

**Final Exam – Level 1 Geometry**

Ms. Andersen, Mrs. King, Mr. Shea, Ms Tee, Mr. Trainor, Mr. Williams

NAME \_\_\_\_\_ **ANSWER KEY** \_\_\_\_\_ Class \_\_\_\_\_ Date \_\_\_\_\_

**TOTAL: 103 Points [Points for each problem are indicated in the problem. ]**

1. The measure of the supplement of an angle is five times that of the angle's complement. Find the measure of the complement.

[1 pt]  $180 - x = 5(90 - x)$

[1 pt]  $180 - x = 450 - 5x$

$4x = 270$

[1 pt]  $x = 67.5$

Complement =  $90 - 67.5 = 22.5$

**Angle Measure = 67.5**

**Complement = 22.5 [1 pt]**

**4 pts total**

2. Find  $x$  and  $y$ .  $\overline{AB}$  is parallel to  $\overline{EC}$

$DE = 4$

$AE = 5$

$DC = 6$

$EC = 7$

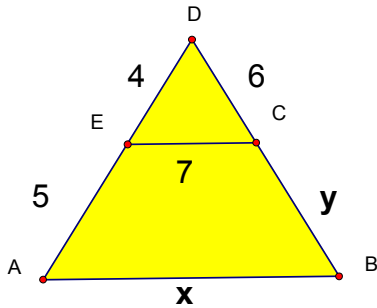
$CB = y$

$AB = x$

$x = \underline{15.75 [1 pt]}$

$y = \underline{7.5 [1 pt]}$

**4 pts total**



[1 pt]

$$\frac{4}{9} = \frac{7}{x}$$

$$4x = 63$$

$$x = \frac{63}{4} = 15.75$$

[1 pt]

$$\frac{6}{6+y} = \frac{7}{15.75}$$

$$42 + 7y = 15.75(6) = 94.5$$

$$7y = 52.5$$

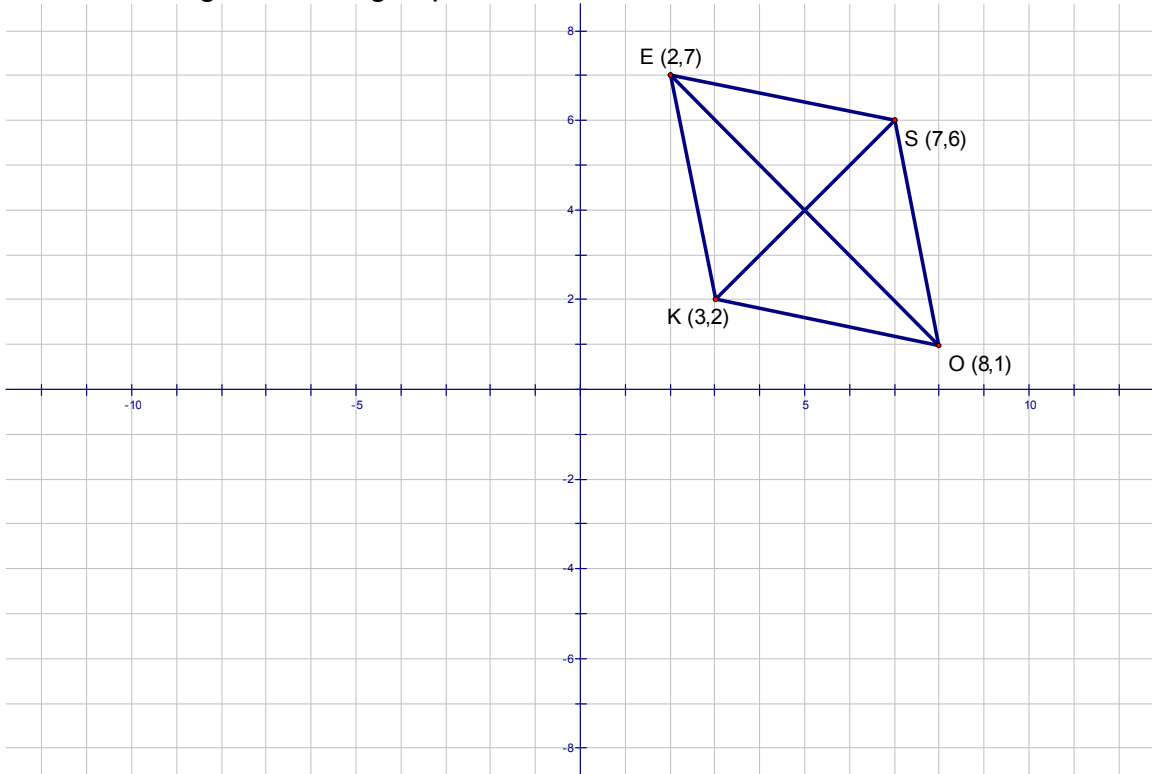
$$y = 7.5$$

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3. The vertices of a quadrilateral KOSE have coordinates as follows: Point K is (3, 2), Point O is (8, 1), Point S is (7, 6) and Point E is (2, 7). Draw and label the figure on the grid provided below.



