GEOMETRY SEMESTER 1
FINAL EXAM REVIEW 2015

Name: _____

A few things …
1. Refer to your packets to help you study and complete this review.
2. You may write whatever you want on the cheat sheet.
3. Have your cheat sheet out on your desk while you're working and write things down as you complete the review.
4. Know the vocabulary!
5. Know the postulates and theorems!
6. DO NOT forget your cheat sheet the day of the final exam.
7. Don't wait until the night before this final to start studying! Start today and work on it **every day**!
8. Get a good night's sleep the night before your final.
9. Eat a nutritious breakfast on the morning of your final.

Good Luck!

1. Find the next two numbers in the sequence

   3, -9, 27, -81 … 243, -729

2. 

   Name the ray in two different ways. $\overrightarrow{AB}$, $\overrightarrow{AC}$

3. ∠A supp ∠B Conclusion: $\angle A \cong \angle C$

   ∠C supp ∠B Reason: If supp to same angle, then ≅.

4. What is the only thing you may assume from any diagram? Straight angles

5. The measure of an angle is ten less that tree times the measure of its compliment. What is the measure of both angles?

   $x = 3(90-x) - 10$
   $x = 270 - 3x - 10$
   $x = 260 - 3x$
   $4x = 260$
   $x = 65$

   65°, 25°

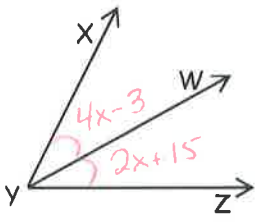
6. What is the compliment of 75°?

   15°

7. What is the supplement of 112°?

68°

8. $\overline{YW}$ is an angle bisector of $\angle XYZ$
$m\angle XYW = 4x - 3$
$m\angle WYZ = 2x + 15$
Find: $m\angle XYZ$

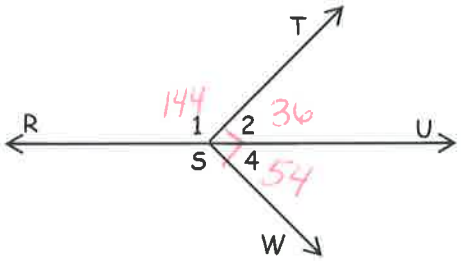


$4x - 3 = 2x + 15$
$2x - 3 = 15$
$2x = 18$
$x = 9$

$m\angle XYZ = 66°$

Use the diagram to answer question 9 & 10.

9. Given: $\overline{TS} \perp \overline{SW}$
$m\angle 4 = 54$
Find: $m\angle 1$



$m\angle 1 =$ 144°

10. Given: $\overline{TS} \perp \overline{SW}$
$m\angle 2 = 2x - 3$
$m\angle 4 = 3x + 8$
Then $x =$ 17

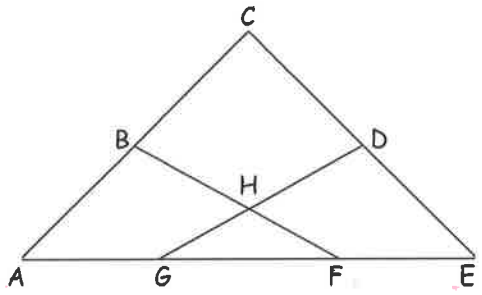
$2x - 3 + 3x + 8 = 90$
$5x + 5 = 90$
$5x = 85$
$x = 17$

11. Write the converse to the statement:

"If a point is a midpoint, then the point divides a segment into two congruent parts."

If a point divides a segment into 2 ≅ parts, then it is a midpoint.

Directions: Use the diagram for problems 12 - 15.



12. Given: B is midpoint of $\overline{AC}$
Conclusion: $\overline{CB} \cong \overline{BA}$
Reason: If midpoint, then 2 ≅ segments.

13. Given: $\overline{AF} \cong \overline{GE}$
Conclusion: $\overline{AG} \cong \overline{FE}$
Reason: Subtraction

14. Given: $\overline{AB} \cong \overline{ED}$
$\overline{BF} \cong \overline{DG}$

15. Given: $\angle A \cong \angle E$
Conclusion: $\overline{AC} \cong \overline{EC}$
Reason: If Δs, then ☆

What info is needed to prove $\Delta ABF \cong \Delta EDG$ by:

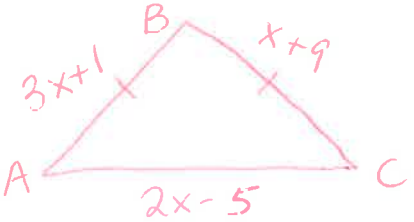
a) SAS? $\angle ABF \cong \angle EDG$

b) SSS? $\overline{AF} \cong \overline{GE}$

16. If $\Delta TIM \cong \Delta ROB$, then: a) $\overline{BR} \cong$ $\overline{MT}$ b) $\angle I \cong$ $\angle O$

17. ΔABC is isosceles with vertex angle B. Find the perimeter of the triangle if:

