) 3x - 5y = 15

$-3x \quad -3x$

$$\frac{-5y}{-5} = \frac{-3x}{-5} + \frac{15}{-5}$$

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

slope: 3/5

y-int: -3

b) 8 = 4x - 16y

9.) (8 pts tot, 4 pts each) Write the equation of the line in both ~~point-slope~~ and slope-intercept form.

a) Slope: m = -6 y-intercept: (0, 9)

$y = mx + b$

$9 = (-6)(0) + b$

$9 = b$

$y = mx + b$

$y = -6x + 9$

b) Slope: m = 0 y-intercept: (0, -4)

10.) (8 pts tot, 4 pts each) Write the equation of the line that passes through the given point. Express the equation in slope-intercept form.

a) Slope: m = -⅓
(-6, 9)

$y = mx + b$

$9 = (-\frac{1}{3})(-6) + b$

$9 = 2 + b$

$-2 \quad -2$

$7 = b$

$y = mx + b$

$y = -\frac{1}{3}x + 7$

b) Slope: m = 4
(-2, 8)

11.) (8 pts tot, 4 pts each) Find the equation of the line that passes through the given point and also satisfies the additional piece of information.

a) (1, 4); perpendicular to $6x + 14y = 7$

opposite, inverse

$-\frac{3}{7} \rightarrow \frac{7}{3} = m$

$-6x \quad -6x$

$14y = -6x + 7$

$\frac{14y}{14} = \frac{-6x}{14} + \frac{7}{14}$

$y = -\frac{3}{7}x + \frac{1}{2}$

$y = mx + b$

$4 = \left(\frac{7}{3}\right)(1) + b$

$4 = \frac{7}{3} + b$

b) (3, 5); parallel to $3x - 8y = 20$

$\frac{12}{3} = \frac{7}{3} + b$

$-\frac{7}{3} \quad -\frac{7}{3}$

$b = \frac{5}{3}$

$y = mx + b$

$y =$

12.) (4 pts each) Write an equation that describes the variation.

a) P varies inversely with r^2

13.) (8 pts tot, 4 pts each) Write an equation that describes the variation.

a) y varies inversely with both x and z; y = 32, x = 4, z = 0.05

b) V varies directly with h; V = 18, h = 8