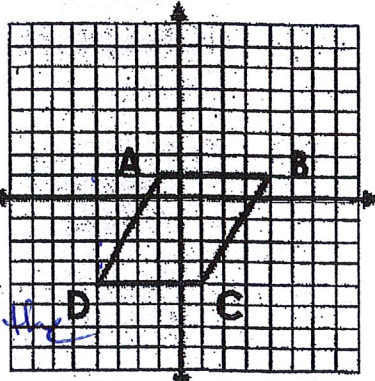


Name: _____

Date: _____

what you need to know & be able to do	Things to remember	Problem	Problem
<p>Midpoint</p>	$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$ <p>Diagonals of a parallelogram bisect. To verify a shape is a parallelogram, find the midpoint for each diagonal. The results should be the same.</p>	<p>1. Find the midpoint of (5, 1) and (6, 7).</p> $\left(\frac{5+6}{2}, \frac{1+7}{2} \right)$ $\left(\frac{11}{2}, \frac{8}{2} \right)$ $\left(\frac{11}{2}, 4 \right)$ <p> $m_{\overline{AB}} = 0$ $m_{\overline{DC}} = 0$ $m_{\overline{AD}} = \frac{5}{3}$ $m_{\overline{BC}} = \frac{5}{3}$ </p> <p>Opp sides have the same slope so they're parallel, therefore ABCD is a p'gram</p>	<p>2. Prove the shape is a parallelogram.</p> 
<p>Distance and Applications</p> $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ $(x - h)^2 + (y - k)^2 = r^2$	<ul style="list-style-type: none"> Find the distance between two points. The distance formula is the basis for the equation of a circle Decide if a point lies on a circle: Find the length of the radius and see if the other distance is the same. 	<p>3. Find the distance (-16, 7) and (-9, 6)</p> $d = \sqrt{(-7)^2 + (1)^2}$ $= \sqrt{49 + 1}$ $= \sqrt{50} = 5\sqrt{2}$	<p>4. Determine whether Point A (-5, 8) lies on the circle whose center is Point C (1, 2) and which contains the Point P (7, -4).</p> <p>Find eq of this circle</p> $(x - 1)^2 + (y - 2)^2 = 72$ <p>now plug in (-5, 8)</p> $(-5 - 1)^2 + (8 - 2)^2 \stackrel{?}{=} 72$ $(-6)^2 + (6)^2 = 72$ $72 \stackrel{?}{=} 72$ <p>so (-5, 8) is on the circle</p> <p>b. Determine whether the point B(-3, -2) lies on the circle whose center is (0, 2) and has a radius of 5</p> <p>Eq of circle $x^2 + (y - 2)^2 = 25$</p> <p>Plug in (-3, -2)</p> $(-3)^2 + (-2 - 2)^2 \stackrel{?}{=} 25$ $9 + (-4)^2 \stackrel{?}{=} 25$ $9 + 16 \stackrel{?}{=} 25$ $25 \stackrel{?}{=} 25$ <p>so yes it's on the circle.</p>

Writing the Equation of a Line

- Two Points: Find the slope; plug in slope and one point into $y = mx + b$
- Parallel: same slopes
- Perpendicular: Use the opposite reciprocal slope and solve for b
(if it's perpendicular, how do you work it? You put the slope down flip it and reverse it!)

8. Write the slope of a line that is parallel to $y = 6x + 9$

$m = 6$

9. Write the slope of a line that is perpendicular to $y = -3x + 7$

$m_{\perp} = \frac{1}{3}$

10. Write an equation of the line that passes through $(-3, 4)$ and is parallel to $Y = -3x - 1$. $m = -3$

$(y - 4) = -3(x + 3)$
 $y - 4 = -3x - 9$
 $+4 \quad +4$
 $y = -3x - 5$

11. Write an equation of the line that passes through $(5, -3)$ and is perpendicular to $y = -5/2x + 1$.

$m_{\perp} = 2/5$
 $y + 3 = \frac{2}{5}(x - 5)$
 $y + 3 = \frac{2}{5}x - 2$
 $-3 \quad -3$
 $y = \frac{2}{5}x - 5$

$(\frac{bx_1 + ax_2}{b+a}, \frac{by_1 + ay_2}{b+a})$

Partitions

- Use formula:
- Find the distance between the x's
- Find the fraction using the ratio
- Multiply the difference from step 1 by the fraction in step 2
- Add this result to the original x
- Repeat for the y's

