## Geometry Final Review – Fall Semester

Chapter 1: Discovering Points, Lines, Planes and Angles

Important Vocabulary and Concepts:
- Undefined Terms
- Segment Addition Postulate
- Definition of a Midpoint
- Distance Formula
- Midpoint Formula
- Angle Bisector

- Adjacent Angles
- Linear Pair
- Vertical Angles
- Complementary Angles
- Supplementary Angles

1. If C is the **midpoint** of $\overline{AB}$, $AC = x^2 + 5x$, $CB = 8x + 28$, solve for x and $\overline{AB}$.

$$x^2 + 5x \qquad 8x+28$$

$$A \qquad C \qquad B$$
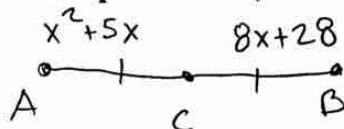
No Factoring on Final

$$x^2 + 5x = 8x + 28$$

$x =$ _____

$\overline{AB} =$ _____

2. Find the coordinate of the **midpoint** of $\overline{ST}$, if the endpoints are $S(-1, 2)$ and $T(3, -5)$.

$$\frac{x_1 + x_2}{2}, \quad \frac{y_1 + y_2}{2} \quad = \quad \frac{-1+3}{2}, \frac{2+-5}{2}$$
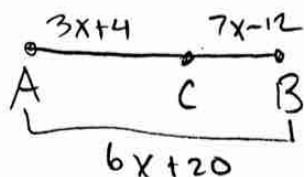
$$-1, -\frac{3}{2}$$

3. Find the **distance** between $S(-4, -6)$ and $T(3, -1)$.

$$\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} = \sqrt{(3+4)^2 + (-1+6)^2}$$

$$\sqrt{49 + 25}$$

$$\sqrt{74}$$

$\sqrt{74}$ or 8.6

4. If C is **between** A and B, $AC = 3x + 4$, $CB = 7x - 12$, and $AB = 6x + 20$ solve for x and $\overline{AB}$. Describe which property was used to solve the problem.

$$3x+4 \qquad 7x-12$$

$$A \qquad C \qquad B$$

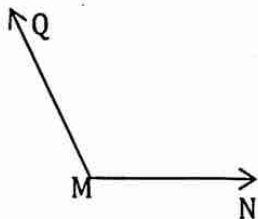$$6x+20$$

$$3x+4 + 7x-12 = 6x + 20$$

$$10x - 8 = 6x + 20$$

$$4x = 28$$

$$x = 7$$

$x =$ __7__

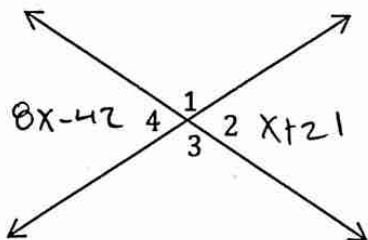Property: Segment Addition Postulate

5. Name the angle shown below.

$\angle M$
$\angle NMQ$
$\angle QMN$

6. Use the figure below to answer the question.
   If $m\angle 2 = x + 21$ and $m\angle 4 = 8x - 42$. Find $m\angle 4$ and $m\angle 1$.
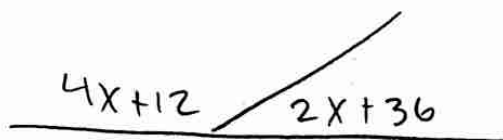

$X + 21 = 8X - 42$

$63 = 7X$

$X = 9$

$8(9) - 42$

$m\angle 4 = \underline{30}$

$m\angle 1 = \underline{150}$

$X + 30 = 180$

7. If $\angle A$ and $\angle B$ are a **linear pair**, $m\angle A = (4x + 12)°$ and $m\angle B = (2x + 36)°$, solve for x.
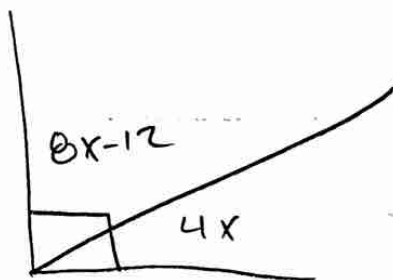

$4X + 12 + 2X + 36 = 180$

$6X + 48 = 180$

$6X = 136$

$x = \underline{22}$

8. If $\angle C$ and $\angle D$ are **complementary** angles, $m\angle C = (8x - 12)°$ and $m\angle D = (4x)°$, solve for x and $m\angle C$.