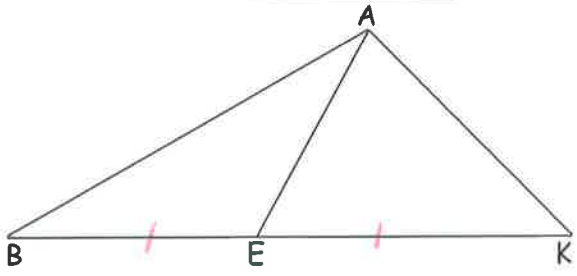
$\overline{AB} = 3x + 1$
$\overline{BC} = x + 9$
$\overline{AC} = 2x - 5$



$3x+1 = x+9$
$2x+1 = 9$
$2x = 8$
$x = 4$

$P = 13+13+3$
$= 29$

Perimeter: 29

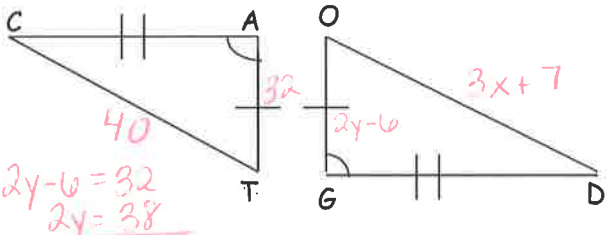


18. If $\overline{AE}$ is a median, then you may conclude $\overline{BE} \cong \overline{EK}$.

19. What does "CPCTC" stand for and why do we use it? Corresponding Parts of Congruent Triangles are Congruent. We use CPCTC after we have congruent Δs in order to prove something beyond $\cong$ Δs.

20. a. $\Delta CAT \cong \Delta$ DGO (make sure letters are in correct order!)

b. $\overline{CT} = 40$ Find x
$\overline{AT} = 32$ Find y
$\overline{OD} = 3x + 7$
$\overline{OG} = 2y - 6$



$3x+7=40$
$3x=33$
$x=11$

$2y-6=32$
$2y=38$
$y=19$

21. a) Draw a picture of an obtuse triangle that is isosceles (use markings to indicate congruencies).



b) Draw a picture of an acute triangle that is isosceles (use markings to indicate congruencies).



22. Find the slope & distance between (3, 1) & (-2, -5)

$m = \frac{y_2-y_1}{x_2-x_1} = \frac{-5-1}{-2-3} = \frac{-6}{-5} = \boxed{\frac{6}{5}}$

$d = \sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$
$d = \sqrt{(-2-3)^2+(-5-1)^2}$
$= \sqrt{(-5)^2+(-6)^2}$
$= \sqrt{25+36}$
$= \sqrt{61} = \boxed{7.81}$

23. What is the perpendicular slope to question #22.

$\perp m = \boxed{\frac{-5}{6}}$

24. Find the midpoint between (6, -1) & (2, 5).

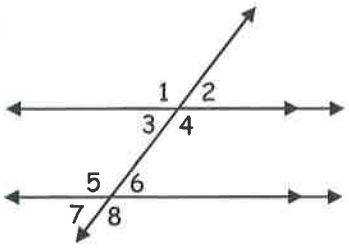
$m\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$ $m\left(\frac{6+2}{2}, \frac{-1+5}{2}\right)$ $m\left(\frac{8}{2}, \frac{4}{2}\right)$ $\boxed{m(4,2)}$

25. Two angles both supplementary and congruent must be 90°.



$2x = 180$
$x = 90$

26. Name the angle pair relationship between the following angles:



a. ∠4 and ∠8 Corresponding

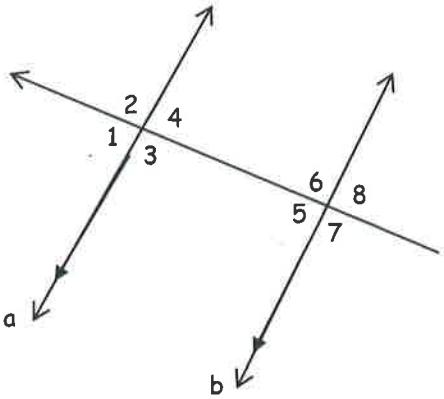
b. ∠2 and ∠7 Alt. Ext.

c. ∠1 and ∠5 Corresponding

d. ∠3 and ∠6 Alt. Int.

e. ∠4 and ∠6 Same Side Interior

27. Given: a ∥ b



a. If m∠4 = 102°, find m∠7. 78°

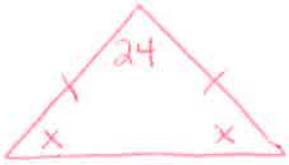
b. If m∠2 = 85° find m∠6. 85°

c. If m∠1 = 2x + 4 and m∠5 = 12, find x. 4

d. If m∠6 = 97°, find m∠3. 97°

$2x+4=12$
$2x=8$
$x=4$

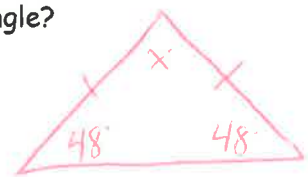
28. The measure of the vertex angle of an isosceles triangle is 24°. What is the measure of a base angle?



$x+x+24=180$
$2x=156$
$x=78$

78°

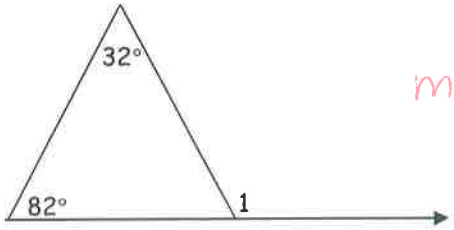
29. The measure of a base angle of an isosceles triangle is 48°. What is the measure of the vertex angle?



