Name:____________________________ Date:__________________________

Math 10/11 Honours: Section 7.4 Shortest Distance Points and Lines

1. Given each line, find the coordinates of the "x" and "y" intercepts:

a) $y=-\frac{4}{5}x+11$

y-intercept:

x-intercept:

b) $7x-8y=-28$

y-intercept:

x-intercept:

c) $9y-3x+21=0$

y-intercept:

x-intercept:

2. Given each line, find the shortest distance from the origin (0,0):

a) $y=-\frac{3}{4}x+8$

b) $8x+6y=24$

c) $9y+4x+36=0$

3. Determine the shortest distance from each point to the line:

a) $y=\frac{2}{3}x+8 \quad (-6,11)$

b) $3x+5y=15 \quad (-10,3)$

c) $3x+4y-28=0 \quad (7,6)$

4. Determine the distance between each pair of parallel line:

a) $\begin{matrix} 3x+5y=10 \\ 3x+5y=3 \end{matrix}$

b) $\begin{matrix} y=\frac{2}{3}x+4 \\ y=\frac{2}{3}x-7 \end{matrix}$

c) $\begin{matrix} 3x-4y+12=0 \\ 3x-4y+18=0 \end{matrix}$

5. Given the line equation L_1: $3x+4y+2=0$ is a tangent to the circle "C" centered at (-3,-2). Find the equation of the circle.

B) Find the equation of the other tangent line to the circle that is parallel with L_1

6. A line through B(0,-10) is 8 units from the origin. Determine its equation:

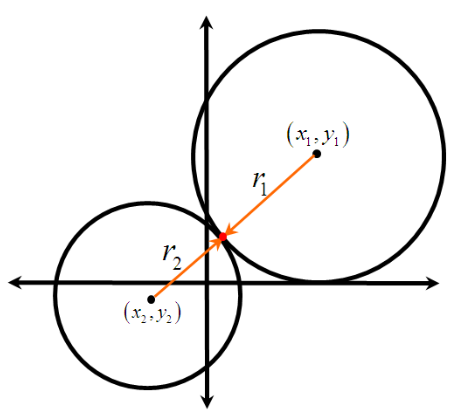
7. Two lines with a slope of 2, L_1 passes through (-3,1) and L_2 passes through (9,0). Find the distance between L_1 and L_2

8. Given the line equation L_k: $kx - y - k - 1 = 0$, where “k” can be all real numbers, what point must all the lines pass through?

9. Given the circle equation: $x^2 + y^2 - 6x - 8y - 24 = 0$ and line equation: $4x + 3y + C = 0$. For what values of “C” will the circle and line intersect at two different points?

10. Given two circles C1 and C2, with centers (-1,2) and (2,6) respectively, and radius 2 and 3 respectively. If the two circles intersect at only one point, find the point of intersection.

11. Challenge: Given circle C_1 with center (x_1, y_1) and radius r_1, and circle C_2 with center (x_2, y_2) and radius r_2 and that they intersect at only one point, prove that the point of intersection (x_m, y_m) is given by the formula: $x_m = \dfrac{x_1 r_2 + x_2 r_1}{r_1 + r_2}$ and $y_m = \dfrac{y_1 r_2 + y_2 r_1}{r_1 + r_2}$



12. Super Challenge: The formula for the shortest distance "D" between a point P$\left(x_1, y_1\right)$ and a line $Ax+By+C=0$ is given by the formula $D=\frac{\left|Ax_1+By_1+C\right|}{\sqrt{A^2+B^2}}$. The proof for this formula can be very challenging. Use this page to prove this formula.

