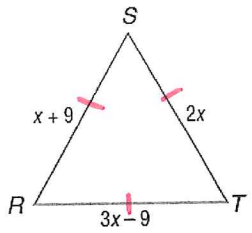
Name: Key HOUR: _____ Due Date: _____

2016 Geometry Midterm Review

Directions: This review consists of problems that could be on your midterm. Make sure you complete each problem and **show your work.**

1. For equilateral ΔRST, find the variable and the side lengths. All units are in inches.



$x+9 = 2x$

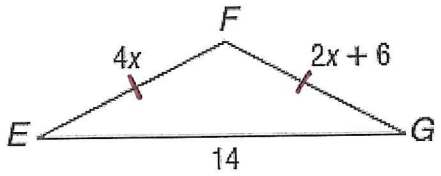
$9 = x$

$SR = 9+9 = 18$

$ST = 2(9) = 18$

$RT = 3(9)-9 = 18$

2. For isosceles ΔRST, find the variable and the side lengths. All units are in centimeters.



$4x = 2x+6$

$2x = 6$

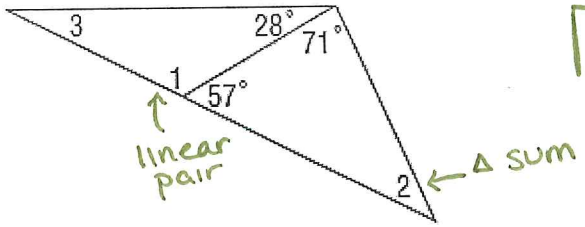
$x = 3$

$FE = 4(3) = 12$

$FG = 2(3)+6 = 12$

$EG = 14$

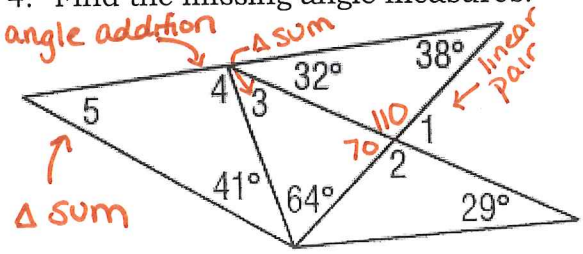
3. Find the missing angle measures, $m\angle 1$ and $m\angle 2$.



$m\angle 1 = 123°$

$m\angle 2 = 52°$

4. Find the missing angle measures.



$m\angle 1 = 70°$

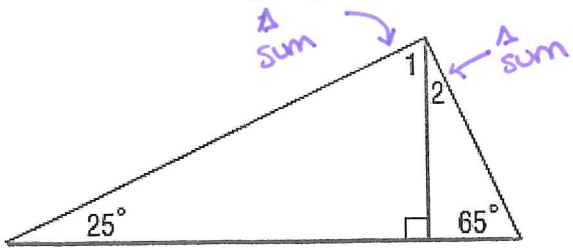
$m\angle 2 = 110°$

$m\angle 3 = 46°$

$m\angle 4 = 102°$

$m\angle 5 = 37°$

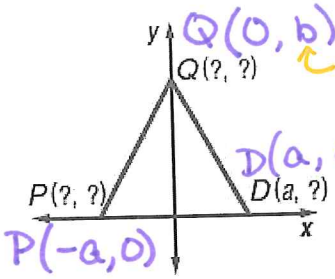
5. Find the missing angle measures.



$\angle 1 = 65°$

$\angle 2 = 25°$

6. What are the missing coordinates of the isosceles triangle?

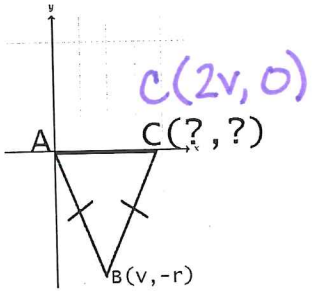


Q(0, b) ← any variable other than a

D(a, 0)

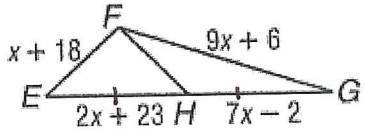
P(−a, 0)

7. What are the missing coordinates of this isosceles triangle?



C(2v, 0)

8. If FH is a median of ΔEFG, find the perimeter of ΔEFG, then state 3 true things about this figure.



$2x+23 = 7x-2$

$25 = 5x$

$5 = x$ ← plug in to find perimeter

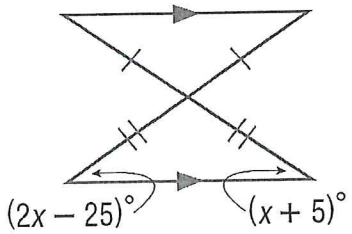
$\underbrace{5+18}_{23}+\underbrace{9(5)+6}_{51}+\underbrace{2(5)+23}_{33}+\underbrace{7(5)-2}_{33}$ → P = 140

1) EH ≅ HG

2) H is the midpoint of EG

3) ΔEFG is scalene

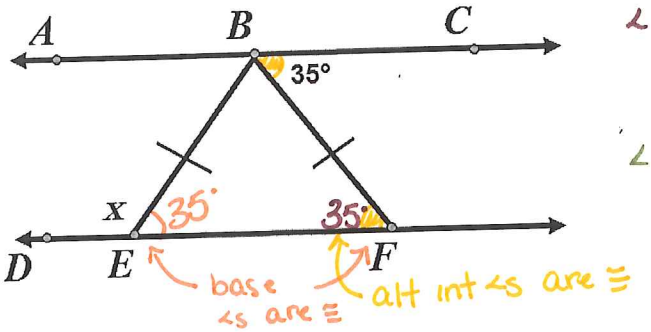
9. Find x.



$2x - 25 = x + 5$ base ∠s are ≅

$\boxed{x = 30}$

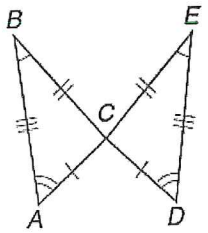
10. In the figure below, B is on $\overline{AC}$, E is on $\overline{DF}$, $\overline{AC}$ is parallel to $\overline{DF}$, and $\overline{BE}$ is congruent to $\overline{BF}$.. Name the legs of the isosceles triangle, name the base angles and vertex angle of the isosceles triangle, and provide an example of an exterior angle. What is the measure of <DEB and <EBF?