12. Find a point P on the segment with endpoints $A(-1, -3)$ and $B(7, 1)$ that partitions it in a 3:1 ratio.

$(\frac{1(-1) + 3(7)}{1+3}, \frac{1(-3) + 3(1)}{1+3})$
 $(\frac{-1+21}{4}, \frac{-3+3}{4})$
 $(\frac{20}{4}, \frac{0}{4})$
 $(5, 0)$

13. Find a point T on the segment with endpoints $C(-4, -6)$ and $D(2, 3)$ that partitions it in a 2:1 ratio.

$(\frac{2(-4) + 1(2)}{2+1}, \frac{2(-6) + 1(3)}{2+1})$
 $(\frac{-8+2}{3}, \frac{-12+3}{3})$
 $(\frac{-6}{3}, \frac{-9}{3})$
 $(-2, -3)$

Equations of Circles

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

Equation is based off the Pythagorean theorem & distance formula

The center in the equation uses the opposite signs when graphed

The radius in the equation is squared

14. If the center of a circle is $(7, -8)$ and the diameter is 12, what is the equation of the circle?

$r = 6$
 $(x - 7)^2 + (y + 8)^2 = 36$

$(\frac{3+3}{2}, \frac{-2+6}{2})$
 $(3, 2) \leftarrow \text{CTR}$

$d = \sqrt{(0)^2 + (4)^2}$
 $r = \sqrt{16}$

$(x - 3)^2 + (y - 2)^2 = 16$

15. State the center and radius of the circle:

$4x^2 + 24x + 6y^2 + 12y = 0$
 $x^2 + 4x + \frac{4}{2} + y^2 + 6y + \frac{9}{2} = -2$
 $(\frac{4}{2})^2 \rightarrow (\frac{6}{2})^2 \rightarrow$
 $(x + 2)^2 + (y + 3)^2 = 11$
 CTR $(-2, -3)$
 $r = \sqrt{11}$

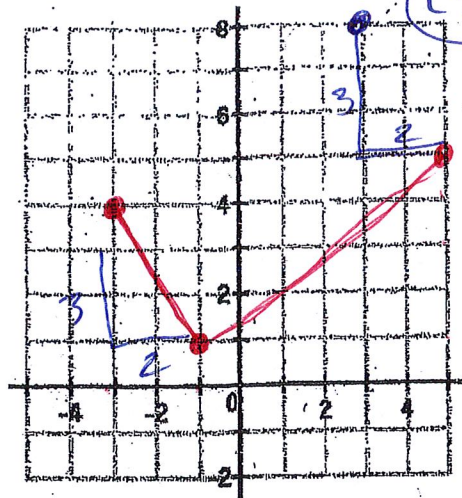
BONUS

16. Write the equation of a circle with diameter endpoints of $(-3, -2)$ and $(3, 6)$

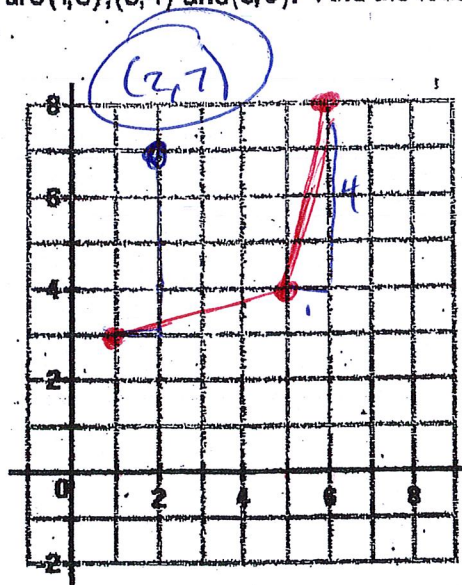
not Bonus!

5. Three coordinate points of a rectangle are $(-3, 4)$, $(-1, 1)$ and $(5, 5)$.

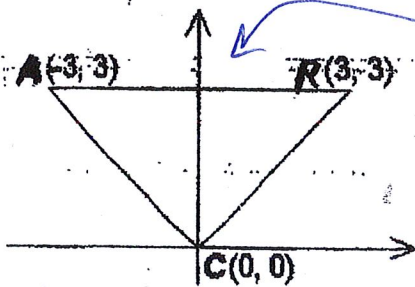
Find 4th vertex.



6. Three coordinate points of a rhombus are $(1, 3)$, $(5, 4)$ and $(6, 8)$. Find the fourth vertex.



7. Classify the triangle below as scalene, isosceles or equilateral using the distance formula.



$$AR = 6$$

$$CR = \sqrt{(3)^2 + (3)^2} = \sqrt{18}$$

$$CA = \sqrt{(3)^2 + (3)^2} = \sqrt{18}$$

$\triangle CAR$ is isosceles