$x+48+48=180$
$x+96=180$
$x=84$

84°

30. Find m∠1.



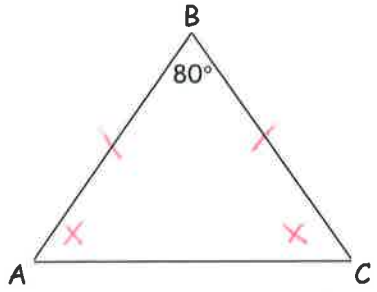
$m\angle 1 = 32+82$

m∠1 = 114°

31. Find m∠A and m∠C if ΔABC is isosceles with base $\overline{AC}$.

$2x + 80 = 180$
$2x = 100$
$x = 50$

50°



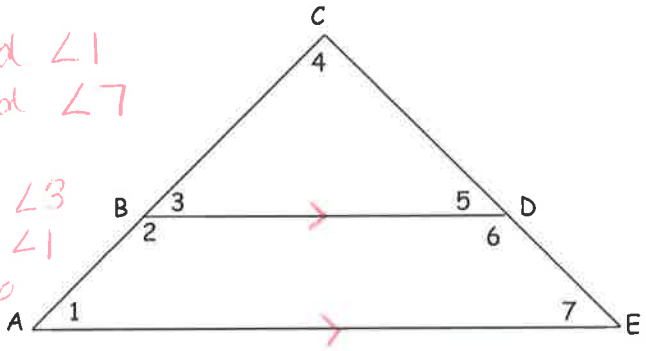
32. What is the converse of the statement "If you live in Orland, then you go to Sandburg H.S."

If you go to Sandburg H.S., then you live in Orland.

33. If $\overline{BD} \parallel \overline{AE}$, name pairs of corresponding and supplementary angles.

Corresponding: ∠3 and ∠1
∠5 and ∠7

Supplementary: ∠2 and ∠3
∠2 and ∠1
∠5 and ∠6
∠6 and ∠7



34. What does equilateral and equiangular mean?

Equilateral: all sides of a polygon are ≅.

Equiangular: all angles of a polygon are ≅.

35. Definitions for these types of triangles:

- Acute: all ∠s are less than 90°
- Obtuse: one angle is obtuse
- Right: one angle is right
- Scalene: no sides are ≅.

36. m∠3 = 105°
m∠4 = 30°
Find m∠1

m∠1 = 135°



m∠1 = 105 + 30

37. Conditional statement: If p then q

Converse: If q, then p

Inverse: If not p, then not q

38. M is the midpoint of $\overline{XY}$. If X is (4, -7) and M is (1, -5), find the coordinate of **endpoint** Y.

X: $M+3 < 4$, $1 < -2$

Y: $-7 > -5+2$, $-5 > -3+2$

Y(-2, -3)

39. A triangle has two sides of lengths 12 cm and 20 cm. Give the range of the third side.

$12 + 20 > x$, $32 > x$

$x + 12 > 20$, $x > 8$

8 cm < x < 32 cm

40. A triangle has two sides of lengths 5m and 9m. Give the range of the third side.

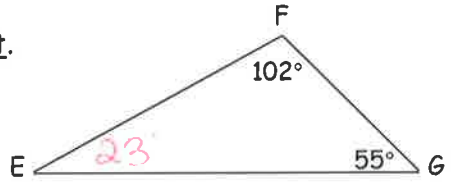
$5 + 9 > x$, $14 > x$

$x + 5 > 9$, $x > 4$

4m < x < 14m

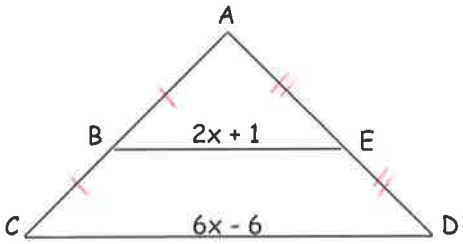
41. Rank the sides from longest to shortest.

$\overline{EG}$, $\overline{FE}$, $\overline{FG}$



42. B is midpoint of $\overline{AC}$
E is midpoint of $\overline{AD}$

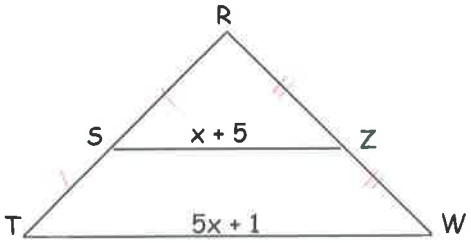
$\overline{CD}$ = 18



$2(2x+1) = 6x-6$
$4x+2 = 6x-6$
$2 = 2x-6$
$8 = 2x$
$x = 4$

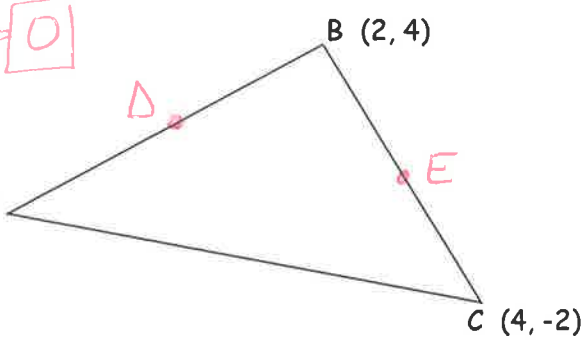
43. S is midpoint of $\overline{RT}$
Z is midpoint of $\overline{RW}$