- a. By finding the lengths and slopes of the sides, give the most descriptive name for the quadrilateral.

**[2 pts]**

Let  $M_{AB}$  be the midpoint between 2 points AB

$$M_{KE} = (7 - 2) / (2 - 3) = -5$$

$$M_{KO} = (2 - 1) / (3 - 8) = - 1/5$$

$$M_{ES} = (7 - 6) / (2 - 7) = - 1/5$$

$$M_{SO} = (6 - 1) / (7 - 8) = -5$$

**Name of**

**Quadrilateral RHOMBUS [1 pt]**

**[2 pts]**

LENGTHS :

$$ES = \sqrt{(25 + 1)} = \sqrt{26}$$

$$KO = \sqrt{(25 + 1)} = \sqrt{26}$$

$$EK = \sqrt{(1 + 25)} = \sqrt{26}$$

$$SO = \sqrt{(1 + 25)} = \sqrt{26}$$

All sides are congruent

**8 pts total**

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- b. Find the mid-points of OE, KS. What other property of the quadrilateral does this show?

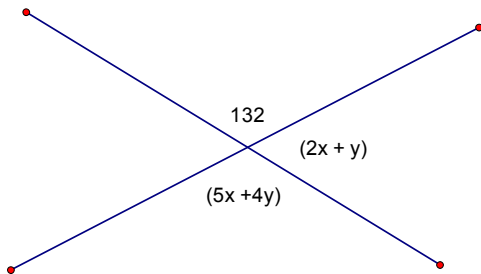
[1 pt] Midpoint of OE = (5, 4)

[1 pt] Midpoint of KS = (5, 4)

[1 pt] PROPERTY: Diagonals of a rhombus bisect each other.

4. Use the diagram below to find x and y:

$x = \underline{20}$   
 $y = \underline{8}$



**4 pts total**

[1 pt]  $2x + y + 132 = 180 \Rightarrow y = 48 - 2x$

[1 pt]  $2x + y + 5x + 4y = 180 \Rightarrow 7x + 5y = 180$

$7x + 5(48 - 2x) = 180$

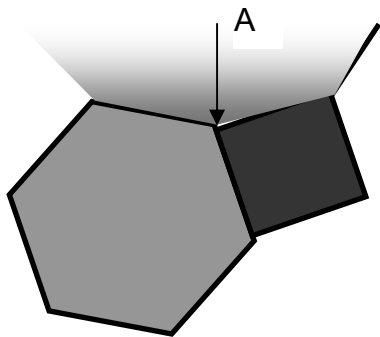
$3x = 5(48) - 180$

[1 pt]  $x = 20$

[1 pt]  $y = 48 - 2(20) = 8$

5. 3 regular polygons meet at point A. How many sides does the largest polygon have?

**4 pts total**



Number of sides = 12 [1 pt]

[1 pt]  $120 + 90 = 210$   
 $360 - 210 = 150$

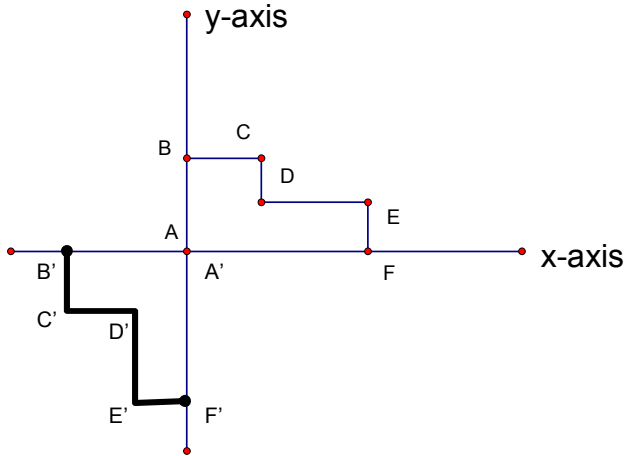
[1 pt]  $(n - 2)180 = 150n$   
 $180n - 150n = 360 =$   
 $30n$   
 [1 pt]  $n = 12$

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6. L shaped polygon, ABCDEF



**3 pts total**

a. Redraw the figure: Rotate  $90^\circ$  clockwise ( $-90^\circ$ ) around point A, followed by a reflection across the y axis. Clearly label the final figure. **[2 pts]**

b. How can you perform this transformation in one step? **[1 pt]**

Reflect across the line  $y = x$

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7. Refer to the figure below.