$4X + 8X - 12 = 90$

$12X = 102$

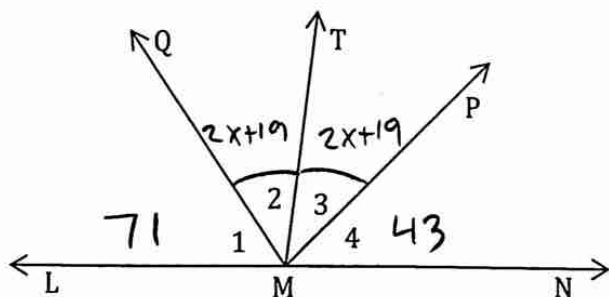$x = \underline{8.5}$

$m\angle C = \underline{56}$

$8(8.5) - 12$

9. Use the figure below to answer the following question.
   $\overrightarrow{ML}$ and $\overrightarrow{MN}$ are opposite rays. $\overrightarrow{MT}$ **bisects** $\angle QMP$. If $m\angle 4 = 43, m\angle 1 = 71$ and $m\angle 3 = 2x + 19$, solve for x and $m\angle 3$

$2(2x + 19) + 71 + 43 = 180$

$4x + 38 + 114 = 180$

$4x = 28$

$X = 7$

$x = \underline{7}$

$m\angle 3 = \underline{33}$

$2(7) + 19$

Chapter 2: Reasoning and Proof

Important Vocabulary and Concepts
- Justification List for Proofs (attached)
- Converse
- Contrapositive
- Conditional Statement
- Laws of Deduction
- Inverse
- Hypothesis
- Conclusion

#10-18: Describe the property being used.

10. If $x + 8 = 12y$, then $12y = x + 8$

Symmetric

11. If $A + C = 20$, and $C = 30$, then $A + 30 = 20$

Substitution

12. $AB = AB$

Reflexive

13. If $x = y + 1$, and $y + 1 = z$, then $x = z$.

Transitive

14. If $3x + 8 = 20$, then $3x = 12$

Subtraction

15. If $PQ = 16$, then $2PQ = 32$

Multiplication

16. If R is the midpoint of $\overline{TS}$, then $\overline{TR} \cong \overline{RS}$
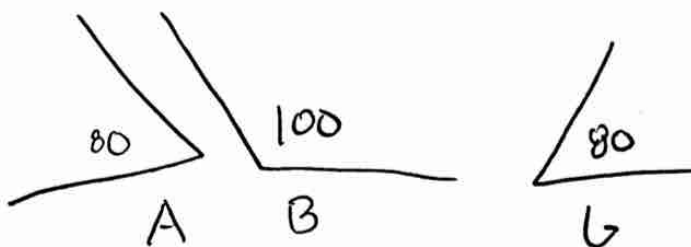
Def of Midpoint

17. If $AB = CD$, then $CD = AB$

Symmetric

18. If B is between A and C, then $AB + BC = AC$

Seg Add Post

19. If $\angle A$ is supplementary to $\angle B$ and $\angle G$ is supplementary to $\angle B$, then what must be true?

80 100   80
A   B   G

$\angle A \cong \angle G$

20. Given the statement: All drivers are 16 yrs old or over.

    a) Write in Conditional form _If a driver, then 16 yrs +_

    b) Identify the hypothesis _If a driver_

    c) Identify the conclusion _Then 16 yrs +_

    d) Write the converse _If 16 yrs +, then a driver_   T or (F)

    e) Write the inverse _If not a driver, Then not 16 yrs +_   T or (F)

    f) Write the Contrapositive _If not 16 yrs +, then not a driver_ T or F

    g) Give a counterexample to the Converse of the statement:

        Jack is 17 and does not have a license

21. If I go to the movie, then I'll eat popcorn. (P) (q)
    If I eat popcorn, then I'll enjoy the movie. (r)

Conclusion? (Q) _If I go to the movie, then I'll enjoy the movie_

Law of Logic? _Law of syllogism_

22. If I miss my bus, then I'll be late for school. (P)   (Q)
    I miss my bus. (P)

Conclusion? _Then I'll be late for school_

Law of Logic? _Law of Detachment_

23. If this wind keeps up, then we will lose some trees.
    We lose some trees.

Conclusion? _None_

Law of Logic? _____

Chapter 3: Parallel and Perpendicular Lines

Important Vocabulary and Concepts:
- Slope
- Parallel Lines (Slopes)
- Perpendicular Lines (Slopes)
- Parallel Lines
- Alternate Interior Angles
- Alternate Exterior Angles
- Vertical Lines
- Horizontal Lines
- Transversal
- Consecutive Interior Angles
- Corresponding Angles
- Proving Lines are Parallel with the Converse