$\overline{SZ}$ = 8



$2(x+5) = 5x+1$
$2x+10 = 5x+1$
$10 = 3x+1$
$9 = 3x$
$x = 3$

Use the following diagram to answer questions 44 - 47:



44. Find slope of $\overline{AC}$ $m = \frac{-2-(-2)}{4-(-2)} = \frac{0}{6} = 0$

45. Find slope of the altitude to $\overline{AC}$ $m =$ undefined

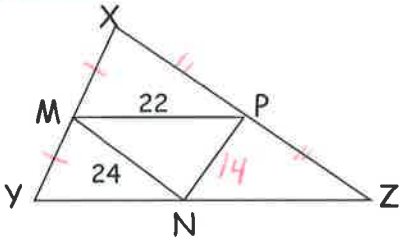
46. Find slope of a line parallel to $\overline{AC}$ $m = 0$

47. Find the endpoints of the midsegment of ΔABC and is parallel to $\overline{AC}$.

$D\left(\frac{2+(-2)}{2}, \frac{4+(-2)}{2}\right)$ $E\left(\frac{2+4}{2}, \frac{4-2}{2}\right)$

$D(0, 1)$ $E(3, 1)$

48. In ΔXYZ, M, N and P are midpoints. The perimeter Of ΔMNP is 60. Find NP, XZ, YZ, and XY.



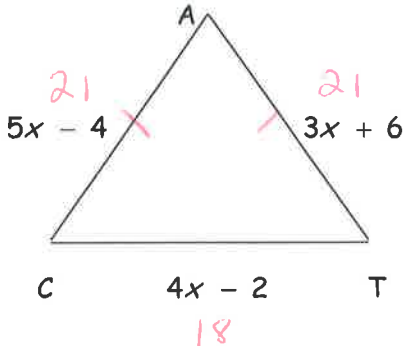
$NP = 60 - 22 - 24 = 14$

$XZ = 48$

$YZ = 44$

$XY = 28$

49. ΔCAT is isosceles with vertex angle A. Find the perimeter of ΔCAT.



Perimeter: 60

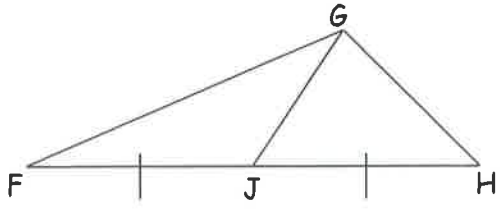
$5x - 4 = 3x + 6$

$2x - 4 = 6$

$2x = 10$

$x = 5$

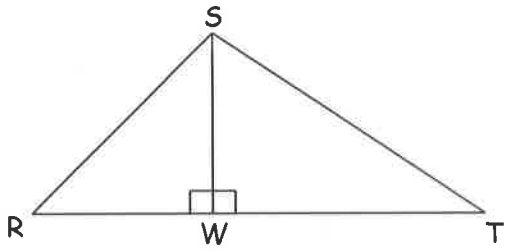
50. What is the name of $\overline{GJ}$?



Median

51. What ~~are~~ is the name of $\overline{SW}$?

Altitude



52. The intersection of two lines is a: point

53. The intersection of two planes is a: line

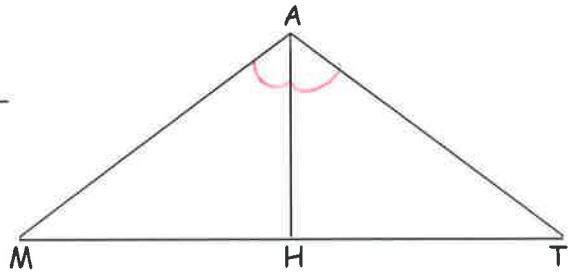
54. Define the following terms:

- Parallel: two coplanar lines that do not intersect
- Perpendicular: two lines that intersect to form a right ∠.
- Coplanar: points, lines, rays, & segments in the same plane.
- Skew: two non-coplanar lines that do not intersect.