∠DEB = 145° b/c linear pairs are suppl.

∠EBF = 110° b/c △ sum thm

11. Identify the triangle △CAB is congruent to, then name all corresponding parts. There should be 6 pairs.



△CAB ≅ △CDE

≅ corresponding angles

∠B ≅ ∠E

∠A ≅ ∠D

∠ACB ≅ ∠DCE

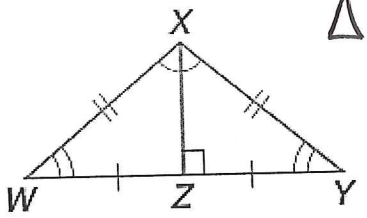
≅ corr. sides.

BC ≅ CE

CA ≅ CD

AB ≅ DE

12. Identify the triangle △XZW is congruent to, then name all corresponding parts. There should be 6 pairs.



△XZW ≅ △XZY

≅ angles

∠W ≅ ∠Y

∠WXZ ≅ ∠YXZ

∠WZX ≅ ∠YZX

≅ sides

XZ ≅ XZ

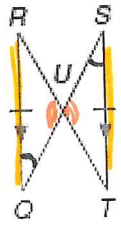
XW ≅ XY

WZ ≅ ZY

13. Write a two-column proof.

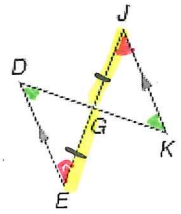
Given: $\overline{RQ} \cong \overline{ST}$ and $\overline{RQ} \parallel \overline{ST}$

Prove: $\triangle RUQ \cong \triangle TUS$



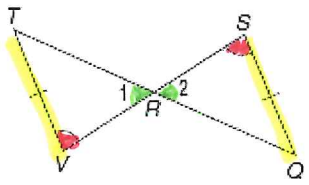
1. RQ ≅ ST RQ // ST	1. given
2. ∠Q ≅ ∠S	2. alt. int. ∠s are ≅
3. ∠RUQ ≅ ∠TUS	3. vertical ∠s are ≅
4. △RUQ ≅ △TUS	4. AAS

14. Write a two-column proof.
Given: $\overline{DE} \parallel \overline{JK}$, $\overline{DK}$ bisects $\overline{JE}$.
Prove: $\triangle EGD \cong \triangle JGK$



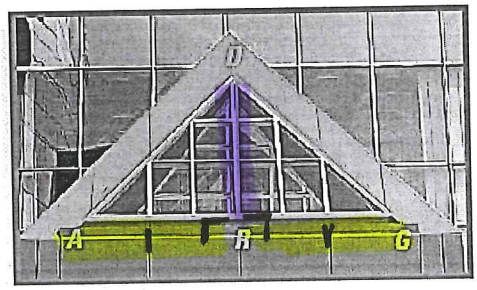
1. DE // JK DK bisects JE	1. given
2. JG ≅ GE	2. def of bisector
3. ∠E ≅ ∠J ∠D ≅ ∠K	3. alt. int ∠s are ≅
4. △EGD ≅ △JGK	4. AAS

15. Write a two-column proof.
Given: $\angle V \cong \angle S$, $\overline{TV} \cong \overline{QS}$
Prove: $\overline{VR} \cong \overline{SR}$



1. ∠V ≅ ∠S TV ≅ QS	1. given
2. ∠1 ≅ ∠2	2. vertical ∠s are ≅
3. △RTV ≅ △RQS	3. AAS
4. VR ≅ SR	4. CPCTC

16. REAL LIFE **ARCHITECTURE** You are designing the window shown in the photo. You want to make $\triangle DRA$ congruent to $\triangle DRG$. You design the window so that $\overline{DR} \perp \overline{AG}$ and $\overline{RA} \cong \overline{RG}$. Can you conclude that $\triangle DRA \cong \triangle DRG$?

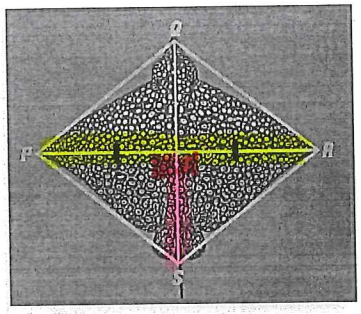


1. DR ⊥ AG RA ≅ RG	1. given
2. ∠DRA = 90° ∠DRG = 90°	2. def of ⊥
3. ∠DRA ≅ ∠DRG	3. substitution
4. DR ≅ DR	4. reflexive
5. △DRA ≅ △DRG	5. SAS

17. Write a two column proof using the stingray below.

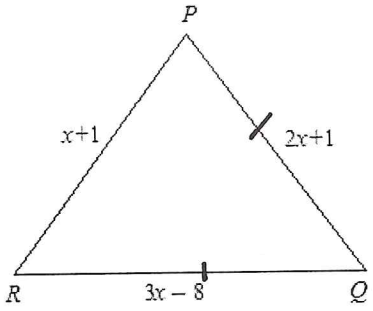
GIVEN ▶ $\overline{QS} \perp \overline{RP}, \overline{PT} \cong \overline{RT}$

PROVE ▶ $\overline{PS} \cong \overline{RS}$



1. $QS \perp RP$, $PT \cong RT$	1. given
2. $\angle PTS = 90°$, $\angle RTS = 90°$	2. def of $\perp$
3. $\angle PTS \cong \angle RTS$	3. substitution
4. $TS \cong TS$	4. reflexive
5. $\triangle PTS \cong \triangle RTS$	5. SAS
6. $PS \cong RS$	6. CPCTC