24. Write an equation of a line that passes through $(-8, 5)$ and $(-10, 13)$.

$$\frac{y_2 - y_1}{x_2 - x_1} = \frac{13 - 5}{-10 + 8} = \frac{8}{-2} = -4$$

$$y - y_1 = m(x - x_1)$$
$$y - 5 = -4(x + 8)$$
$$y - 5 = -4x - 32 \qquad y = \underline{-4x - 27}$$

25. Find the slope of the line **perpendicular** to the line passing through $(12, -5)$ and $(8, -3)$.

$$\frac{y_2 - y_1}{x_2 - x_1} = \frac{-3 + 5}{8 - 12} = \frac{3}{-4}$$

$$m = \underline{\frac{4}{3}}$$

26. Find the slope of the line **parallel** to the line passing through $(-2, 5)$ and $(-7, -5)$.

$$\frac{y_2 - y_1}{x_2 - x_1} = \frac{-5 - 5}{-7 + 2} = \frac{-10}{-5} = 2$$

$$m = \underline{2}$$

27. Write an equation for a line that is **parallel** to $2x + 3y = 9$, and passes through $(3, 1)$.

$$\frac{3y}{3} = \frac{-2x}{3} + \frac{9}{3}$$

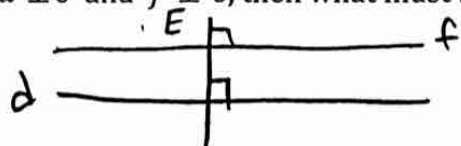$$y = \frac{-2}{3}x + 3$$

$$m = -\frac{2}{3}$$
$$y - y_1 = m(x - x_1)$$
$$y - 1 = -\frac{2}{3}(x - 3)$$
$$y = \underline{\qquad}$$
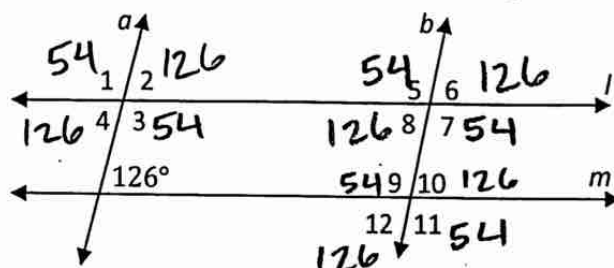$$y - 1 = -\frac{2}{3}x + 2$$

$$\boxed{y = -\frac{2}{3}x + 3}$$

28. If $d \perp e$ and $f \perp e$, then what must be true of lines d and f? (Draw a diagram)

$f \parallel d$

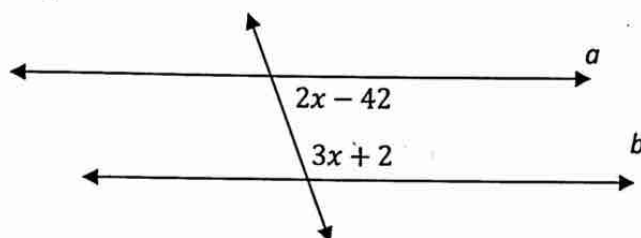29. Use the figure below to final all missing angle measures, given $l \parallel m$ and $a \parallel b$

$54_1 / _2 126$ $54_5 / _6 126$ l
$126 _4 / _3 54$ $126_8 / _7 54$
$126°$ $54_9 / _{10} 126$ m
$12 / _{11} 54$
126

∠1 = _____ ∠2 = _____ ∠3 = _____ ∠4 = _____ ∠5 = _____ ∠6 = _____

∠7 = _____ ∠8 = _____ ∠9 = _____ ∠10 = _____ ∠11 = _____ ∠12 = _____

30. Use the figure below to solve for x, given $a \parallel b$. Name the special relationship, if one exists, between the shown angles.