Given:

EA is tangent to the circle P at A

Arc AB = 80°, arc CD = 140° and segment AC is a diameter

a. Find  $m\angle 1$

140° [1 pt]

b. Find  $m\angle 2$

70° [1 pt]

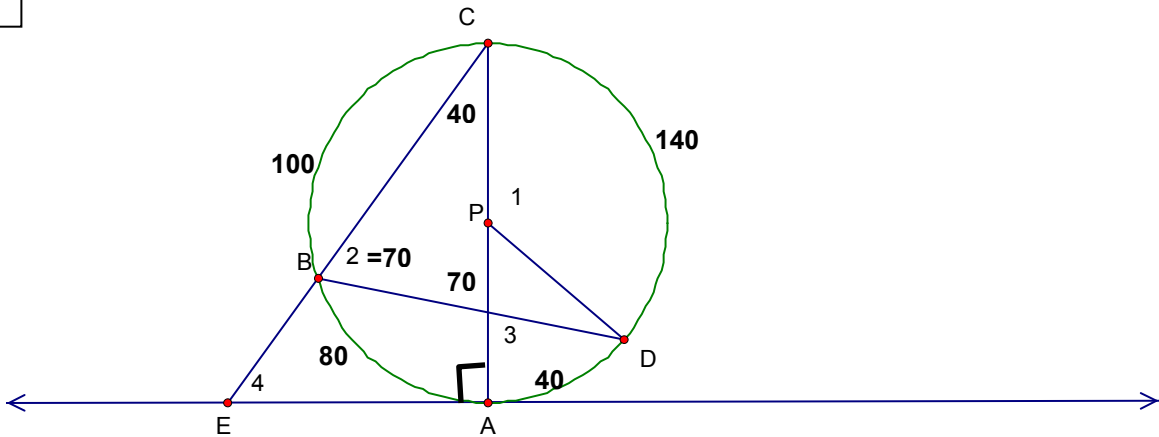
c. Find  $m\angle 3$

70° [1 pt]

d. Find  $m\angle 4$

50° [1 pt]

4 pts total



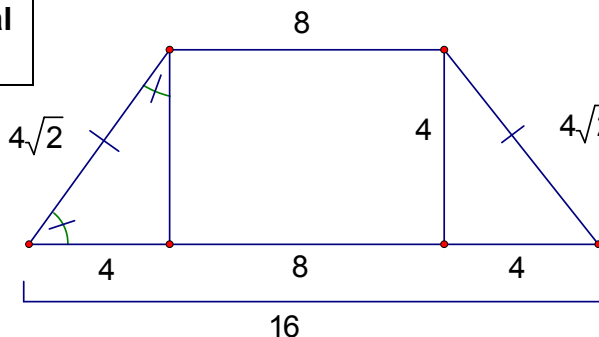
8. Which of the following is NOT a property of a parallelogram? Circle your answer. [1 pt]

- a. Opposite sides are parallel
- b. Opposite angles are congruent
- c. Consecutive angles are supplementary
- d. The diagonals are congruent**
- e. Opposite sides are congruent

1 pt total

9. An isosceles trapezoid has bases with lengths 16 and 8. The base angles are 45°. Find the perimeter and area of the trapezoid. Leave your answer in simplest radical form.

4 pts total



Trapezoid  
Perimeter =

24 + 8√2  
[2 pts]

Trapezoid Area =

48 [2 pts]

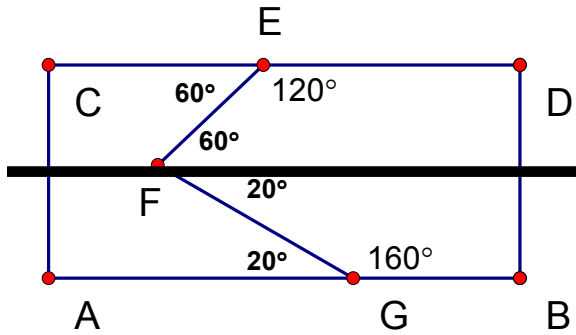
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10. In the diagram below, ABCD is a rectangle. Find the measure of  $\angle EFG$ .

2 pts total

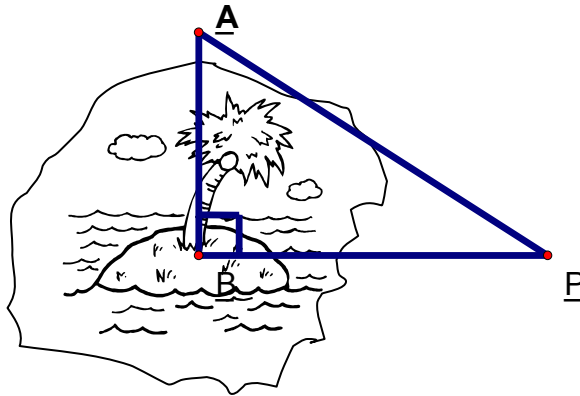


Measure  $\angle EFG =$  80

Draw line XF which will be parallel to ED and AB and label.