18. Find x, PQ, QR, and RP if $\triangle PQR$ is an isosceles triangle with $\overline{PQ} \cong \overline{QR}$.



$2x + 1 = 3x - 8$

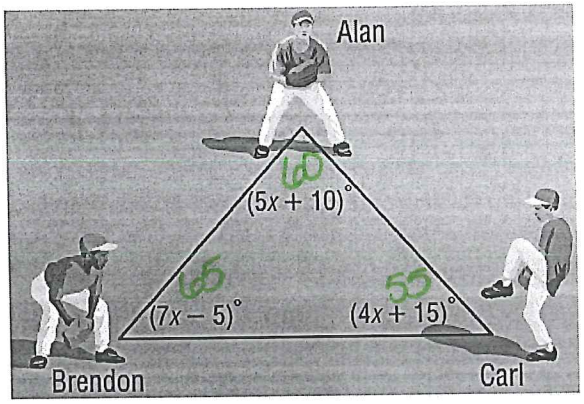
$\boxed{9 = x}$

$PQ = 2(9) + 1 = \boxed{19}$

$RQ = 3(9) - 8 = \boxed{19}$

$PR = 9 + 1 = \boxed{10}$

19. **BASEBALL** Alan, Brendon, and Carl were standing in a triangular formation shown. They were throwing the baseball to warm up for the game. Find the value of x, the measure of each angle and then conclude what two people must throw the farthest distance.



$5x + 10 + 7x - 5 + 4x + 15 = 180$

$16x + 20 = 180$

$16x = 160$

$\boxed{x = 10}$

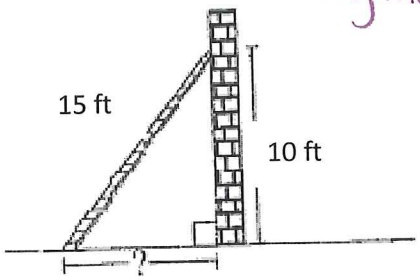
$\angle A = 5(10) + 10 = 60°$

$\angle B = 7(10) - 5 = 65°$

$\angle C = 4(10) + 15 = 55°$

Alan & Carl have to throw the farthest distance to one another

20. A ladder is 15ft long and reaches 10 feet up a wall, as shown in the picture. How many feet is the bottom of the base of the wall? Pythagorean Thm



$10^2 + x^2 = 15^2$

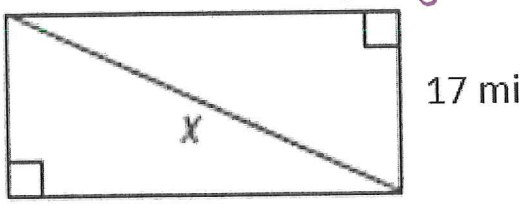
$100 + x^2 = 225$

$\sqrt{x^2} = \sqrt{125}$

$x = 5\sqrt{5}$ ft

$\sqrt{125}$ → $\sqrt{5}$ $\sqrt{25}$ → $\sqrt{25}$ → 5

21. Find the value of x.



Pythagorean Thm

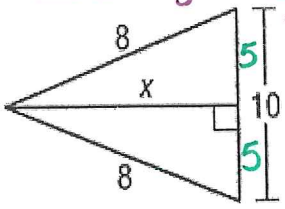
$21^2 + 17^2 = x^2$

$441 + 289 = x^2$

$\sqrt{730} = \sqrt{x^2}$

$x = \sqrt{730}$ mi

22. Find x. Pythagorean Thm



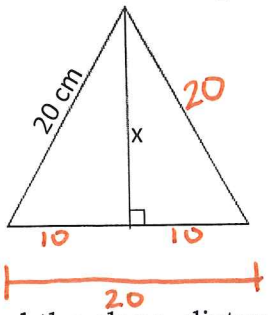
$5^2 + x^2 = 8^2$

$25 + x^2 = 64$

$\sqrt{x^2} = \sqrt{39}$

$x = \sqrt{39}$

23. Find x if the triangle is an equilateral triangle whose sides are 20 cm long. Pythagorean Thm



$10^2 + x^2 = 20^2$

$100 + x^2 = 400$

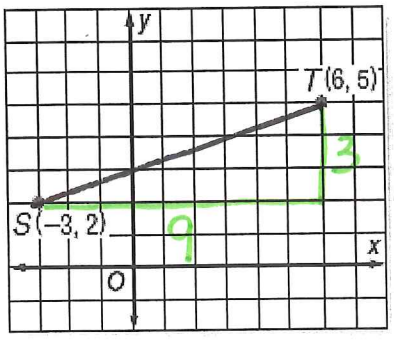
$\sqrt{x^2} = \sqrt{300}$

$x = 10\sqrt{3}$

$\sqrt{300}$ → $\sqrt{100}$ $\sqrt{3}$ → $\sqrt{100}$ → 10

24. Find the slope, distance, and midpoint between each set of points.

A) points S and T.



distance:

$3^2 + 9^2 = x^2$

$9 + 81 = x^2$

$\sqrt{90} = \sqrt{x^2}$

$x = 3\sqrt{10}$

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

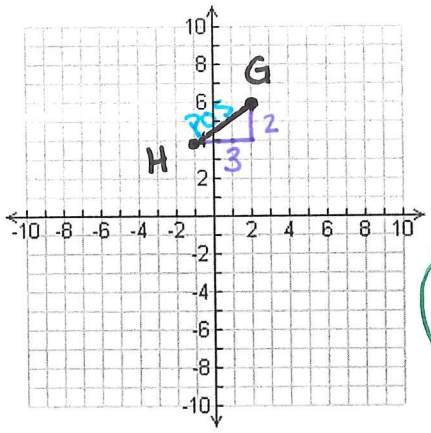
Distance: $3\sqrt{10}$

Midpoint: $\left(\frac{3}{2}, \frac{7}{2}\right)$

Slope: $\frac{1}{3}$

slope: $\frac{\text{rise}}{\text{run}} = \frac{3}{9} = \frac{1}{3}$

b) G(2,6), H(-1,4)