$2x - 42$
$3x + 2$

$2x - 42 + 3x + 2 = 180$
$5x - 40 = 180$
$5x = 220$

$x =$ ___44___

Relationship: ___SSI___

31. Use the figure below to solve for x, given $a \parallel b$. Name the special relationship, if one exists, between the shown angles.

$8x + 2$
$10x - 34$
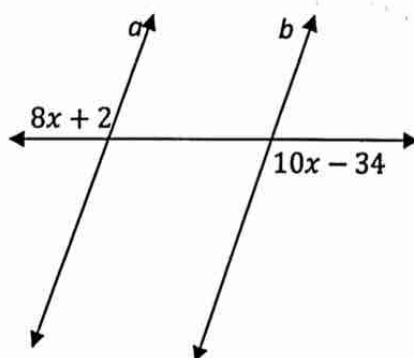
$8x + 2 = 10x - 34$

$36 = 2x$

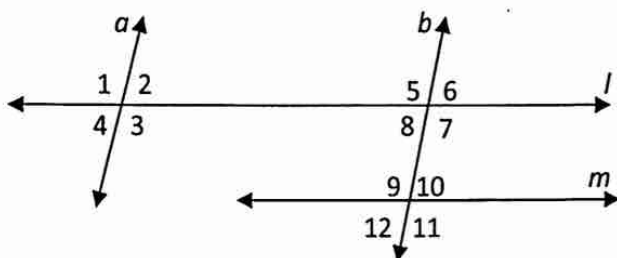$x =$ ___18___

Relationship: ___AEA___

32. Use the figure below to solve for x, given $a \parallel b$.
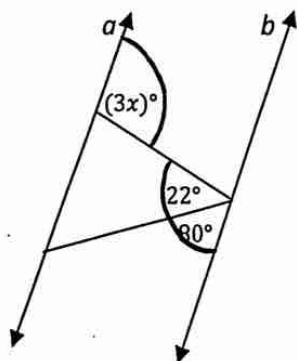
$$3x = 102$$

$$x = \underline{34}$$

#33-35: Use the figure below and the given information to determine which lines, if any, are parallel. State the theorem or postulate that justifies your answer. If you cannot prove any lines are parallel, write "cannot prove".

33. $\angle 1 \cong \angle 7$

Parallel Lines: __a $\parallel$ b__ Justification: __Converse AEA__

34. $\angle 9 \cong \angle 11$

Parallel Lines: __None__ Justification: _____

35. $m\angle 8 + m\angle 9 = 180°$

Parallel Lines: __$\ell \parallel m$__ Justification: __Converse SSI__

Chapter 4: Congruent Triangles

Important Vocabulary and Concepts
- Scalene
- Isosceles
- Equilateral
- Exterior Angle Theorem
- SSS, SAS, ASA, AAS, HL

- Acute
- Right
- Obtuse
- Triangle Sum Theorem
- CPCTC

36. Explain the difference between each type of triangle and draw a picture of each.

   a. Isosceles:

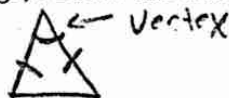   b. Equilateral:

   c. Scalene:

37. What type of triangle has a hypotenuse. Draw the triangle and identify the hypotenuse.

   Right   hypotenuse
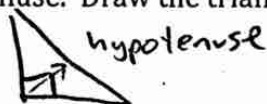
38. What type of triangle has a vertex angle? Draw the triangle and identify the vertex angle.

   Isosceles   ← vertex

39. What does CPCTC stand for? When would it be used in a proof?

   Corresponding Parts of Congruent Triangles are Congruent

40. Use the figure below to solve for x and y.
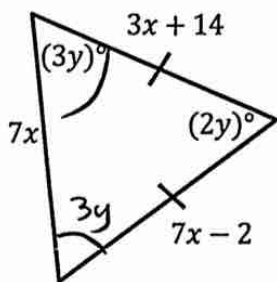
   $3x + 14$
   $(3y)°$
   $7x$
   $(2y)°$
   $3y$
   $7x - 2$

