Coordinate Geometry Review Name: _____ Period:____

MIDPOINT

1. Find the midpoint of the segment with endpoints

a) (6,-7) and (3,-5)

$\left(\frac{6+3}{2}, \frac{-7-5}{2}\right)$

$= \left(\frac{9}{2}, -6\right)$

b) (12,5) and (-9,-1).

$\left(\frac{12-9}{2}, \frac{5-1}{2}\right)$

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

2. Find x and y if

a) the midpoint = (3, -4) with endpoints are (x,y) and (9,14)

$\frac{x+9}{2} = 3$ $\frac{y+14}{2} = -4$ $(-3,-22)$

$x+9=6$ $y+14=-8$

$x=-3$ $y=-22$

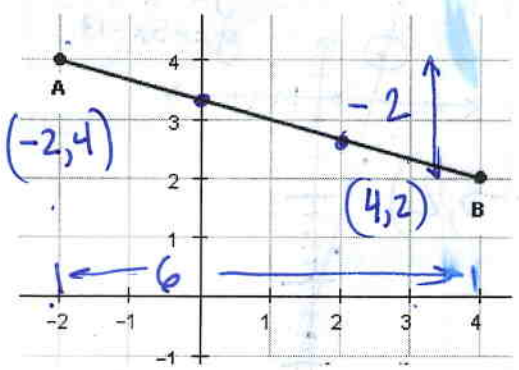
b) the midpoint = (7, 10) with endpoints are (x,y) and (-5,6

$\frac{x-5}{2} = 7$ $\frac{y+6}{2} = 10$ $(19,14)$

$x-5=14$ $y+6=20$

$x=19$ $y=14$

3. Find the two coordinates that divide the segment into thirds



	add to (x, y)
$\frac{1}{3}$ x distance +2	$(-2+2, 4-\frac{2}{3})$
$\frac{2}{3}$ x distance +4	$(-2+4, 4-\frac{4}{3})$
$\frac{1}{3}$ y distance $-\frac{2}{3}$	$(0, 3\frac{1}{3})$
$\frac{2}{3}$ y distance $-\frac{4}{3}$	$(2, 2\frac{2}{3})$

SLOPE, EQUATIONS, PARALLEL/ PERPENDICULAR LINES

Determine the slope of the line that contains the given points.

4. $S(-1,2)$, $W(0,4)$

$m = \frac{4-2}{0-(-1)} = 2$

5. $G(-2,5)$, $H(1,-7)$

$m = \frac{-7-5}{1-(-2)} = \frac{-12}{3} = -4$

6. $C(0,1)$, $D(3,3)$

$m = \frac{3-1}{3-0} = \frac{2}{3}$

7. $J(-5,-2)$, $K(5,-4)$

$m = \frac{-4-(-2)}{5-(-5)} = \frac{-2}{10} = -\frac{1}{5}$

Determine whether $\overleftrightarrow{AB}$ and $\overleftrightarrow{MN}$ are parallel, perpendicular, or neither.

8. $A(0,3)$, $B(5,-7)$, $M(-6,7)$, $N(-2,-1)$

slopes

$AB = \frac{-7-3}{5-0} = \frac{-10}{5} = -2$ $MN = \frac{-1-7}{-2-(-6)} = \frac{-8}{4} = -2$

Parallel

9. $A(-1,4)$, $B(2,-5)$, $M(-3,2)$, $N(3,0)$

$AB = \frac{-5-4}{2-(-1)} = \frac{-9}{3} = -3$ $MN = \frac{0-2}{3-(-3)} = \frac{-2}{6} = -\frac{1}{3}$

Neither

10. $A(-2,-7)$, $B(4,2)$, $M(-2,0)$, $N(2,6)$

AB $\frac{2-(-7)}{4-(-2)} = \frac{5}{6}$ $MN = \frac{6-0}{2-(-2)} = \frac{6}{4}$

Neither

11. $A(-4,-83)$, $B(4,-6)$, $M(-3,5)$, $N(-1,-3)$

$AB = \frac{-6-(-83)}{4-(-4)} = \frac{77}{8}$ $MN = \frac{-3-5}{-1+3} = \frac{-8}{2}$

Neither

Write an equation for each line described:

12. $m = -\frac{5}{3}, b = 0$

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

13. $m = -1$, point $(0, -6)$

$-6 = -1(0) + b$

$b = -6 \quad y = -1x - 6$

14. $m = 4$, point $(2, 5)$

$5 = 4(2) + b$

$-3 = b$

$y = 4x - 3$

15. Write an equation for the line in slope-intercept form.

a c. A line parallel to $y = 3x - 2$ through (5,4)

$m = 3 \quad 4 = 3(5) + b$

$4 = 15 + b$

$-11 = b \quad y = 3x - 11$

b. A line perpendicular to $y = 4x + 3$ through (-6,3)

$m = -\frac{1}{4} \quad 3 = -\frac{1}{4}(-6) + b$

$3 = \frac{3}{2} + b \quad y = -\frac{1}{4}x + \frac{3}{2}$

$+\frac{3}{2} = b$

SOLVING SYSTEMS – choose one to do with elimination, one to do with graphing and one to do with substitution

16. $-2x + 6y = 6$ (S)

$-7x + 8y = -5$

$x - 3y = -3 \quad x = 3y - 3$

$-7(3y - 3) + 8y = -5$

$-21y + 21 + 8y = -5$

$-13y = -26$

$y = 2$

$-2x + 6(2) = 6$

$-2x + 12 = 6$

$-2x = -6$

$x = 3$

$(3, 2)$

17. $2x + y = 20$ E

$6x - 5y = 12$

$10x + 5y = 100$

$16x = 112$

$x = 7$

$2x + y = 20$

$14 + y = 20$

$y = 6$

$(7, 6)$

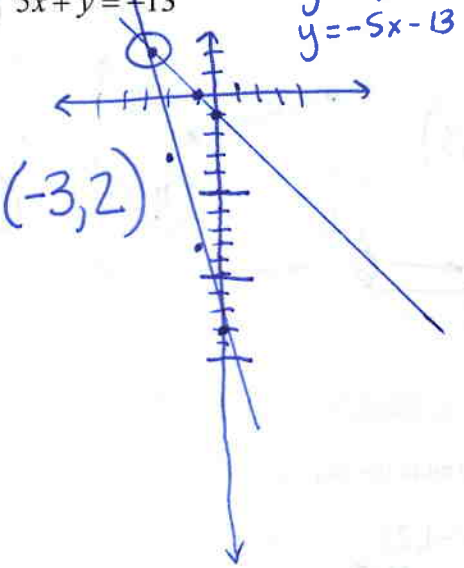
18. $6x + 6y = -6$ 9

$5x + y = +13$

$6y = -6x - 6$

$y = -x - 1$

$y = -5x - 13$



$(-3, 2)$

DISTANCE FORMULA

Find the distance between the points.

19. $(-4, -3), (1, 4)$

$d = \sqrt{(4 - (-3))^2 + (1 - (-4))^2}$

$d = \sqrt{49 + 25} = \sqrt{74}$

2-37

20. $(6, -7), (3, -5)$

$d = \sqrt{(-5 - -7)^2 + (3 - 6)^2}$

$= \sqrt{4 + 9}$

$= \sqrt{13}$

$= \sqrt{13}$

21. $(-2, 3), (-1, 7)$

$d = \sqrt{(7 - 3)^2 + (-1 - (-2))^2}$

$= \sqrt{16 + 1}$

$= \sqrt{17}$

EQUATION OF A CIRCLE

Write the equation of each circle.

22. Center at the origin, radius 6

$x^2 + y^2 = 36$

23. Center at (4, 3), radius 9

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

23. Center at (4, 3), radius 9

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

25. C(7,1), diameter 24

$r = 12$

$(x - 7)^2 + (y - 1)^2 = 144$

26. C(-4, -1), passes through (-2, 3)

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

$= (-2 + 4)^2 + (3 + 1)^2 = r^2$

$= 2^2 + 4^2 = r^2$

$4 + 16 = r^2 = 20 \quad (x + 4)^2 + (y + 1)^2 = 20$

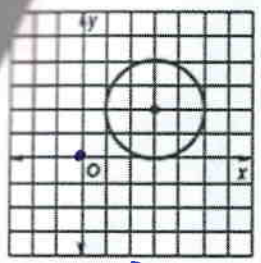
27. C(5,-2), passes through (4,0)