distance

$3^2+2^2=HG^2$

$9+4=HG^2$

$\sqrt{13}=HG$

midpoint

$\left(\frac{2+(-1)}{2}, \frac{6+4}{2}\right)$

$\left(\frac{1}{2}, \frac{10}{2}\right)=\left(\frac{1}{2}, 5\right)$ midpoint

simplify

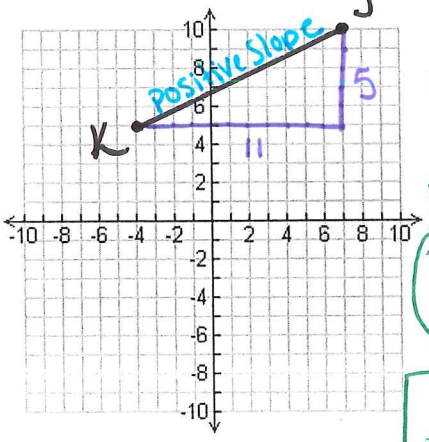
Distance: $\sqrt{13}$

Midpoint: $\left(\frac{1}{2}, 5\right)$

Slope: $\frac{2}{3}$

$\frac{\text{Rise}}{\text{Run}}=+\frac{2}{3}=\frac{2}{3}=\text{slope}$

c) J(7,10), K(-4,5)



distance

$5^2+11^2=KJ^2$

$25+121=KJ^2$

$\sqrt{146}=KJ$

midpoint

$\left(\frac{7+(-4)}{2}, \frac{10+5}{2}\right)$

$=\left(\frac{3}{2}, \frac{15}{2}\right)$

Distance: $\sqrt{146}$

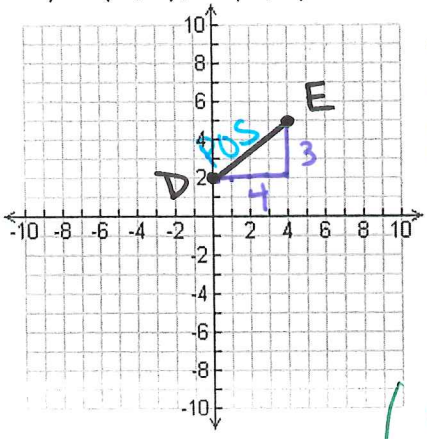
Midpoint: $\left(\frac{3}{2}, \frac{15}{2}\right)$

Slope: $\frac{5}{11}$

$\frac{\text{Rise}}{\text{Run}}=+\frac{5}{11}$

Slope $=\frac{5}{11}$

d) D(0,2), E(4,5)



distance

$4^2+3^2=DE^2$

$16+9=DE^2$

$\sqrt{25}=\sqrt{DE^2}$

$5=DE$

midpoint

$\left(\frac{0+4}{2}, \frac{2+5}{2}\right)$

$=\left(\frac{4}{2}, \frac{7}{2}\right)=\left(2, \frac{7}{2}\right)$ midpt

Distance: 5

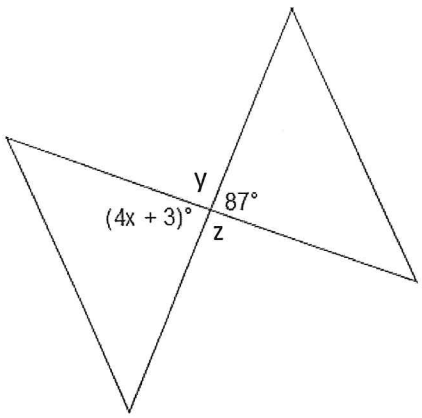
Midpoint: $\left(2, \frac{7}{2}\right)$

Slope: $\frac{3}{4}$

$\frac{\text{Rise}}{\text{Run}}=+\frac{3}{4}$

Slope $=\frac{3}{4}$

25. Find the value of x, y, and z.



Find x:

$4x + 3 = 87$ vertical ∠s are ≅

$-3 \quad -3$

$4x = 84$

$\boxed{x = 21}$

Find z:

$z + 87 = 180°$ linear Pairs are Suppe.

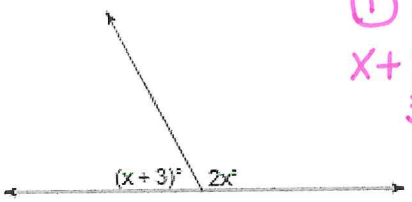
$\boxed{z = 93°}$

Find y:

$y + 87 = 180°$ linear Pairs are suppl.

$\boxed{y = 93°}$

26. What is the degree measure of the larger of the two angles?



① Find x 1st!

$x + 3 + 2x = 180°$ linear pairs are suppl.

$3x + 3 = 180$

$3x = 177$

$\boxed{x = 59}$

② Find the measure of the two ∠s

$x + 3 = 59 + 3 = 62°$

$2(59) = 118°$

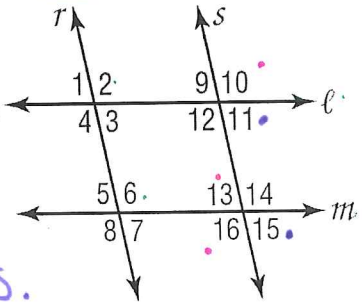
$\boxed{118°}$

27. a) Given $l \parallel m$, name the relationship that makes ∠10 ≅ ∠16?

// lines form ≅ alt. EXT angles.

b) Given $r \parallel s$, name the relationship that makes ∠3 + ∠12 = 180°?

// lines form suppl. con. int. ∠s.



c) If ∠11 ≅ ∠15, what 2 lines are parallel?

$\ell \parallel m$ because ≅ corr. ∠s form // lines.

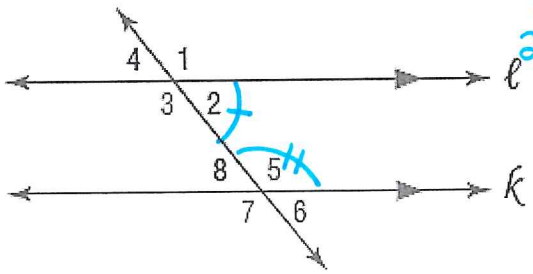
d) If ∠2 ≅ ∠6, what 2 lines are parallel?

$\ell \parallel m$ because ≅ corr. ∠s form // lines.

e) If ∠9 ≅ ∠13, what 2 lines are parallel?

$\ell \parallel m$ because ≅ corr. ∠s form // lines.

28. Find x so that lines l and k are parallel, given $< 2 = 27x + 2$ and $< 5 = 18x - 2$.



$\angle 2 + \angle 5 = 180°$ (con. int ∠s are suppl.)