55. Given: $\overline{AH}$ bisects ∠MAT

Conclusion: ∠MAH ≅ ∠TAH

Reason: If bisected, then 2 ≅ ∠s



56. Find the slope between the two points. A(-8, 1) B(-3, -2)

$m = \frac{-2-1}{-3+8} = \frac{-3}{5}$

57. Find the midpoint between the two points. C(-5, -2) D(7, 4)

$m\left(\frac{-5+7}{2}, \frac{-2+4}{2}\right) \rightarrow m(1, 1)$

58. Find the distance between the two points. E(4, -9) F(6, -3)

$d = \sqrt{(6-4)^2+(-3+9)^2} = \sqrt{2^2+6^2} = \sqrt{4+36} = \sqrt{40} = 6.32$

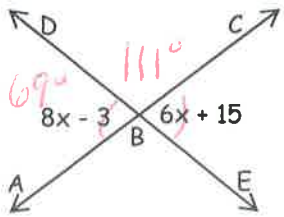
59. Find m∠DBC

$8x-3 = 6x+15$

$2x-3 = 15$

$2x = 18$

$x = 9$



m∠DBC = 111°

60. Find the sum of the interior angles of a nonagon.

Sum = $(9-2)180$

$= 1260°$

61. Find the sum of the interior angles of a 24-gon.

Sum = $(24-2)180$

$= 3960°$

62. Find the sum of the exterior angles of a heptagon.

$360°$

63. Find the sum of the exterior angles of an 18-gon.

$360°$

64. Find each exterior angle of a regular decagon.

$\frac{360}{10} = 36°$

65. Find each interior angle of a regular dodecagon.

Each Ext. Angle $= \frac{360}{12} = 30°$ Int $\angle = 180 - 30 = 150°$

66. Find each interior angle of a regular octagon.

Each Ext Angle $= \frac{360}{8} = 45$ Int $\angle = 180 - 45 = 135°$

67. Name the regular polygon if each exterior angle is 24 degrees.

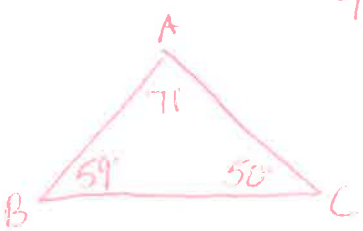
$\frac{360}{n} = 24$ $\frac{360}{24} = 15$ Pentadecagon

68. Name the regular polygon if each interior angle is 120 degrees.

Ext $\angle = 180 - 120 = 60$

$\frac{360}{n} = 60$ $\frac{360}{60} = 6$ Hexagon

69. $\triangle ABC$ has verities measures of $m\angle A = 4x - 5$, $m\angle B = 3x + 2$, and $m\angle C = 2x + 12$. Find the measure of each angle and rank the sides from smallest to largest.



$4x - 5 + 3x + 2 + 2x + 12 = 180$

$9x + 9 = 180$

$9x = 171$

$x = 19$

$m\angle A = 71°$

$m\angle B = 59°$

$m\angle C = 50°$

$\overline{AB}, \overline{AC}, \overline{BC}$

70. Find the slope of a line parallel to $5x + 3y = 9$.

$3y = -5x + 9$

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

$m = \frac{-5}{3}$

71. Write the equation of the line parallel to $2y + 10 = 2x$ that passes through the point (3, -5).

$2y = 2x - 10$

$y = x - 5$

$m = 1$

$y + 5 = 1(x - 3)$

$y + 5 = x - 3$

$y = x - 8$

72. Write the equation of the line perpendicular to $2x - y = 8$ that passes through the point (-2, 3).

$-y = -2x + 8$

$y = 2x - 8$

$m = 2$

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

$y - 3 = -\frac{1}{2}(x + 2)$

$y - 3 = -\frac{1}{2}x - 1 \rightarrow y = -\frac{1}{2}x + 2$

73. Find the slope of a line perpendicular to $x + y = 3$.

$y = -x + 3$

$m = -1$

$\perp m = 1$

74. Using the line $x + 3y = 12$, state whether the following lines are parallel, perpendicular, or neither.

$3y = -x + 12 \rightarrow y = -\frac{1}{3}x + 4$ $m = -\frac{1}{3}$

a. $3x - y = 2 \rightarrow -y = -3x + 2 \rightarrow y = 3x - 2$ $m = 3$ Perpendicular

b. $2x = 6y - 6 \rightarrow 6y - 6 = 2x \rightarrow 6y = 2x + 6 \rightarrow y = \frac{1}{3}x + 1$ Neither

c. $y = 3x$ $m = 3$ Perpendicular

d. $x + 10 = -3y \rightarrow -3y = x + 10 \rightarrow y = -\frac{1}{3}x - \frac{10}{3}$ $m = -\frac{1}{3}$ Parallel

e. $x + 3y = 3 \rightarrow 3y = -x + 3 \rightarrow y = -\frac{1}{3}x + 1$ $m = -\frac{1}{3}$ Parallel

75. Which statement is true of the given lines?

Line a: $2x + 3y = 6$ $3y = -2x + 6 \rightarrow y = \frac{-2}{3}x + 2$ $m = \frac{-2}{3}$

Line b: $y = -\frac{2}{3}x + 2$ $m = \frac{-2}{3}$

Line c: $-3x + 2y = 12$ $2y = 3x + 12$ $y = \frac{3}{2}x + 4$ $m = \frac{3}{2}$

a. Lines a and b are parallel
b. Lines a and c are parallel
c. Lines a and b are perpendicular
d. Lines a and c are perpendicular

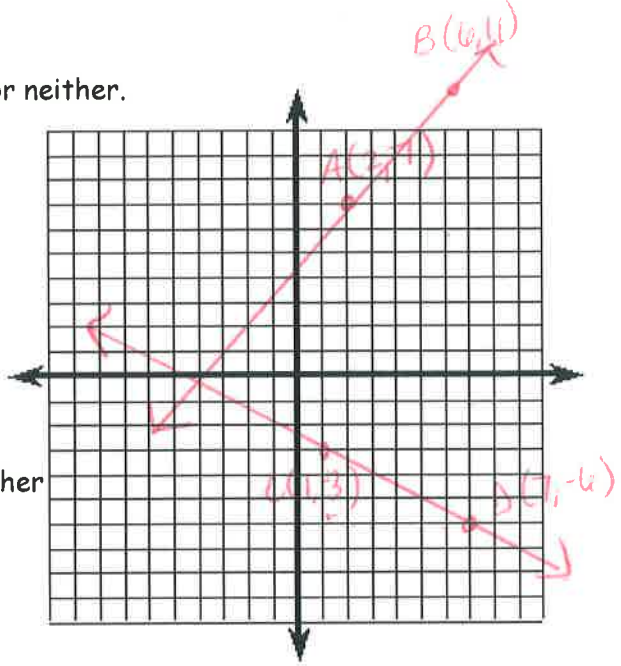
76. Find the slope of the line that passes through the points (7, -3) and (4, 1).

