Geometry Midterm Review 2014 Name: KEY

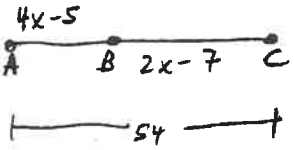
Chapter 1: Essentials of Geometry

1) Point B is between A and C on $\overline{AC}$. Use the given information to write an equation in terms of x. Solve the equation. Then find AB and BC, and determine whether $\overline{AB}$ and $\overline{BC}$ are congruent.

a) $AB = 4x - 5$

$BC = 2x - 7$

$AC = 54$



$4x - 5 + 2x - 7 = 54$

$6x - 12 = 54$

$6x = 66$

$x = 11$

$AB = 39$

$BC = 15$

Not $\cong$ ANS

b) $AB = x + 3$

$BC = 2x + 1$

$AC = 10$

$x + 3 + 2x + 1 = 10$

$3x + 4 = 10$

$3x = 6$

$x = 2$

$AB = 5 = BC$

They are $\cong$ ANS

2) Find the coordinates of the midpoint of the segment with the given endpoints.

$A(2,-4), B(7,1)$ $\left(\frac{2+7}{2}, \frac{-4+1}{2}\right) = \left(\frac{9}{2}, -\frac{3}{2}\right)$ ANS

3) Use the endpoint and midpoint M of the segment to find the coordinates of the other endpoint.

$A(3,-7), M(1,1)$ $B(x_2, y_2)$

$\frac{3 + x_2}{2} = 1$

$3 + x_2 = 2$

$x_2 = -1$

$\frac{-7 + y_2}{2} = 1$

$-7 + y_2 = 2$

$y_2 = 9$

$(-1, 9)$ ANS

4) Find the length of the segment with given endpoint and midpoint M.

$A(-3,-4), M(9,5)$

$D = \sqrt{(9 - -3)^2 + (5 - -4)^2}$

$= \sqrt{144 + 81}$

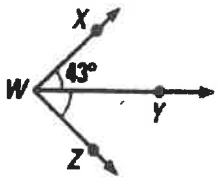
$= \sqrt{225}$

$= 15$

$15(2) = 30$ ANS

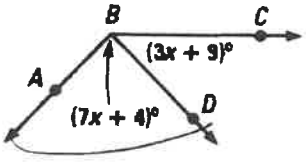
5) Use the given information to find the indicated angle measures.

$m\angle XWZ =$?



43
× 2
86°
ANS

6) **Given $m\angle ABC = 133°$, find $m\angle ABD$.**



$7x + 4 + 3x + 9 = 133$

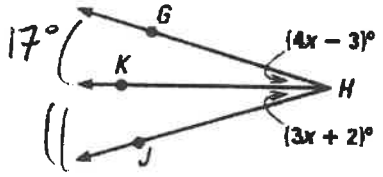
$10x + 13 = 133$

$10x = 120$

$x = 12 \quad \therefore m\angle ABD = 88°$

ANS

7) **Given $m\angle GHK = 17°$, find $m\angle KHJ$.**



$4x - 3 = 17$

$4x = 20$

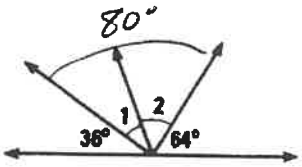
$x = 5$

$\therefore m\angle KHJ = 17°$

ANS

8) **Tell whether ∠1 and ∠2 are *vertical angles*, *adjacent angles*, a *linear pair*, *complementary*, or *supplementary*. There may be more than one answer.**

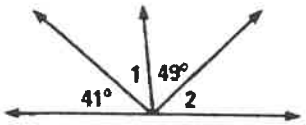
a)



Adjacent

ANS

b)

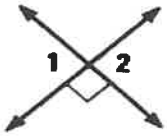


$41 + 49 = 90°$

Complementary

ANS

c)



Vertical & Supplementary

ANS

Chapter 2: Reasoning and Proof

1) For the statement "Soccer players are athletes." Write the:

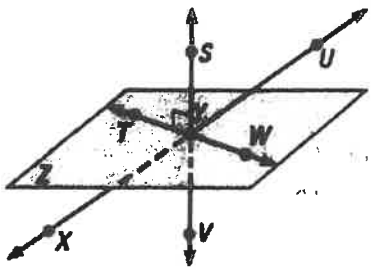
$p \to q$ T a) If-then form: If you are a soccer player, then you are an athlete.