$27x + 2 + 18x - 2 = 180°$

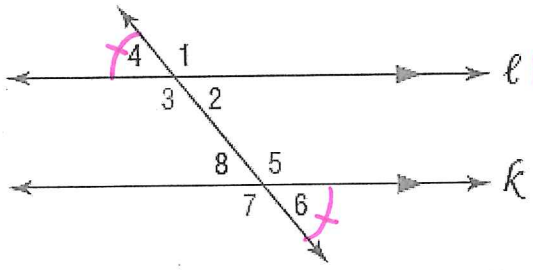
$45x = 180°$

$\boxed{x = 4}$

OR

(suppl. con. int. ∠s form // lines)

29. Find x so that lines l and k are parallel, given $< 4 = 17x$ and $< 6 = -5 + 18x$.



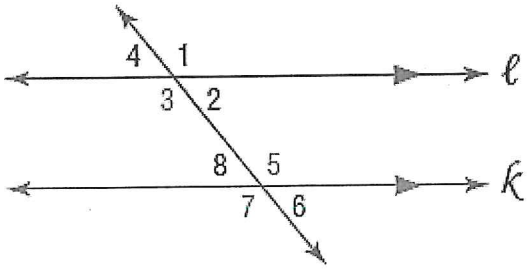
$\angle 4 \cong \angle 6$ $\cong$ alt. EXT $\angle$s form Parallel lines

$17x = -5 + 18x$

$-1x = -5$

$x = 5$

30. Name all the relationships that allow us to say l is parallel to k.



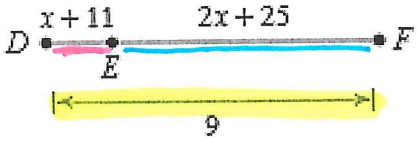
$< 1 \cong < 7$ proves $l \| k$ because $\cong$ alt. EXT $\angle$s form $\|$ lines.

$< 2 \cong < 8$ proves $l \| k$ because $\cong$ alt. int $\angle$s form $\|$ lines.

$< 3 \cong < 7$ proves $l \| k$ because $\cong$ corr. $\angle$s form $\|$ lines.

$< 3 + < 8 = 180$ proves $l \| k$ because suppl. con. int $\angle$s form $\|$ lines.

31. Find x, then the length of EF. Show your work, geometry and justify your set up!



$DE + EF = DF$ Segment addition

$x+11 + 2x+25 = 9$

$3x + 36 = 9$

$-36 \quad -36$

$3x = -27$

$x = -9$

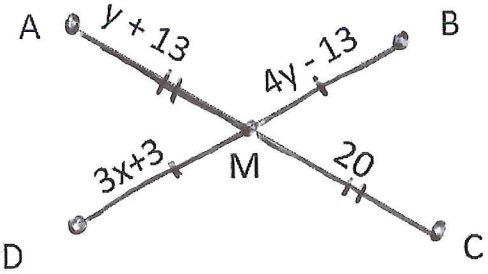
(subs $x = -9$)

$EF = 2(x) + 25$

$EF = 2(-9) + 25$

$EF = 7$

32. AC and BD bisect each other at point M. Find x, y, and BM. Show your work, geometry and justify your set up!



$AM \cong CM$ def of seg. bisector

$y + 13 = 20$

$y = 7$

$DM \cong BM$ def of seg. Bisector

$3x+3 = 4y-13$

$3x+3 = 4(7)-13$ (subs $y = 7$)

$3x + 3 = 28 - 13$

$3x + 3 = 15$

$-3 \quad -3$

$3x = 12$

$x = 4$

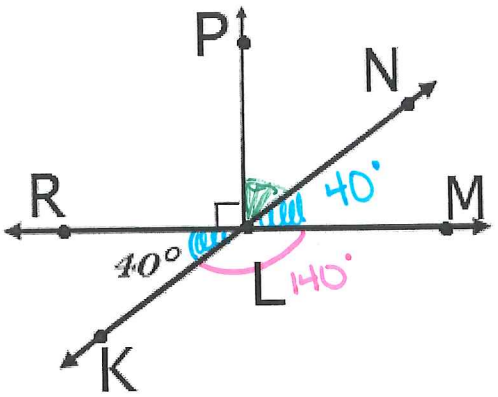
$BM = 4(7) - 13$

$BM = 15$

33. Find all the missing angle measures.

$90° + \angle NLP + 40 = 180°$

$\angle NLP = 50°$



$m\angle NLM =$ 40°

$m\angle NLP =$ 50°

$m\angle MLK =$ 140°

$m\angle NLR =$ 140°

$m\angle PLM =$ 90°

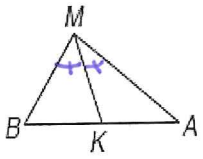
34. Given the following triangle with angle bisector MK state if the following statements are true or false.

a. $m < MKA = 90°$ False

b. $\overline{BK} \cong \overline{AK}$ False

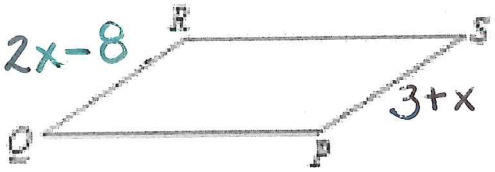
c. $m < BMK = m < AMK$ TRUE

d. ΔBMA is isosceles with vertex angle M. False



35. Given that the following are parallelograms, find x.

a.



$QR \cong SP$ op. sides of paras are $\cong$

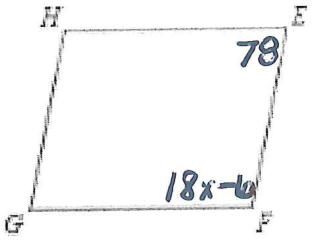
$2x - 8 = 3 + x$

$x - 8 = 3$

$+8 \quad +8$

$x = 11$

b.



$\angle E + \angle F = 180°$ Con. int $\angle$s of a Para are suppl.