$m = \frac{1+3}{4-7} = \frac{4}{-3}$

77. Determine if the lines are parallel, perpendicular, or neither.

Plot the following:
Line AB : A (2, 7) B (6, 11)
Line CD : C (1, -3) D (7, -6)

a.) Slope of line AB $m = \frac{4}{4} = 1$
b.) Equation of line AB $y = x + 5$
c.) Slope of line CD $m = \frac{-3}{6} = \frac{-1}{2}$
d.) Equation of line CD $y = \frac{-1}{2}x - \frac{5}{2}$
e.) Are lines AB and CD Parallel, perpendicular, or neither Neither



b). $y - 7 = 1(x - 2)$
$y - 7 = x - 2$
$y = x + 5$

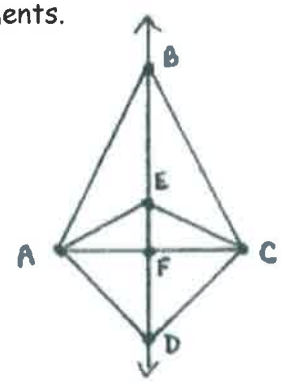
d). $y + 3 = \frac{-1}{2}(x - 1)$
$y + 3 = \frac{-1}{2}x + \frac{1}{2}$
$y = \frac{-1}{2}x - \frac{5}{2}$

78. Line CD is perpendicular to the equation of the line $2x + 3y = 8$. If C(2, 4), find the equation of line CD.

$3y = -2x + 8$
$y = \frac{-2}{3}x + \frac{8}{3}$
$m = \frac{-2}{3}$ $\perp m = \frac{3}{2}$

$y - 4 = \frac{3}{2}(x - 2)$
$y - 4 = \frac{3}{2}x - 3$
$y = \frac{3}{2}x + 1$

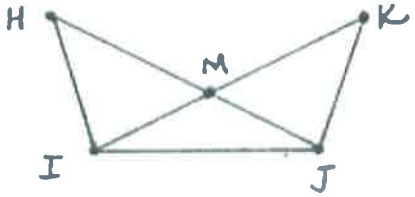
79. Given points *B, E, F, D* lie on the perpendicular bisector of $\overline{AC}$. List all sets of congruent segments.



$\overline{BA} \cong \overline{BC}$
$\overline{AE} \cong \overline{EC}$
$\overline{AF} \cong \overline{FC}$
$\overline{AD} \cong \overline{DC}$

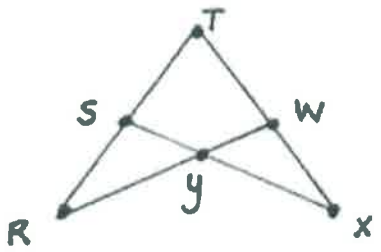
80. If $\triangle HIJ \cong \triangle KJI$, which part is reflexive?

$\overline{IJ}$



81. If $\triangle RTW \cong \triangle XTS$, which part is reflexive?

$\angle T$



82. List the properties of the following quadrilaterals: parallelogram, rhombus, rectangle, square, kite, trapezoid?

Trapezoid: one pair of opp. sides are $\parallel$

Parallelogram
1. Both pairs of opp. sides $\parallel$.
2. Both pairs of opp. sides $\cong$.
3. Both pairs of opp. $\angle$s $\cong$.
4. Consecutive $\angle$s are supp.
5. Diagonals bisect each other.

Rhombus:
1. $\square$ properties
2. All sides $\cong$.
3. Diagonals are $\perp$ bisectors of each other.
4. Diagonals bisect the $\angle$s.
5. Divided into 4 $\cong$ $\triangle$s by diagonals.

Rectangle
1. $\square$ Properties
2. $\angle$s are right
3. Diagonals are $\cong$
4. Diagonals create 4 isosceles $\triangle$s

Kite
1. Consecutive pairs of sides $\cong$.
2. One diagonal is $\perp$ bisector of other.
3. One diagonal bisects $\angle$s.
4. One pair of opp. $\angle$s $\cong$.

Square
All properties of $\square$, rectangle, and rhombus.

83. List and memorize the five ways to prove that a quadrilateral is a parallelogram.

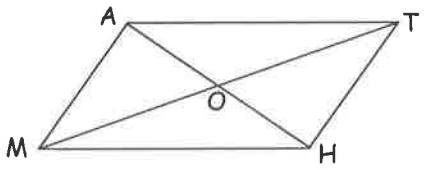
1. Both pairs of opp. sides are $\parallel$.
2. Both pairs of opp. sides are $\cong$.
3. Both pairs of opp. $\angle$s are $\cong$.
4. Diagonals bisect each other.
5. One pair of opposite sides BOTH $\parallel$ and $\cong$.