$\sim p \to \sim q$ F b) Inverse: If you aren't a soccer player, then you aren't an athlete.

$\sim q \to \sim p$ T c) Contrapositive: If you aren't an athlete, then you aren't a soccer player.

$q \to p$ F d) Converse: If you are an athlete, then you are a soccer player

2) Use the diagram to determine if the statement is true or false.



T a) $\overline{SV} \perp$ plane Z

T b) $\overline{XU}$ intersects plane Z at point Y.

T c) $\overline{TW}$ lies in plane Z.

F d) $\angle SYT$ and $\angle WYS$ are vertical angles.

F e) $\angle SYT$ and $\angle TYV$ are complementary angles.

T f) $\angle TYU$ and $\angle UYW$ are a linear pair.

F g) $\angle UYV$ is acute.

3) Write the converse of the true statement. Determine if the converse is also true. If it is combine the statements to write a true biconditional statement.

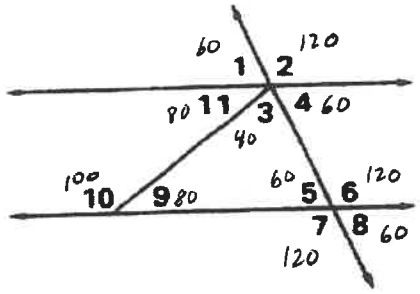
If two circles have (p) the same diameter, then they have (q) the same circumference.

- If 2 ⊙s have the same circumference, then they have the same diameter
  ✓True

Two ⊙'s have the same diameter, if & only if they have the same circumference.

4) Use the diagram and the given information to solve for each of the angles.

$\angle 4 \cong \angle 5$, $m\angle 3 = 40°$, $m\angle 6 = 120°$, and $m\angle 3 + m\angle 5 + m\angle 9 = 180°$.



a) $m\angle 1 =$ 60°

b) $m\angle 2 =$ 120°

c) $m\angle 3 =$ 40°

d) $m\angle 4 =$ 60°

e) $m\angle 5 =$ 60°

f) $m\angle 6 =$ 120°

g) $m\angle 7 =$ 120°

h) $m\angle 9 =$ 80°

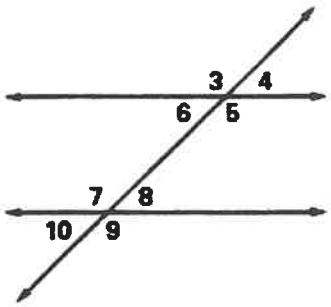
i) $m\angle 8 =$ 60°

j) $m\angle 10 =$ 100°

k) $m\angle 11 =$ 80°

Chapter 3: Parallel and Perpendicular Lines

1) **Complete the statement with *corresponding, alternate interior, alternate exterior,* or *consecutive interior.***



a) corresponding ∠3 and ∠7 are ? angles.

b) alt. ext. ∠4 and ∠10 are ? angles.

c) consecutive int. ∠5 and ∠8 are ? angles.

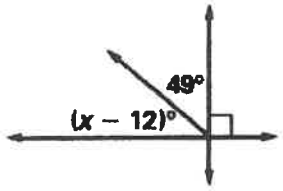
d) alt. int. ∠8 and ∠6 are ? angles.

e) corr. ∠9 and ∠5 are ? angles.

f) alt. int. ∠5 and ∠7 are ? angles.