   $3x + 14 = 7x - 2$

   $16 = 4x$

   $x = 4$

   $3y + 3y + 2y = 180$

   $8y = 180$

   $x = \underline{\quad 4 \quad}$

   $y = \underline{\quad 22.5 \quad}$

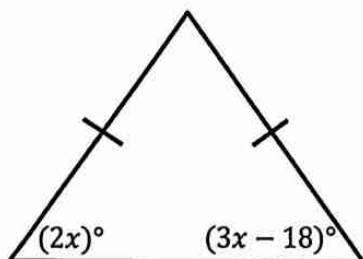41. Solve for x, if $m\angle AED = 2x$ and $m\angle AEG = 5x - 2$
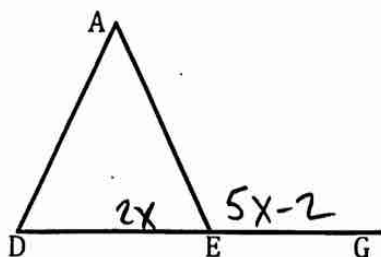
$2x + 5x - 2 = 180$

$7x = 182$

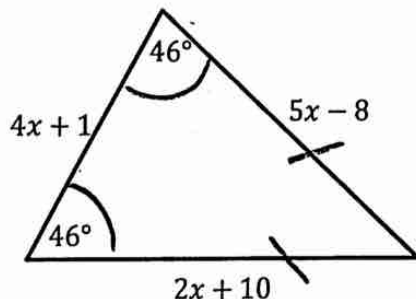$x = \underline{26}$

42. Use the figure below to solve for x.

$(2x)° \quad (3x - 18)°$

$2x = 3x - 18$

$x = 18$

$x = \underline{18}$

43. Use the figure below to solve for x.

$46°$

$4x + 1$

$5x - 8$

$46°$

$2x + 10$

$5x - 8 = 2x + 10$

$3x = 18$

$x = \underline{6}$

44. Use the figure below to solve for x.

$(x + 19)°$
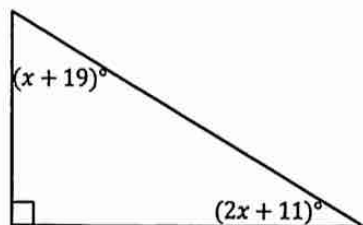
$(2x + 11)°$

$x + 19 + 2x + 11 + 90 = 180$

$3x + 120 = 180$

$3x = 60$

$x = \underline{20}$

45. If $\triangle ABC \cong \triangle FGH$, then $\triangle GHF \cong \underline{BC\ A}$

<u>#46-47: If the triangles are congruent, name the congruent triangles and the postulate that proves they are congruent (if not congruent, write "not congruent").</u>
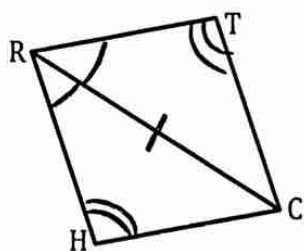
46. Given: $AB = CD$, and $AB \parallel CD$.
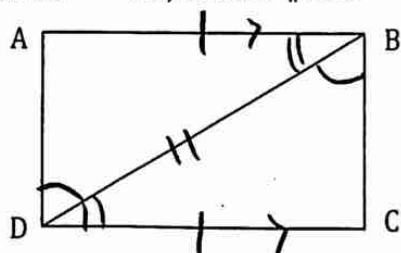
$\triangle ABD \cong \triangle CDB$

Why? __SAS__

47. $\overline{RC}$ bisects $\angle HRT$ and $\angle H \cong \angle T$.

$\triangle RTC \cong \triangle RHC$

Why? __AAS__

Chapter 5: Relationships within Triangles

Important Vocabulary and Concepts
- Perpendicular Bisector
- Medium
- Ordering Angle Measurements based on Side Lengths
- Ordering Side Lengths base on Angles

- Angle Bisector
- Altitude
- Triangle Inequality Theorem
- Determining if it is a triangle

48. Describe the four segments in a triangle. Draw a picture for each segment.

a. Median:

b. Altitude:

c. Angle Bisector:

d. Perpendicular Bisector:

e. Circumcenter   Perp   bisector

f. Incenter   Angle   Bisector

g. Centroid   Medians

h. Orthocenter   Altitudes

49. If $\triangle XYZ$ has vertices $X\ (-2, 8),\ Y\ (6, -2),\ Z\ (4, -10)$, find the slope of the perpendicular bisector of $\overline{XZ}$. Graph the triangle!
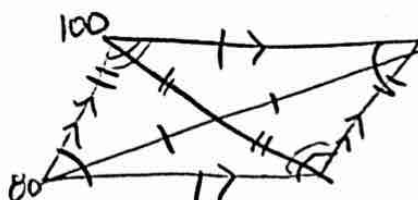
_____

50. If $\triangle XYZ$ has vertices $X\ (-2, 8),\ Y\ (6, -2),\ Z\ (4, -10)$, find coordinates of A if $\overline{ZA}$ is a median of $\triangle XYZ$. Graph the triangle!