Use the parallelogram for problems 84 - 86.

84. If $m\angle AMH = 82°$, find $m\angle MAT$ & $m\angle ATH$.

$m\angle MAT = 180 - 82 = 98°$

$m\angle ATH = 82°$



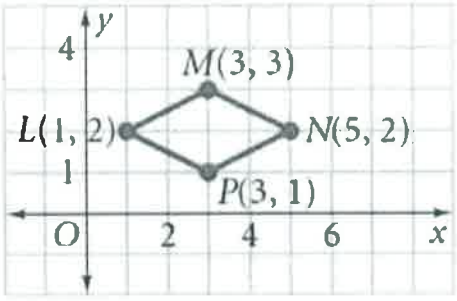
85. If $AM = 3x + 2$ and $TH = x + 14$, find x.

$3x + 2 = x + 14$
$2x + 2 = 14$
$2x = 12$
$x = 6$

86. If $AO = 5y - 4$ and $OH = 10 - 2y$, find y.

$5y - 4 = 10 - 2y$
$7y - 4 = 10$
$7y = 14$
$y = 2$

87. Find the perimeter of the quadrilateral shown to the right.



$LM = \sqrt{(3-1)^2+(3-2)^2} = \sqrt{2^2+1^2} = \sqrt{4+1} = \sqrt{5} = 2.24$

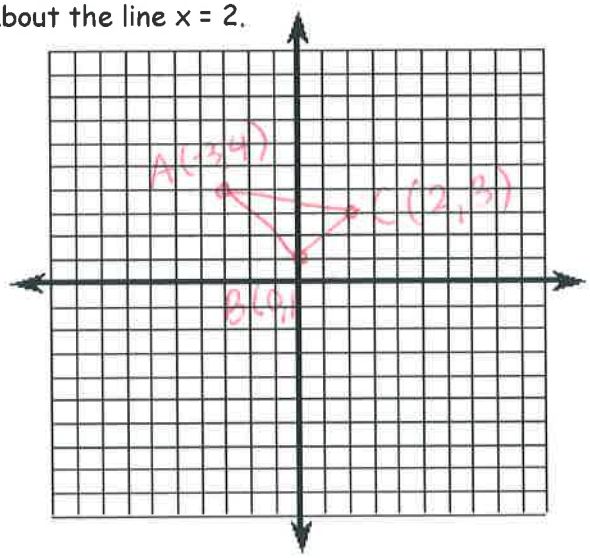
$MN = \sqrt{(5-3)^2+(2-3)^2} = \sqrt{2^2+(-1)^2} = \sqrt{4+1} = \sqrt{5} = 2.24$

$MP = \sqrt{(5-3)^2+(2-1)^2} = \sqrt{2^2+1^2} = \sqrt{4+1} = \sqrt{5} = 2.24$

$PL = \sqrt{(3-1)^2+(1-2)^2} = \sqrt{2^2+(-1)^2} = \sqrt{4+1} = \sqrt{5} = 2.24$

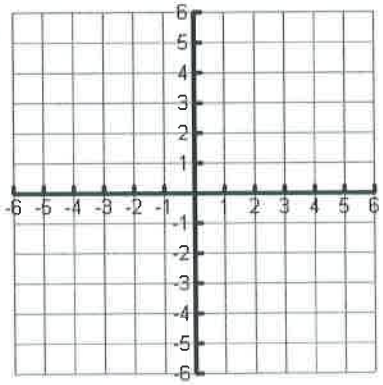
Perimeter = 8.96

88. The vertices of ΔABC are A (-3, 4), B (0, 1), and C (2, 3). Draw the image of ΔABC if it is translated 2 units to the left and is reflected about the line x = 2.

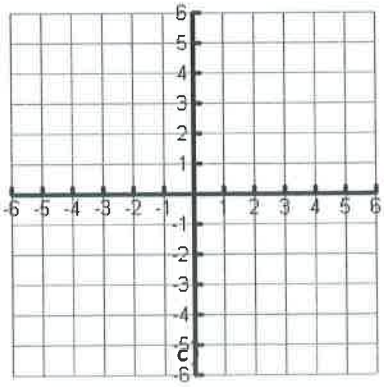


SKIP Ch. 12

89. a) Sketch the quadrilateral with vertices M (-3, -2), A (2, -2), T (-3, 4) and H (2, 4).



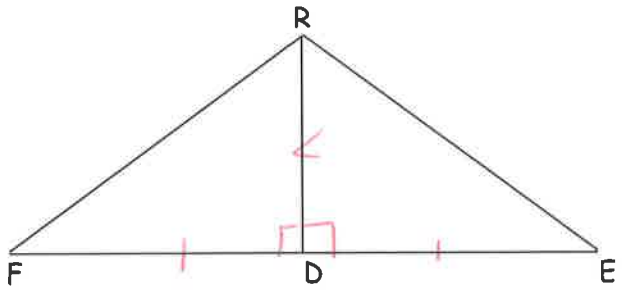
b) Quadrilateral M'A'T'H' is created through a translation of $(x, y) \rightarrow (x + 3, y - 1)$, followed by a reflection across the x-axis. What are the vertices of M, A, T, H? Sketch this new figure.