$(x + 5)^2 + (y + 2)^2 = r^2$

$(4 - 5)^2 + (0 + 2)^2 = r^2$

$1 + 4 = r^2 = 5$

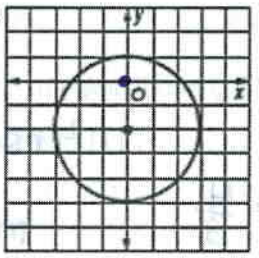
$(x - 5)^2 + (y + 2)^2 = 5$



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

C(3,2)

29

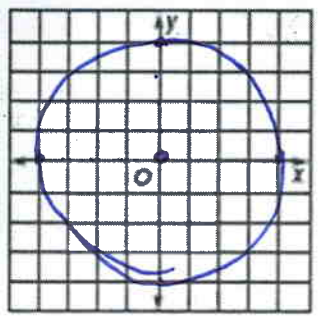


C=(0,-2)

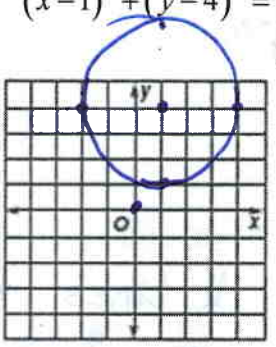
$(x)^2+(y+2)^2=9$

30. Find the center, the radius, and graph the circle.

a. $x^2+y^2=16$ C(0,0) r=4



b. $(x-1)^2+(y-4)^2=9$ C=(1,4) r=3

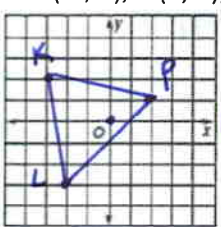


COORDINATE PROOFS

Triangles:

31. Find the measures of the sides of $\triangle KPL$ and classify each triangle by its sides.

a. K (-3, 2), P (2, 1), L (-2, -3)



Isosceles

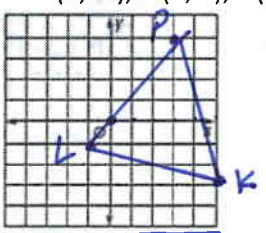
$\overline{KP} \cong \overline{LK}$

$KP=\sqrt{5^2+1^2}=\sqrt{26}$

$PL=\sqrt{4^2+4^2}=\sqrt{32}$

$LK=\sqrt{1^2+5^2}=\sqrt{26}$

b. K (5, -3), P (3, 4), L (-1, 1)



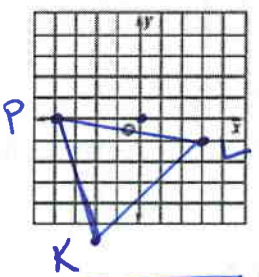
$KP=\sqrt{2^2+7^2}=\sqrt{53}$

$PL=\sqrt{4^2+3^2}=\sqrt{25}$

$KL=\sqrt{6^2+4^2}=\sqrt{52}$

Scalene

c. K (-2, -6), P (-4, 0), L (3, -1)



Isosceles

$\overline{KP} \cong \overline{KL}$

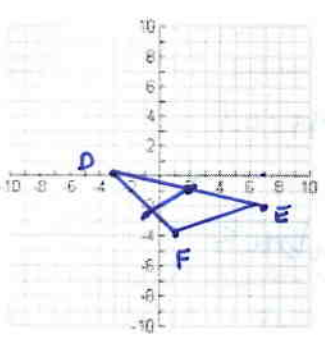
$KP=\sqrt{2^2+6^2}=\sqrt{40}$

$PL=\sqrt{7^2+1^2}=\sqrt{50}$

$KL=\sqrt{5^2+5^2}=\sqrt{50}$

MIDSEGMENT

32. $\triangle DEF$ has vertices D(-3, 0), E (7, -2), F (1, -4). Is $\overline{GH}$ a midsegment given points G(2, -1) and H(-1, -3)?