11. To find the distance from point A on the shore of a lake to point B on an island in that lake, surveyors locate a point P with  $\angle PAB = 65^\circ$  and  $\angle APB = 25^\circ$ . They find that PA measures 352 meters. Find AB to the nearest  $10^{\text{th}}$ .

2 pts total



$$\sin 25^\circ = AB / 352$$

$$AB = 352 (\sin 25^\circ)$$

AB = 148.8

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12. All soccer players are athletes

a. Rewrite the above statement in if... then... form. [1 pt]

If you are a soccer player, then you are an athlete.

b. Write the converse, inverse and contrapositive forms of your answer for a. [1 pt each]

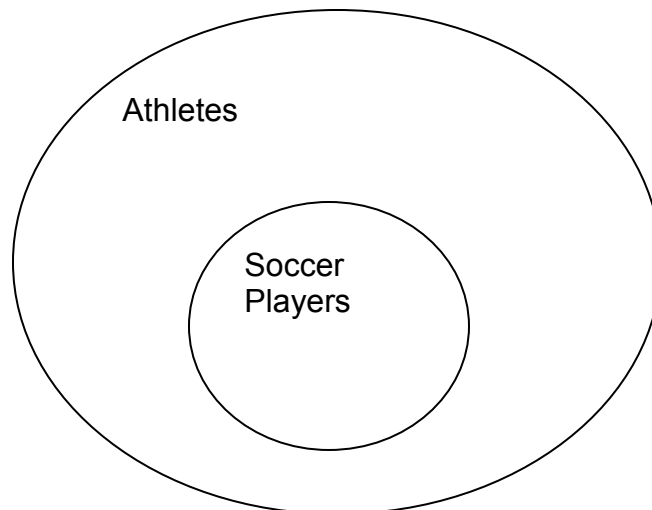
**7 pts total**

Converse: **If you are an athlete then you are a soccer player.**

Inverse: **If you are not a soccer player, then you are not an athlete.**

Contrapositive: **If you're not an athlete, then you're not a soccer player.**

c. Make a Venn diagram to illustrate the statement. [1 pt]



d. If the given statement is true, what can you conclude from each of the following statements? If no conclusion can be made, write NONE.

[1/2 pt each]

1. Molly is an athlete.

**NONE**

2. John plays soccer.

**John is an athlete**

3. Dave is not a soccer player.

**None**

4. Rachel is not an athlete.

**Rachel is not a soccer player**

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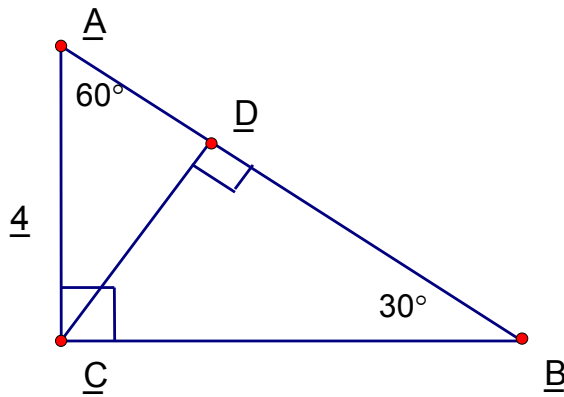
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13. Find BD:

BD = 6 [2 pts]

2 pts total



Use 30-60-90 ratios to find values.

Find sides for  $ACD$  first:

Hypotenuse ( $AC$ ) = 4

Short leg ( $AD$ ) = 2

Long leg ( $CD$ ) =  $2\sqrt{3}$

Then use 30-60-90 ratios again to find sides for  $BCD$  to find  $BD$

Short leg ( $CD$ ) =  $2\sqrt{3}$

Long leg ( $BD$ ) =  $(2\sqrt{3})(\sqrt{3}) = 6$

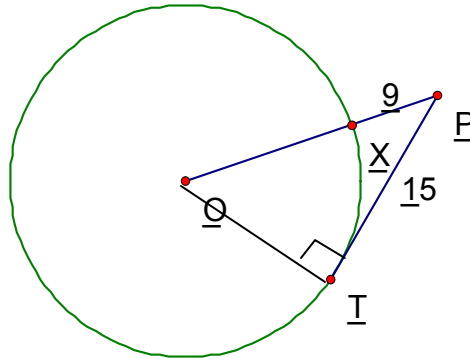
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14. PT is tangent to circle O at point T. Find the radius of the circle O.