2) **Find the value of *x*.**

a)



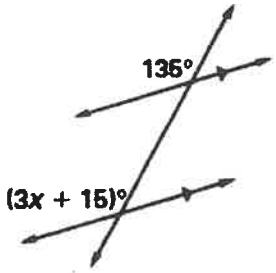
$x - 12 + 49 = 90$

$x + 37 = 90$

$x = 53$

Ans

b)



$3x + 15 = 135$

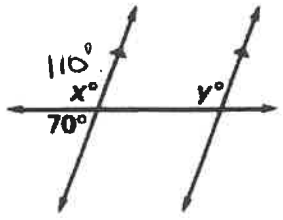
$3x = 120$

$x = 40$

Ans

Find the values of *x* and *y*.

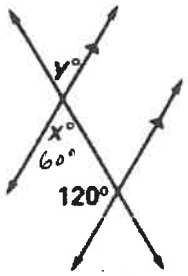
c)



$x = y = 110°$

Ans

d)



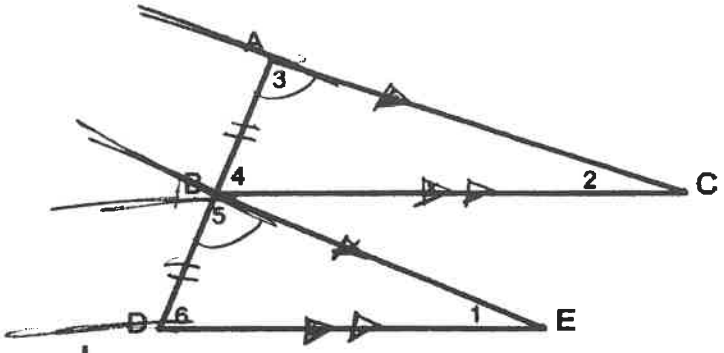
$x = y = 60°$

Ans

3 Given: B is the midpoint of $\overline{AD}$

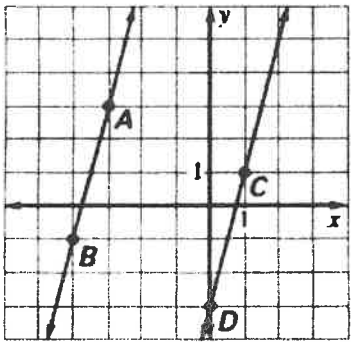
$\overline{AC} \parallel \overline{BE}$ and $\overline{BC} \parallel \overline{DE}$

Prove: $\angle 1 \cong \angle 2$



Statements	Reasons
1. B is the midpoint of $\overline{AD}$	1. Given
2. $\overline{AB} \cong \overline{BD}$	2. Definition of midpoint
3. $\overline{AC} \parallel \overline{BE}$ and $\overline{BC} \parallel \overline{DE}$	3. Given
4. $\angle 3 \cong \angle 5$ and $\angle 4 \cong \angle 6$	4. Corr. $\angle$ Postulate
5. $\Delta ABC \cong \Delta BDE$	5. ASA $\cong$
6. $\angle 1 \cong \angle 2$	6. CPCTC

4 **Find the slope of each line. Are the lines parallel?**

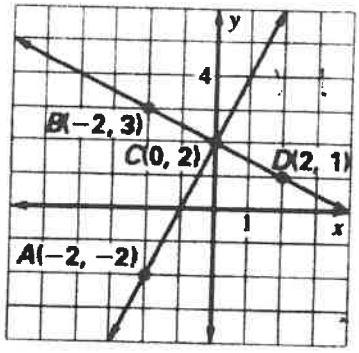


$m\overleftrightarrow{AB} = m\overleftrightarrow{CD} = \underline{4}$ ANS

Yes ANS

5)

Find the slope of $\overleftrightarrow{AC}$ and $\overleftrightarrow{BD}$. Decide whether $\overleftrightarrow{AC}$ is perpendicular to $\overleftrightarrow{BD}$.



$m\overleftrightarrow{AC} = 2$ ANS

$m\overleftrightarrow{BD} = -1/2$ ANS

Yes ANS

6) Find the value of k so that the line through the given points has the given slope. Check your solution.