mid segment ½ length & parallel

$d_{GH}=\sqrt{3^2+2^2}=\sqrt{13}$ NO

$d_{FE}=\sqrt{6^2+2^2}=\sqrt{40}$

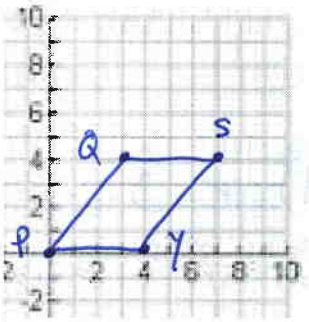
$m_{GH}=\frac{(-3-(-1))}{(-1-2)}=\frac{-2}{-3}=\frac{2}{3}$

$m_{FE}=\frac{(-4-(-2))}{(1-7)}=\frac{-2}{-6}$ NO

Quadrilaterals

33. Prove whether quadrilateral PQSY is a parallelogram. Show all work.

$P(0,0)$, $Q(3,4)$, $S(7,4)$, $Y(4,0)$



intersecting ll lines

$m\overline{PQ} = \frac{4}{3}$

$m\overline{QS} = \frac{0}{4}$

$m\overline{SY} = \frac{-4}{-3} = \frac{4}{3}$

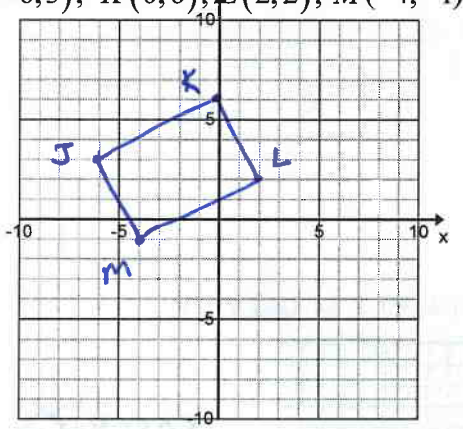
$m\overline{YP} = \frac{0}{-4} = 0$

$m\overline{PQ} = m\overline{SY}$ $\overline{PQ} \parallel \overline{SY}$

$m\overline{QS} = m\overline{YP}$ $\overline{QS} \parallel \overline{YP}$

34. Prove whether quadrilateral JKLM is a rectangle. Justify your answer by showing all work.

$J(-6,3)$, $K(0,6)$, $L(2,2)$, $M(-4,-1)$



ll lines & ⊥ lines

$m\overline{JK} = \frac{3}{6} = \frac{1}{2}$

$m\overline{KL} = \frac{4}{-2} = -2$

$m\overline{LM} = \frac{3}{6} = \frac{1}{2}$

$m\overline{JM} = \frac{4}{-2} = -2$

$\overline{JK} \parallel \overline{LM}$

$\overline{KL} \parallel \overline{JM}$

$\overline{JK} \perp \overline{KL}$ $\angle JKL = 90°$

$\overline{JK} \perp \overline{JM}$ $\angle KJM = 90°$

$\overline{ML} \perp \overline{KL}$ $\angle MLK = 90°$

$\overline{JM} \perp \overline{ML}$ $\angle JML = 90°$

Prove whether QRST is a rhombus, rectangle, or square.

35. $Q(3,5)$, $R(3,1)$, $S(-1,1)$, $T(-1,5)$

$QR = \sqrt{0+4^2} = 4$

$RS = \sqrt{4^2+0} = 4$

$ST = \sqrt{0+4^2} = 4$

$TS = \sqrt{4^2+0} = 4$

} Rhombus or square

$m\overline{QR}$ $\frac{4}{0}$ vert } 90°

$m\overline{RS}$ $\frac{0}{4} = 0$ horz

$m\overline{ST}$ $\frac{4}{0}$ vert } 90°

$m\overline{QT}$ $\frac{0}{4}$ horz

Square

36. $Q(-5,12)$, $R(5,12)$, $S(-1.4)$, $T(-11,4)$

$\overline{QR} = \sqrt{10^2+0} = \sqrt{100}$

$\overline{RS} = \sqrt{6^2+8^2} = \sqrt{100}$

$\overline{ST} = \sqrt{10^2+0} = \sqrt{100}$

$TQ = \sqrt{6^2+8^2} = \sqrt{100}$

} Square or Rhombus

$m\overline{QR}$ $\frac{0}{10} = 0$

$m\overline{RS}$ $\frac{8}{6} = \frac{4}{3}$ NOT vertical

Rhombus