XP = 9  
TP = 15



**4 pts total**

Draw radius OT perpendicular to PT at point T. [ 1 pt ]

Let x be the radius of the circle O  
This will form a right triangle: POT:  
Hypotenuse = OP = x + 9  
Leg 1 = OT = x  
Leg 2 = PT = 15

[ 1 pt ] Pythagorean Theorem:  $x^2 + 15^2 = (9 + x)^2$

[ 2 pt ] Solve for x:

$$81 + 18x + x^2 = 15^2 + x^2$$

$$18x = 15^2 - 81 = 225 - 81 = 144$$

$$x = 144 / 18 = 8$$

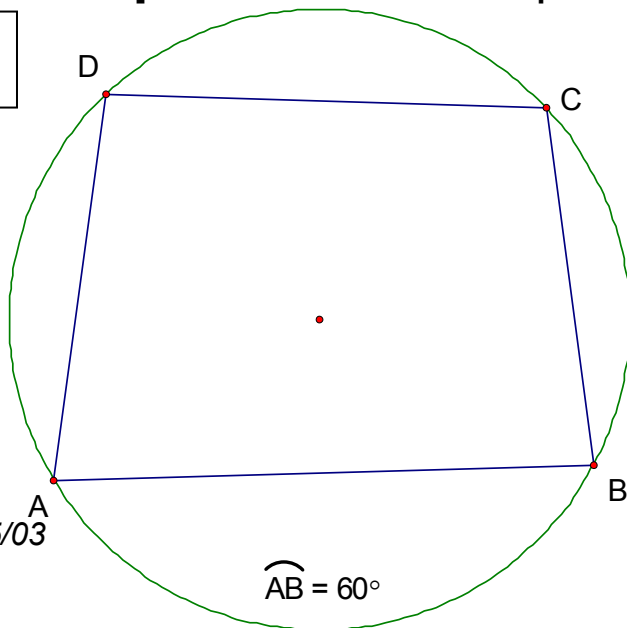
Radius of Circle O = 8

15. ABCD is an inscribed quadrilateral with the measure of the minor arc AB = 60° and the measure of minor arc BC = 90°. The ratio of the measure of the minor arc CD to the measure of the minor arc DA is 2:1. Setup a diagram using this information and find the m

∠BCD. [ 1 pt for diagram ]

$$\widehat{CD} = 2x = 140$$

**4 pts total**



m ∠BCD = 65° [ 1 pt ]

$$\widehat{BC} = 90^\circ$$

[ 2

pts ]

$$3x = 360 - (90 + 60)$$

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$$\widehat{AB} = 60^\circ$$

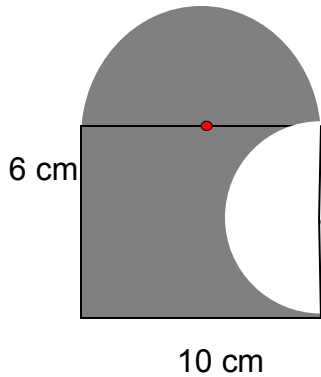
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$$x = 1/3 (420)$$

16. Find the area of the shaded region. Leave your answer in terms of  $\pi$ .



**Area of shaded region = 60 + 8 $\pi$**

The figure consists of a rectangle with a semi-circle cut out of it and another semicircle on top.

The rectangle has sides 6 and 10.

The semi-circle cut out of the rectangle has a diameter of 6, hence a radius of 6

The semi-circle cut outside the rectangle has a diameter of 10, hence a radius of 5

**4 pts total**

[ 1 pt ] Area of Rectangle =  $6 * 10 = 60$

[ 1 pt ] Area of semi-circle inside rectangle =  $\frac{1}{2}(\pi 3^2)$   
=  $(9/2)\pi$

[ 1 pt ] Area of semi-circle outside rectangle =  $\frac{1}{2}(\pi 5^2)$   
=  $(25/2)\pi$

The area of the figure (shaded region) is:

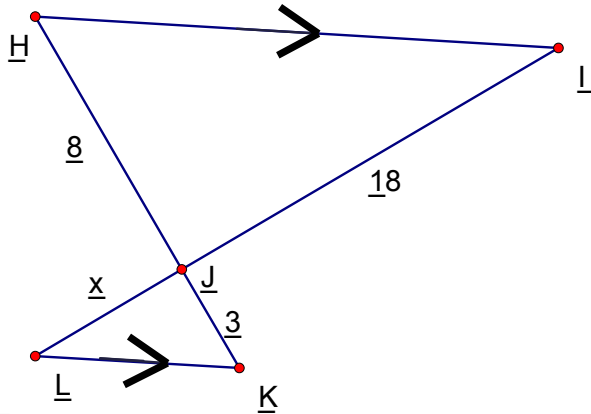
[ 1 pt ]  $60 - (9/2)\pi + (25/2)\pi = 60 + (16/2)\pi = 60 + 8\pi$