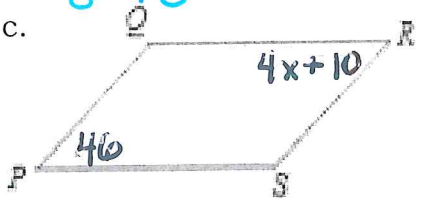
$78° + 18x - 6 = 180$

$18x + 72 = 180$

$18x = 108$

$x = 6$

c.



$\angle P \cong \angle R$ op. $\angle$s of a para are $\cong$.

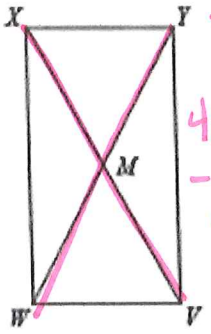
$46 = 4x + 10$

$36 = 4x$

$9 = x$

36.

a. Suppose VWXY is a rectangle and XV= 4x - 9 and WY = x + 3, find x and WM.



$XV \cong WY$ diags of a Rectangle are $\cong$

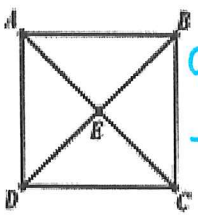
$4x-9=x+3$
$-x \quad -x$
$3x-9=3$
$+9 \quad +9$
$3x=12$
$\boxed{x=4}$

$WM=\frac{1}{2}WY$ diags of a Rectangle bisect each other.

$WM=\frac{1}{2}(4+3)$

$\boxed{WM=3.5}$

b. Suppose ABCD is a square and AC = 9y – 8 and BD = 7y +8. Find y and AC.



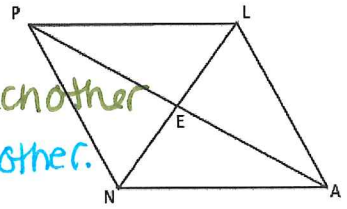
$AC \cong BD$ diags of a square are $\cong$

$9y-8=7y+8$
$-7y \quad -7y$
$2y-8=8$
$+8 \quad +8$
$2y=16$
$\boxed{y=8}$

$AC=9(8)-8$ substitution

$\boxed{AC=64}$

37. **Use rhombus PLAN to write the correct geometric statement (if needed) and justification.**



a.) AL ≅ PL because : def of Rhombus: 4 ≅ sides

b.) <NEA = 90 because : diags of a Rhombus are ⊥ to each other

c.) EA ≅ PE because : diags of a Rhombus bisect each other.

d.) NA // PL because : a Rhombus IS a parallelogram

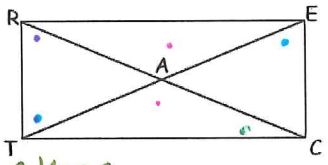
e.) <NPE ≅ <LPE because : diags of a Rhombus bisect the angles.

f.) <PLA ≅ <PNA because : op. <s of a Rhombus are ≅

g.) <LNA ≅ <PNL because : diags of a Rhombus bisect the angles.

h.) <LEA = 90 because : diags of a Rhombus are ⊥ to each other.

38. **Use rectangle RECT to write the correct geometric statement (if needed) and justification.**



a.) RC ≅ TE because : diags of a Rectangle are ≅.

b.) <TCE = 90 because : def of a Rectangle: 4 right ∠s.

c.) EA ≅ AT because : diags of a Rectangle bisect each other

d.) RE // TC because : def of Rectangle (a parallelogram w/ 4 Right angles sides // opp.)

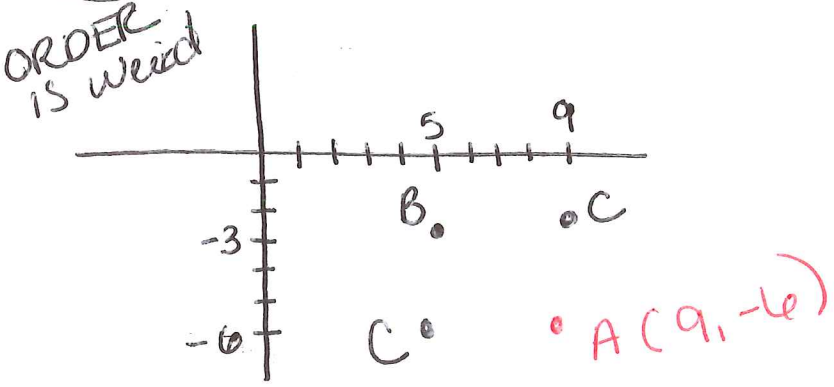
e.) <TRA ≅ <RTA because : Base ∠s of isos. △'s are ≅

f.) <RAE ≅ ∠CAT because : vertical ∠s are ≅

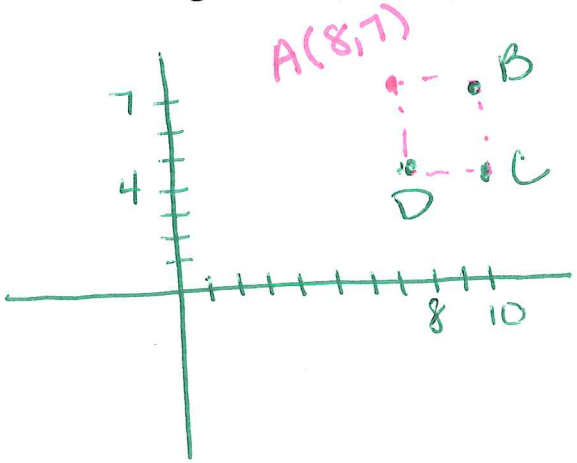
g.) <RTE ≅<TEC because : // lines form ≅ alt. int ∠s

h.) <TCR + ∠ECR = 90 because : def of a rectangle: a para w/ 4 Right ∠s.

39. a. *ABCD* is a rectangle with $B(5,-3), C(5,-6)$, and $D(9,-3)$. Find the coordinates of A.