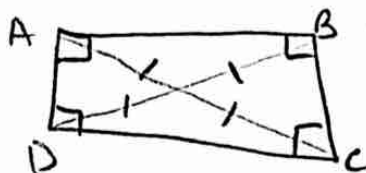_____

Chapter 6: Polygons and Quadrilaterals

Important Vocabulary and Concepts
- Parallelogram
- Rectangle
- Isosceles Trapezoid
- Rhombus
- Square
- Median

51. Describe the properties of a parallelogram.

52. Describe the properties of a rectangle.

$AC = BD$

53. Describe the properties of a rhombus.

$1 \cong 2$
$3 \cong 4$
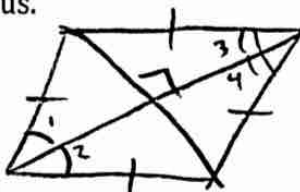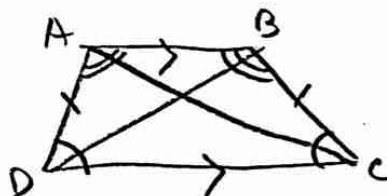
54. Describe the properties of a square.
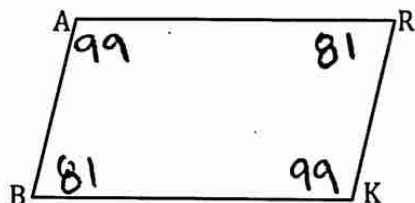
$\angle 1 = 45$
$\angle 2 = 45$
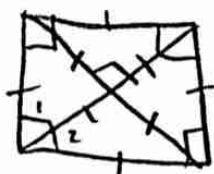
55. Describe the properties of an isosceles trapezoid.

$$\overline{AC} \cong \overline{BD}$$

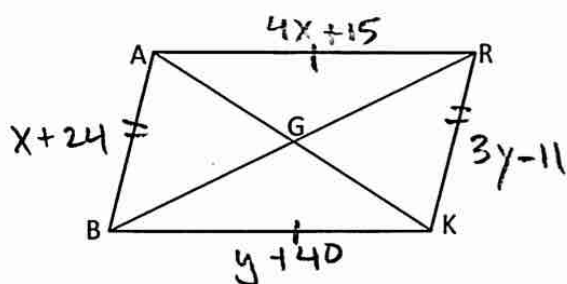56. *BARK* is a parallelogram. If $m\angle A = 99°$, solve for $m\angle R$, $m\angle K$ and $m\angle B$.

$m\angle R = $ _____

$m\angle K = $ _____

$m\angle B = $ _____

57. *BARK* is a parallelogram. If $\overline{AB} = x + 24, \overline{AR} = 4x + 15, \overline{RK} = 3y - 11$ and $\overline{KB} = y + 40$, solve for x and y

$$4y + 15 = y + 40 \qquad x + 24 = 3y - 11$$
$$\underline{\quad -40 \qquad -40}$$
$$y = \boxed{4x - 25}$$

$$x + 24 = 3(4x - 25) - 11$$
$$x + 24 = 12x - 75 - 11 \qquad x = \underline{\quad 10 \quad}$$
$$x + 24 = 12x - 86$$
$$11x = 110 \qquad\qquad y = \underline{\quad 15 \quad}$$
$$y = 4(10) - 25$$

58. *BARK* is a parallelogram. If $m\angle RKG = 49°$ and $m\angle AGR = 82°$, solve for $m\angle RGK$ and $m\angle ABG$.
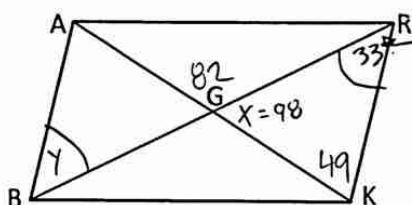
$$x + 82 = 180$$
$$x = 98$$