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17. Find x:



X = 6.75

**4 pts total**

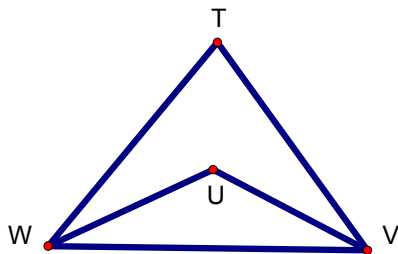
- [ 1 pt ]  $HI / KL = IJ / LJ = HJ / KJ$
- [ 2 pt ]  $3 / x = 8 / 18$   
 $8x = 54$
- [ 1 pt ]  $x = 6.75$

18. Given:

- WU bisects  $\angle TWV$
- VU bisects  $\angle TVW$
- $\angle T = 80^\circ$

Find  $\angle WUV$

**4 pts total**



$\angle WUV =$   $130^\circ$  [ 1 pt]

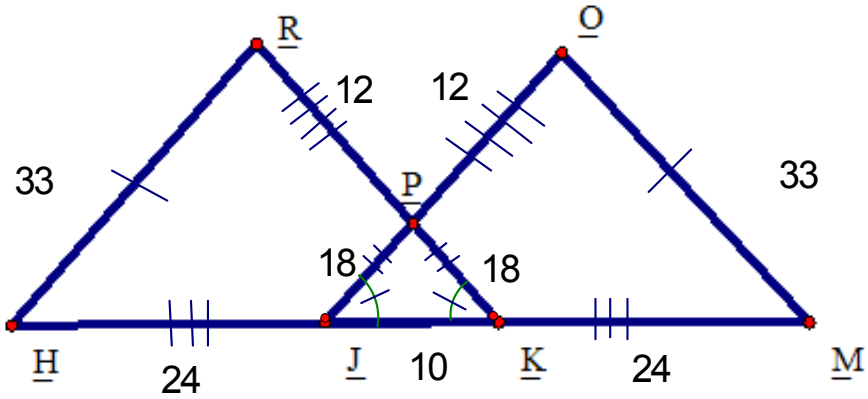
- Let  $x = \angle UWV$  and also  $\angle TWU$
- Let  $y = \angle UVW$  and also  $\angle TVU$
- [ 2 pt ]  $2x + 2y + 80 = 180$
- [ 1 pt ]  $x + y = 50$  and [ 1 pt ]  $\angle WUV = 180 - 50 = 130^\circ$

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19.



