Name: ______________________ ?. **Date:** Oct. 21st

Knowledge	Application	TIPS	Communication
19 ~~18~~ /18	5 /15	6 /6	2 /4

- Show full solutions for full marks. Leave answers in exact form unless a degree of accuracy is given.
- Communication mark will be based on proper form and use of symbols.

(KNOWLEDGE)

1. Match the phrase on the left with the most appropriate item on the right. Answer in the space provided. 7 /7

E Uses a midpoint and a perpendicular slope.	A. Isosceles
F The line through a vertex and the midpoint of the opposite side.	B. Altitude
H A triangle with three equal lengths.	C. Square
C Rectangle with all sides having equal length.	D. Rectangle
B Uses a vertex and a perpendicular slope.	E. Perpendicular Bisector
D A quadrilateral with opposite sides parallel.	F. Median
A A triangle with two equal lengths.	G. Scalene
G A triangle with no equal lengths.	H. Equilateral

2. Find the length, <u>in reduced and exact form</u>, between the points A(2,6) and B(4,4). 2 /2

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

$l = (4-2)^2 + (4-6)^2$

$= (2)^2 + (-2)^2$

$= 4 + 4$

$= \sqrt{8}$

$= \sqrt{2 \cdot 4}$

$= \sqrt{2 \cdot 2 \cdot 2}$

$= 2\sqrt{2}$

∴ The length in exact form is $2\sqrt{2}$.

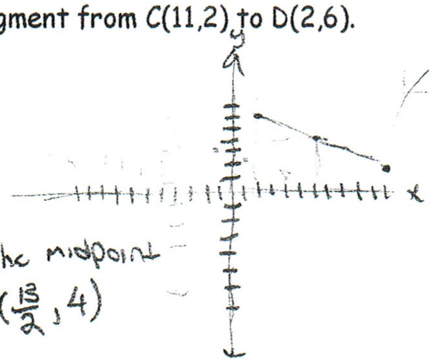
3. Find the midpoint of the line segment from C(11,2) to D(2,6). 2 /2

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

$= \left(\frac{11+2}{2}, \frac{2+6}{2}\right)$

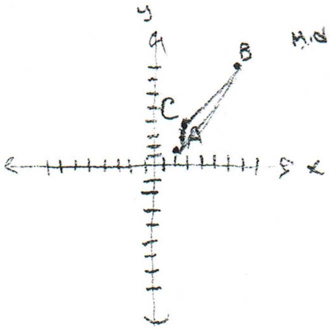
$= \left(\frac{13}{2}, \frac{8}{2}\right)$

$= \left(\frac{13}{2}, 4\right)$



∴ The midpoint is $\left(\frac{13}{2}, 4\right)$

4. Triangle ABC has vertices A(2,1), B(7,8) and C(3,3). Determine the equation of the perpendicular bisector through AC. 5/5



$\text{Midpoint}_{AC} = \left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$

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

$= \left(\frac{5}{2}, \frac{4}{2}\right)$

$= \left(\frac{5}{2}, 2\right)$

Slope $AC = \frac{y_2-y_1}{x_2-x_1}$

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

$= \frac{2}{1}$

$= 2$

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

$y = mx+b$

$2 = \frac{-1}{2}\left(\frac{5}{2}\right)+b$

$2 = \frac{-5}{4}+b$

$2+\frac{5}{4} = b$

$3\frac{1}{4} = b$

$y = \frac{-1}{2}x + \frac{13}{4}$

$\therefore$ The equation of the perpendicular bisector of AC is $y = \frac{-1}{2}x + \frac{13}{4}$

5. Given the following information, determine the type of quadrilateral. 2/2

a)

	AB	BC	CD	DA
slope	2	0.5	2	0.5
length	4	4	4	4

Type: rhombus

b)

	AB	BC	CD	DA
slope	1	-1	1	-1
length	5	2.5	5	2.5

Type: rectangle

(APPLICATION)