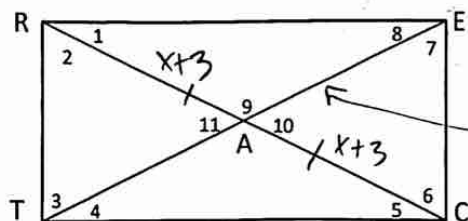$$49 + 98 + x = 180$$
$$x = 33$$

$m\angle RGK = \underline{\quad 98 \quad}$

$m\angle ABG = \underline{\quad 33 \quad}$

- 59. $RECT$ is a rectangle. If $\overline{RA} = x + 3$ and $\overline{ET} = 4x - 44$, solve for x and $\overline{RC}$.
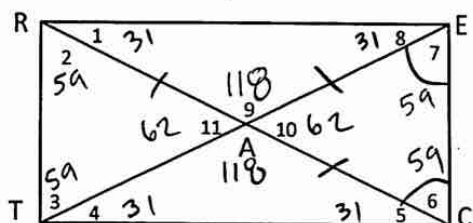

$$2(x+3) = 4x-44$$
$$2x+6 = 4x-44$$
$$2x = 50$$

$x = $ __25__

$2(25+3)$ $\overline{RC} = $ __56__

60. $RECT$ is a rectangle. If $m\angle 9 = 118°$, solve for all the missing angles.

$m\angle 1 = $ _____ $m\angle 6 = $ _____

$m\angle 2 = $ _____ $m\angle 7 = $ _____

$m\angle 3 = $ _____ $m\angle 8 = $ _____

$m\angle 4 = $ _____ $m\angle 10 = $ _____

$m\angle 5 = $ _____ $m\angle 11 = $ _____

61. $RHOM$ is a rhombus. $m\angle 4 = 56°$, solve for all the missing angles.

$m\angle 1 = $ _____ $m\angle 7 = $ _____

$m\angle 2 = $ _____ $m\angle 8 = $ _____

$m\angle 3 = $ _____ $m\angle 9 = $ _____

$m\angle 5 = $ _____ $m\angle 10 = $ _____

$m\angle 6 = $ _____
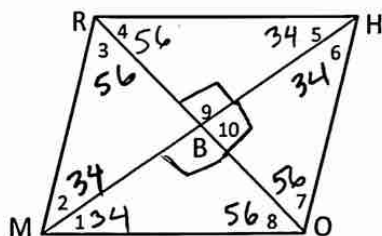
62. $RHOM$ is a rhombus. If $\overline{RM} = x^2 - 2x$ and $\overline{OH} = 5x - 12$, solve for x and find the perimeter of the rhombus. (There will be more than one answer for both parts!!)

No Factoring on Final
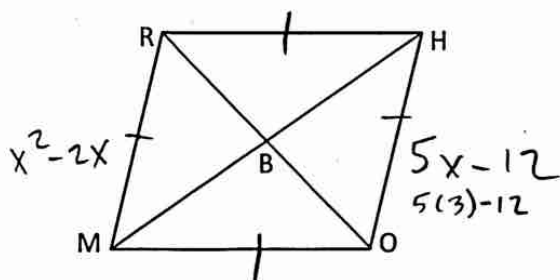
$$x^2 - 2x = 5x - 12$$
$$x^2 - 7x + 12$$
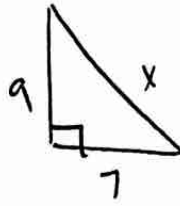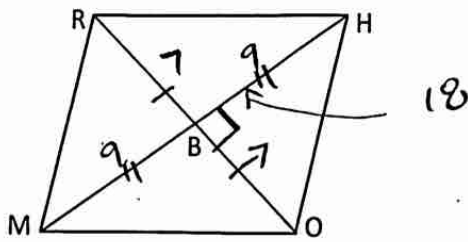$$(x-4)(x-3) = 0$$

$x - 4 = 0$
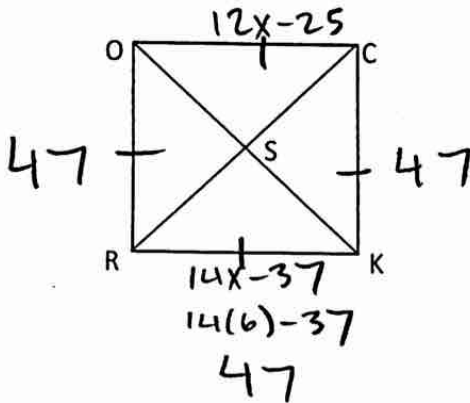$x = 4$

$x - 3 = 0$
$x = 3$

$x = $ __3 or 4__

Perimeter: __12 or 32__

63. $RHOM$ is a rhombus. If $\overline{RB} = 7$ and $\overline{MH} = 18$, solve for $\overline{OH}$. Round answer to two decimals.