Triangle HKR is congruent to MJO

RP = 12

JO = 30

JK = 10

KM = 24

HR = 33

**4 pts total**

How far does Juan walk if he goes from H to K to P to O to M to K? **[4 pts]**

HK = 34

KP = 18

PO = 12

OM = 33

MK = 24

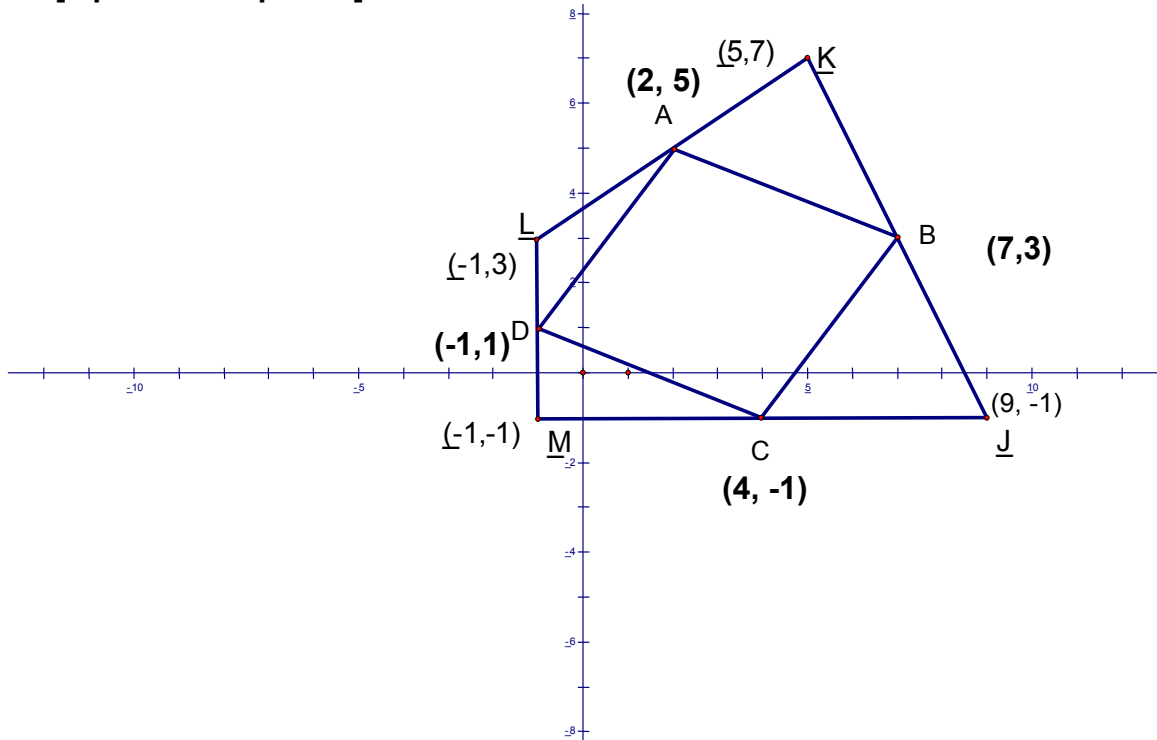
Total : 121 units

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**20. [2 pts for midpoints]**



**5 pts total**

Prove that the quadrilateral ABCD formed by joining the midpoints of KJML is a parallelogram.

**[2 pts]**

Prove by Slope to show opposites sides are parallel:

$$\text{Slope of AD} = (5 - 1) / (2 - (-1)) = 4/3$$

$$\text{Slope of BC} = (3 - (-1)) / (7 - (4)) = 4/3$$

$$\text{Slope of DC} = (1 - (-1)) / (-1 - 4) = -2/5$$

$$\text{Slope of AB} = (5 - 3) / (2 - 7) = -2/5$$

OR Prove by distance to show opposites sides are congruent

$$\text{AD} = 5$$

$$\text{DC} = \sqrt{29}$$

$$\text{BC} = 5$$

$$\text{AB} = \sqrt{29}$$

**[1 pt]** ABCD is a parallelogram

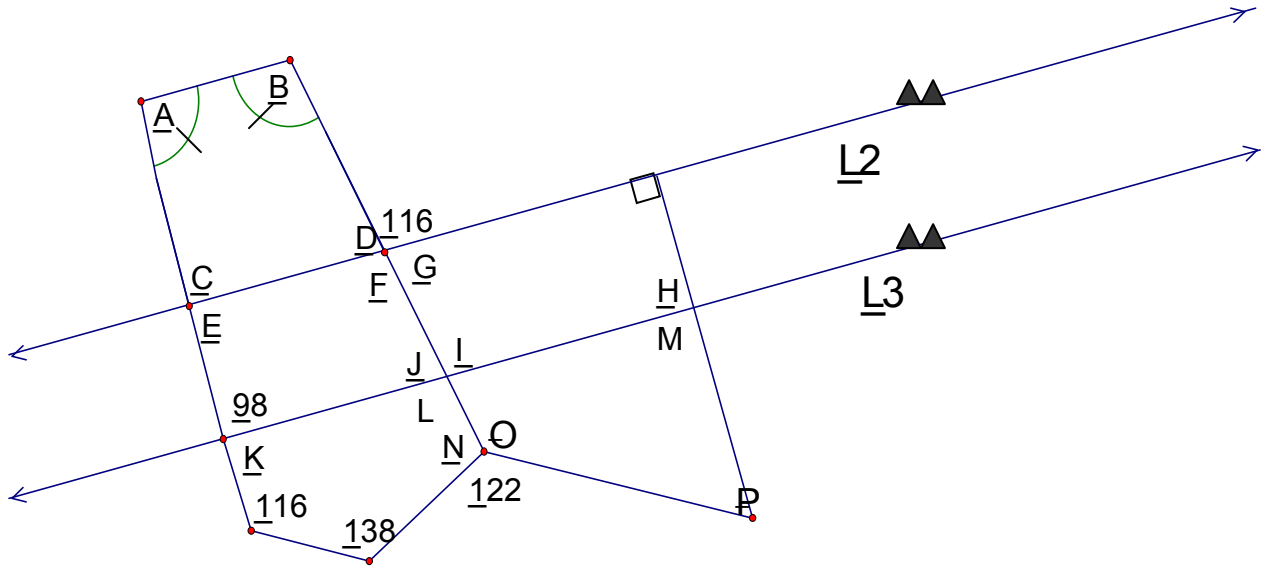
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21. Find the labeled angles:

Given:  $L2 \parallel L3$



[1/2 pt each – 8 points total]