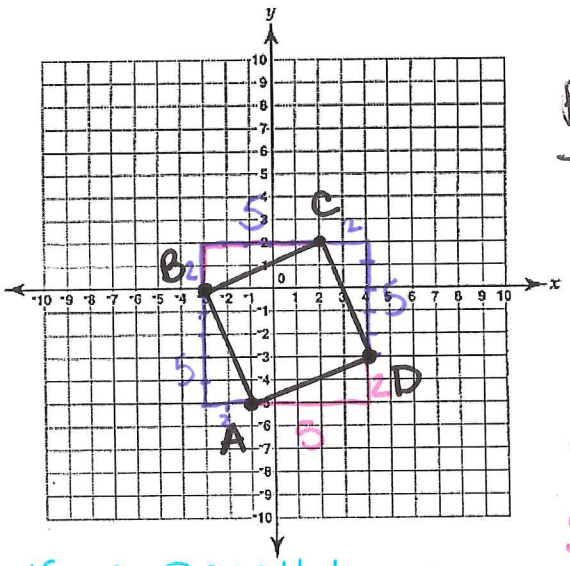


b. *ABCD* is a rectangle with $B(10,7), C(10,4)$, and $D(8,4)$. Find the coordinates of A.



40. Given the set of vertices, determine if it is a parallelogram or not. If it is a parallelogram, determine whether it is a rectangle. Explain why or why not.

a. $A(-1, -5), B(-3, 0), C(2, 2), D(4, -3)$



Parallelogram: op. Slopes are parallel

Rectangle: must have Perp. Slopes

Slope AB $= -\frac{5}{2}$

Slope CD $= -\frac{5}{2}$ $\parallel$

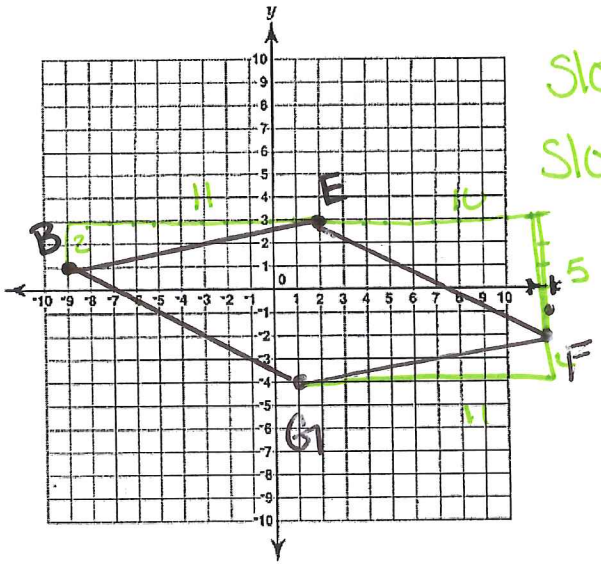
Slope BC $= +\frac{2}{5}$

Slope AD $= +\frac{2}{5}$ $\parallel$

① ABCD is a parallelogram because AB // CD and BC // AD so op. sides are parallel.

② ABCD is a rectangle because $\frac{2}{5} \perp$ slope to $-\frac{5}{2}$

b. $B(-9, 1), E(2, 3), F(12, -2), G(1, -4)$



Slope BE $= +\frac{2}{11}$

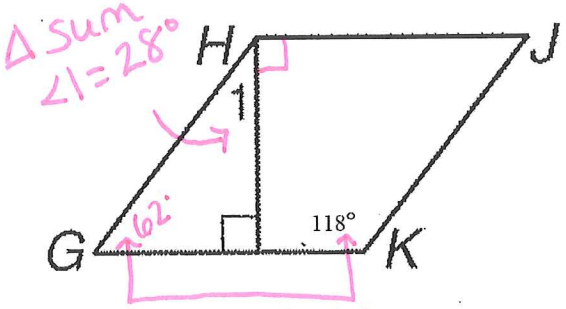
Slope GF $= +\frac{2}{11}$

Slope EF $= -\frac{5}{10} = -\frac{1}{2}$

Slope BG $= -\frac{5}{10} = -\frac{1}{2}$

① ABCD is a parallelogram because op. sides are Parallel (same slopes)

41. For the parallelogram below, find m< 1 if m<K=118.

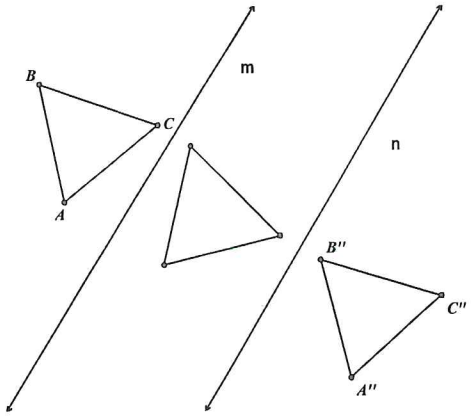


Δ sum
∠1 = 28°

con. int ∠s are suppl.

m∠1 = 28°

42. If $m \| n$ and triangle ABC is reflected over line m first, then line n, what transformation would occur from ΔABC to ΔA"B"C"?