R 7 9 H
18
M B O

9

x
9
7

$a^2 + b^2 = c^2$
$7^2 + 9^2 = c^2$
$49 + 81 = c^2$
$\sqrt{c^2} = \sqrt{130}$

$\overline{OH} = \underline{11.40}$

47

64. $ROCK$ is a square. If $\overline{RK} = 14x - 37$ and $\overline{OC} = 12x - 25$ solve for x and find the area of the square.

12x-25
O C
47 S 47
R 14x-37 K
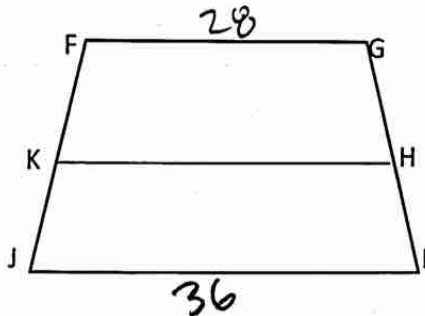14(6)-37
47

$12x - 25 = 14x - 37$
$12 = 2x$
$x = 6$

$x = \underline{6}$

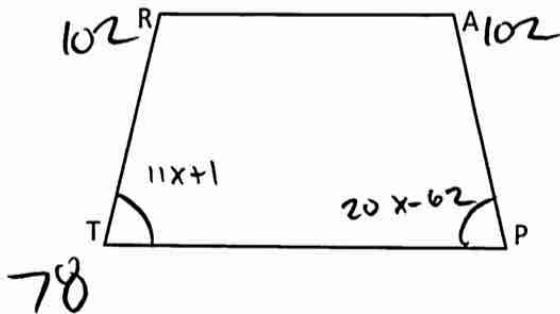Area $= \underline{2,209 \text{ units}^2}$

$A = e \cdot w$
$A = 47 \cdot 47$

65. $FGIJ$ is a trapezoid and $\overline{KH}$ is the median. If $\overline{FG} = 28$ and $\overline{JI} = 36$, solve for $\overline{KH}$.

28
F G
K H
J I
36

$\dfrac{28 + 36}{2}$

$\overline{KH} = \underline{32}$

66. $FGIJ$ is an isosceles trapezoid. If $m\angle T = 11x + 1$ and $m\angle P = 20x - 62$, solve for x, $m\angle R$ and $m\angle A$.

102 R A 102
11x+1 20 x-62
T P
78

$11x + 1 = 20x - 62$
$63 = 9x$
$x = 7$

$11(7) + 1$
$77 + 1$
78

$x = \underline{7}$

$m\angle R = \underline{102}$
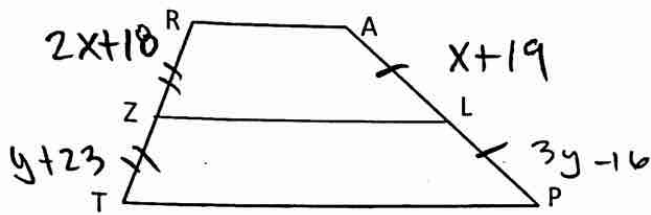
$m\angle A = \underline{102}$

67. $TRAP$ is a trapezoid and $\overline{ZL}$ is the median. If $\overline{RZ} = 2x + 18, \overline{ZT} = y + 23, \overline{AL} = x + 19, \overline{LP} = 3y - 16$ solve for x and y.

$2x+18$ R ⟍⟍⟍⟍ A
$y+23$ Z ⟋ L $x+19$
T ⟍ P $3y-16$

$x = \underline{ 10 }$

$y = \underline{ 15 }$

$x + 19 = 3y - 16$

$2x + 18 = y + 23$ $x = \boxed{3y - 35}$

$2(3y - 35) + 18 = y + 23$

$6y - 70 + 18 = y + 23$

$6y - 52 = y + 23$

$5y = 75$

$y = 15$

$x = 3(15) - 35$

$x = 45 - 35$

$x = 10$