6. Show that triangle ABC with A(1,1), B(2,5), C(6,6) is isosceles. 3/3

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

$= (2-1)^2 + (5-1)^2$

$= (1)^2 + (4)^2$

$= 1+16$

$= \sqrt{17}$

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

$= (6-2)^2 + (6-5)^2$

$= (4)^2 + (1)^2$

$= 16+1$

$= \sqrt{17}$

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

$= (6-1)^2 + (6-1)^2$

$= (5)^2 + (5)^2$

$= 25+25$

$= \sqrt{50}$

$= \sqrt{5 \cdot 10}$

$= \sqrt{5 \cdot 2 \cdot 5}$

$= 5\sqrt{2}$

∴ Since AB and BC are the same lengths this triangle is isosceles because it has 2 equal sides.

7. A circle is centered at the origin and passes through the point (-5,12). Determine the radius of the circle. 2/2

$A = (0,0)$ $B = (-5,12)$

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

$= (-5-0)^2 + (12-0)^2$

$= (-5)^2 + (12)^2$

$= 25+144$

$= \sqrt{169}$

$= 13$

$x^2+y^2=r^2$

$x^2+y^2=169$

$\sqrt{x^2+y^2}=\sqrt{169}$

$x+y=13$

$r=13$

∴ The radius of the circle is 13.

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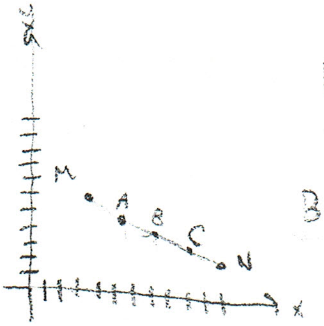
8. Points A, B and C divide the line segment from M(8,12) to N(22,4) into four equal parts. Find the coordinates of A, B and C.. 3/3



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

$= \left(\frac{8+22}{2}, \frac{12+4}{2}\right)$

$= \left(\frac{30}{2}, \frac{16}{2}\right)$

$= (15, 8)$

B=(15,8)

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

$= \left(\frac{8+15}{2}, \frac{12+8}{2}\right)$

$= \left(\frac{23}{2}, \frac{20}{2}\right)$

$= \left(\frac{23}{2}, 10\right)$

A=$\left(\frac{23}{2}, 10\right)$

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

$= \left(\frac{22+15}{2}, \frac{4+8}{2}\right)$

$= \left(\frac{37}{2}, \frac{12}{2}\right)$

$= \left(\frac{37}{2}, 6\right)$

C=$\left(\frac{37}{2}, 6\right)$

∴ The coordinates of A $= \left(\frac{23}{2}, 10\right)$, B=(15,8) and C= $\left(\frac{37}{2}, 6\right)$

A= $\left(\frac{23}{2}, 10\right)$

B= (15,8)

C = $\left(\frac{37}{2}, 6\right)$

9. A circle centered at (1,2) has the following equation $(x - 1)^2 + (y - 2)^2 = 16$. Determine if the point ~~P(1,2)~~ P(3,4) is "in", "on" or "outside" of the circle. 3/3

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

sub in (3,4)

$\sqrt{(3-1)^2 + (4-2)^2} = \sqrt{16}$

$= (2)^2 + (2)^2 = 16$

$= \sqrt{4+4} = \sqrt{16}$

$= \sqrt{8} \neq \sqrt{16}$

LS ≠ RS

$y^2 + x^2 = 16$

$\sqrt{y^2+x^2} = \sqrt{16}$

$y + x = 4$

$r = 4$

A=(1,2) B=(3,4)

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

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

$= \sqrt{(2)^2 + (2)^2}$

$= \sqrt{4+4}$

$l_{AB} = \sqrt{8}$

$= 2.8$

Inside

∴ Since the length of AB is less than the radius (3,4) is inside the circle.

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