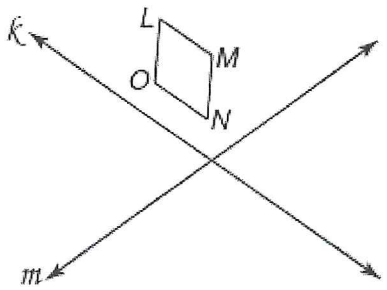
a. reflection

b. dilation

c. rotation

d. translation

43. If LMNO is reflected over line k first, then line m, what transformation would occur from LMNO to L"M"N"O"?



a. reflection

b. dilation

c. rotation

d. translation

44. Given point A(6, -1), find its image if it is reflected across the x-axis, the y-axis, y = x, y = -x

$y = x$ $A(6,-1) \rightarrow A'(-1,6)$

$y = -x$ $A(6,-1) \rightarrow A'(1,-6)$

x-axis
$A(6,-1) \rightarrow A'(6,1)$

y-axis
$A(6,-1) \rightarrow A'(-6,-1)$

45. Given the point (x, y), write the image point if it is reflected across the x-axis, the y-axis, y = x, y = -x

$y = x \quad (x, y) \longrightarrow (y, x)$

$y = -x \quad (x, y) \longrightarrow (-y, -x)$

x-axis $(x, y) \longrightarrow (x, -y)$

y-axis $(x, y) \longrightarrow (-x, y)$

46. What is the original point of Y'(-2, 4) under the translation (x,y) → (x + 5, y)?

$(x, y) \longrightarrow (x+5, y)$

$(x, y) \longrightarrow (-2, 4)$

$Y(-7, 4)$

47. What is the point of X' if X(2, 5) is under the translation (x,y) → (x - 1, y + 2)?

$(x, y) \longrightarrow (x-1, y+2)$

$(2, 5) \longrightarrow (2-1, 5+2)$

$\longrightarrow (1, 7)$

$X'(1, 7)$

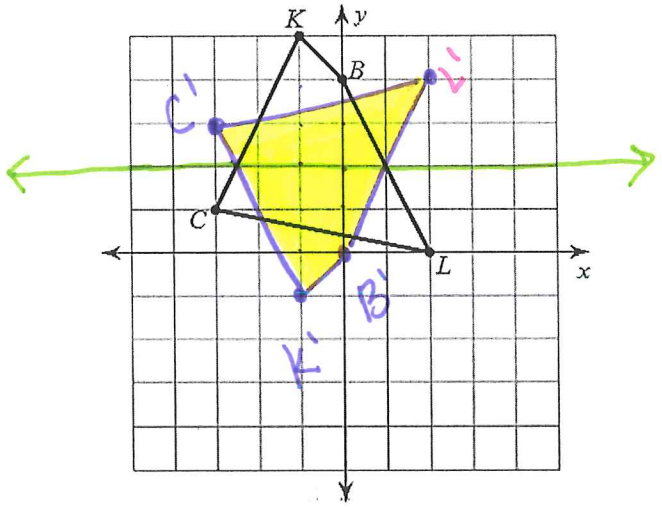
48. Symmetry: How many lines of symmetry does a(n) ....

a. Square have? 4

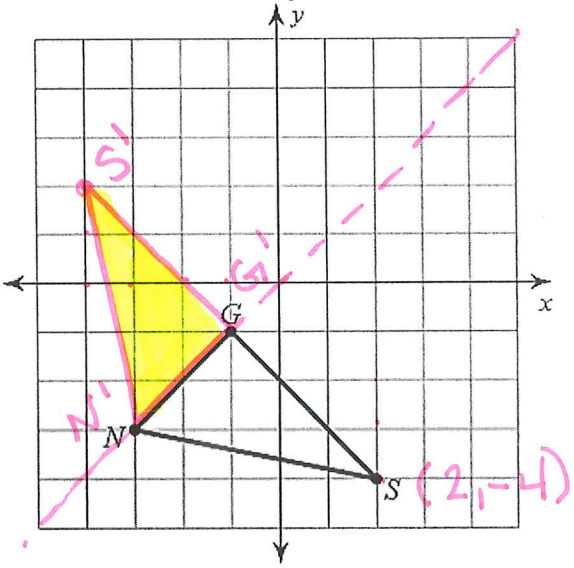
b. Rectangle have? 2

c. Isosceles Triangle have? 1

49. Graph the image of the figure with a reflection across y = 2



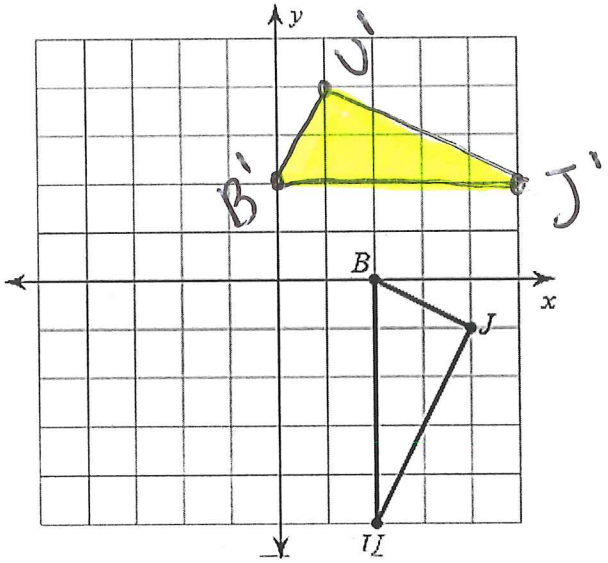
50. Graph the image of the figure with a reflection across y = x



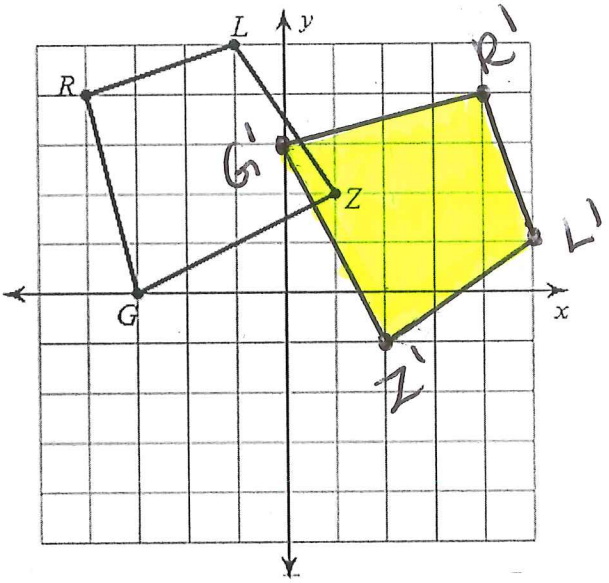
$S(2, -4)$

$S'(-4, 2)$

51. Graph the image of the figure with a rotation 90° counterclockwise about the origin.



52. Graph the image of the figure with a rotation 90° clockwise about the origin.



53. Identify each statement as true or false.

a) The diagonals of a parallelogram are always congruent.

False - sometimes (Rectangle + Square)

b) A parallelogram is always a square.

False - a square is always a Parallelogram

c) The diagonals of a rectangle sometimes bisect each other.

False - Always

d) The diagonals of a rectangle always bisect the angles.

False only when it is a square.

e) The diagonals of a square are never perpendicular bisectors of each other.

False — always

f) A rhombus is always a rectangle.

False - only a square

g) A square is never a rectangle.

False = a square is always a rectangle

h) A square is always a rhombus.

TRUE ☺

i) Opposite angles in a parallelogram are always congruent.

TRUE