- A. 99
- B. 99
- C. 98
- D. 64
- E. 82
- F. 116
- G. 64
- H. 90
- I. 116
- J. 64
- K. 82
- L. 116
- M. 90
- N. 88
- O. 150
- P. 56

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22. Given:

$$\overline{DE} \parallel \overline{AB}$$

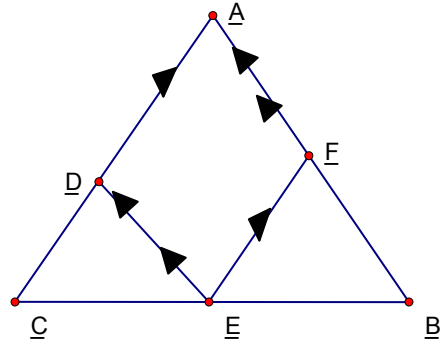
$$\overline{EF} \parallel \overline{AD}$$

ACB is an isosceles triangle

Prove:

$$\triangle CDE \sim \triangle EFB$$

Triangle CDE is similar to Triangle EFB



**[5 pts]**

Statement	Reason
1. DE is parallel to AB and EF is parallel to AD	Given
2. $\angle 2 = \angle 4$ and $\angle 4 = \angle 9$	F Thm (corresponding $\angle$ 's)
3. $\angle 2 = \angle 9$	Transitive
4. ADEF is a parallelogram	Dfn of a parallelogram, opp sides are parallel
5. $\angle 3 = \angle 5$	Opp $\angle$ 's are congruent
6. $\angle 3 = \angle 7$ and $\angle 5 = \angle 8$	Z Thm (alternate interior $\angle$ 's)
7. $\angle 7 = \angle 8$	Transitive
8. Triangle CDE is similar to Triangle EFB	AA

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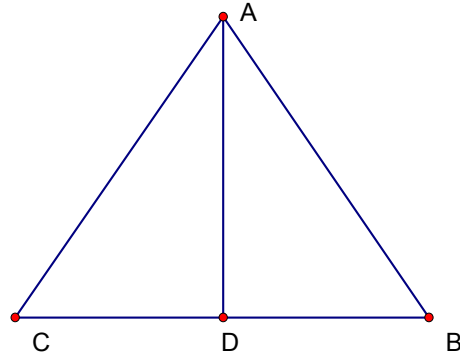
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23. Given:

AD is the altitude to base BC  
AD bisects  $\angle BAC$

Prove:

AD is the median to BC



**[5 pts]**

Statement	Reason
1. AD is altitude to BC AD bisects $\angle BAC$	Given
2. $\angle 1 = \angle 2$	Dfn of Bisector
3. AD perpendicular to BC	Dfn of Alt.
4. $\angle ACD$ and $\angle ADB$ are right angles and $90^\circ$	Dfn of Rt $\angle$ s and rt $\angle$ s = $90^\circ$
5. AD = AD	Reflexive
6. Triangle ACD = Triangle ABD	ASA
7. CD = BD	CPCTC
8. AD is median to BC	Dfn of medians

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24. Given

ABCD is a parallelogram

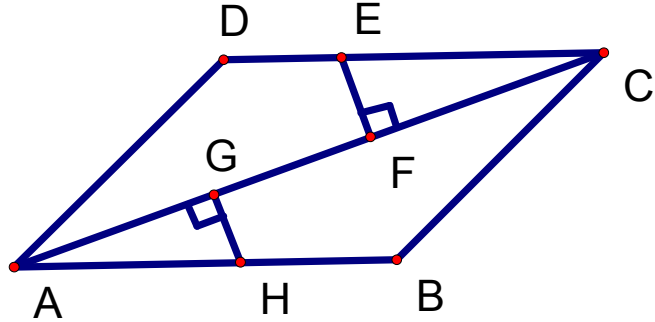
$$\square ABCD$$

$$\overline{AF} \cong \overline{GC}$$

$$\overline{GH} \perp \overline{AC}$$

$$\overline{EF} \perp \overline{AC}$$

Prove:  $EC = AH$



[5 pts]

Statement	Reason
$\square ABCD$ $\overline{AF} \cong \overline{GC}$ 1. $\overline{GH} \perp \overline{AC}$ $\overline{EF} \perp \overline{AC}$	Given
2. AB parallel to CD and AD parallel to BC	Opp sides of parallelogram are parallel
3. $\angle HAG = \angle ECF$	Z Thm (Alt Int angles)
4. $\angle HGA$ and $\angle EFC$ are right $\angle$ s $\angle HGA = \angle EFC$	Perpendicular lines Rt $\angle$ 's are congruent
5. $GF = GF$	Reflexive
6. $AG = CF$	Subtraction
7. Triangle HAG = Triangle FCE	ASA
8. $EC = AH$	CPCTC