SKIP

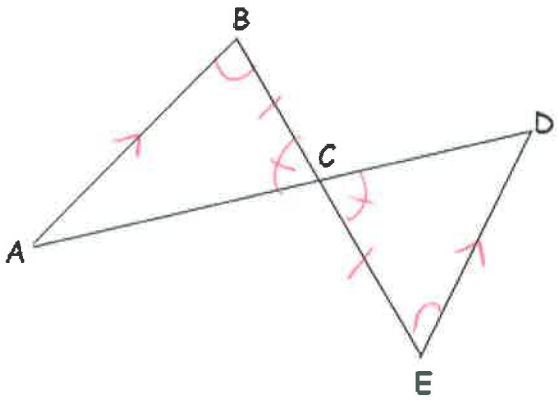
PROOFS

1. Given: $\overline{RD} \perp \overline{FE}$
   D is midpoint of $\overline{FE}$
   Prove: $\overline{FR} \cong \overline{ER}$



STATEMENTS		REASONS
1.	$\overline{RD} \perp \overline{FE}$; D is midpoint of $\overline{FE}$	1. Given
2.	$\angle RDF$ and $\angle RDE$ are right $\angle$'s	2. If $\perp$, then right $\angle$s
3.	$\angle RDF \cong \angle RDE$	3. If right $\angle$s, then $\cong$.
4.	$\overline{FD} \cong \overline{DE}$	4. If midpoint, then 2 $\cong$ segments.
5.	$\overline{RD} \cong \overline{RD}$	5. Reflexive Property
6.	$\triangle FRD \cong \triangle ERD$	6. SAS
7.	$\overline{FR} \cong \overline{ER}$	7. CPCTC

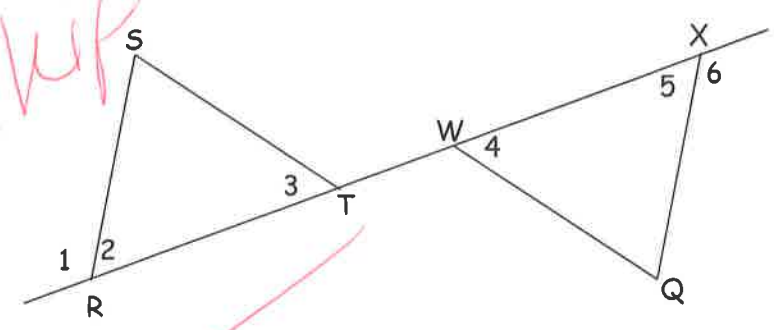
2. Given: $\overline{AB} \parallel \overline{DE}$
   C is midpoint of $\overline{BE}$
   Prove: C is midpoint of $\overline{AD}$



STATEMENTS		REASONS
1.	$\overline{AB} \parallel \overline{DE}$; C is midpoint $\overline{BE}$	1. Given
2.	$\angle B \cong \angle E$	2. If $\parallel$, then alt. int. $\angle$s are $\cong$.
3.	$\angle BCA \cong \angle ECD$	3. Vertical $\angle$s are $\cong$.
4.	$\overline{BC} \cong \overline{CE}$	4. If midpoint, then 2 $\cong$ segments.
5.	$\triangle ABC \cong \triangle DEC$	5. ASA
6.	$\overline{AC} \cong \overline{DC}$	6. CPCTC
7.	C is the midpoint of $\overline{AD}$	7. If 2 $\cong$ segments, then midpoint.

3. Given: $\angle 1 \cong \angle 6$
$\overline{RW} \cong \overline{TX}$
$\angle 3 \cong \angle 4$

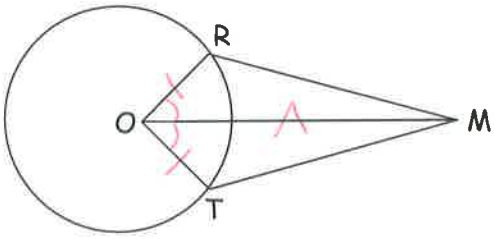
Prove: $\overline{ST} \cong \overline{YW}$



	STATEMENTS	REASONS
1.	$\angle 1 \cong \angle 6$; $\overline{RW} \cong \overline{TX}$; $\angle 3 \cong \angle 4$	1. Given
2.	$\angle 1$ supp $\angle 2$ $\angle 5$ supp $\angle 6$	2.
3.	$\angle 2 \cong \angle 5$	3.
4.	$\overline{RT} \cong \overline{WX}$	4.
5.	$\triangle SRT \cong \triangle YXW$	5.
6.	$\overline{ST} \cong \overline{YW}$	6.

4. Given: Circle O; $\overline{OM}$ bisects $\angle ROT$

Prove: $\overline{RM} \cong \overline{TM}$



	STATEMENTS	REASONS
1.	Circle O; $\overline{OM}$ bisects $\angle ROT$	1. Given
2.	$\overline{OR} \cong \overline{OT}$	2. All radii are $\cong$.
3.	$\angle ROM \cong \angle TOM$	3. If bisected, then 2 $\cong$ $\angle$s
4.	$\overline{OM} \cong \overline{OM}$	4. Reflexive Property
5.	$\triangle ROM \cong \triangle TOM$	5. SAS
6.	$\overline{RM} \cong \overline{TM}$	6. CPCTC