$(\overset{x_1}{0}, \overset{y_1}{k})$ and $(\overset{x_2}{3}, \overset{y_2}{4})$ $m = \frac{1}{2}$

$\frac{1}{2} = \frac{4-k}{3-0}$ → $\frac{3}{2} = 4-k$

$\frac{1}{2} = \frac{4-k}{3}$

$k = 4 - \frac{3}{2} = 2.5$ ANS

✓ $\frac{4-2\frac{1}{2}}{3-0} = \frac{1.5}{3} = \frac{1}{2}$

7) Write an equation of a line that passes through the given point and has the given slope. **Put your answers in all three forms for a and b.** (point-slope, slope-intercept and standard)

a) $(-4, 3)$, $m = 2$

$y - 3 = 2(x - -4)$ ANS

$y - 3 = 2x + 8$

$y = 2x + 11$ ANS

$2x - y = -11$ ANS

b) $(7, -3)$, $m = -\frac{4}{7}$ $y - -3 = -4/7(x - 7)$ ANS

$y + 3 = -4/7x + 4$

$y = -4/7x + 1$ ANS

$7y = -4x + 7$

$4x + 7y = 7$ ANS

c) $(-11, 4)$, $m = 0$

$y = 4$ ANS

d) $(5, -12)$, $m =$ undefined

$x = 5$ ANS

8) Write an equation of the line that passes through the given point and satisfies the given condition. **Put your answers in all three forms.**

a) $(-3,-5)$; parallel to $y=-3x+1$

$y--5=-3(x--3)$ Ans

$y+5=-3x-9$

$y=-3x-14$ Ans

$3x+y=-14$ Ans

b) $(-6,2)$; perpendicular to $y=5x+1$ $\perp m=-1/5$

$y-2=-1/5(x--6)$ Ans

$y-2=-1/5x-6/5$

$y=-1/5x-6/5+10/5$

$y=-1/5x+4/5$ Ans

$5y=-x+4$

$x+5y=4$ Ans

9) Find the x- and y-intercepts of each equation

a) $y=\frac{2}{3}x-5$

$(0,-5)$ Ans

$0=2/3x-5$

$5=2/3x$

$\frac{3}{2}\cdot\frac{5}{1}=x$

$(15/2,0)$ Ans

b) $4x-2y=12$

$-2y=12$

$y=-6$

$(0,-6)$ Ans

$4x=12$

$x=3$

$(3,0)$ Ans

c) $y-3=-\frac{3}{4}(x-12)$

$y-3=-3/4(-12)$

$y=9+3=12$

$(0,12)$ Ans

$0-3=-3/4(x-12)$

$-3=-3/4(x-12)$

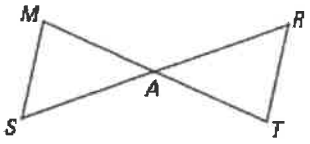
$-4/3\cdot-3=x-12$

$4=x-12$

$16=x$

$(16,0)$ Ans

Chapter 4: Congruent Triangles



1) Given: A is the midpoint of $\overline{MT}$
A is the midpoint of $\overline{SR}$

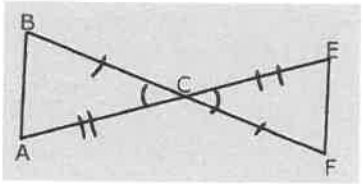
Prove: $\overline{MS} \parallel \overline{RT}$

Statements	Reasons
1). A is the midpoint of $\overline{MT}$ & $\overline{SR}$	1). Given
2). $\overline{MA} \cong \overline{AT}$ and $\overline{SA} \cong \overline{RA}$	2). Def of midpoint
3). $\angle MAS \cong \angle RAT$	3). Vertical Angles
4). $\triangle MAS \cong \triangle TAR$	4). SAS
5). $\angle S \cong \angle R$	5). CPCTC
6). $\overline{MS} \parallel \overline{RT}$	6). Alt Int $\angle$ Converse Thm
7).	7).

2)

Given: Point C is the midpoint of $\overline{BF}$ and $\overline{AC} \cong \overline{CE}$

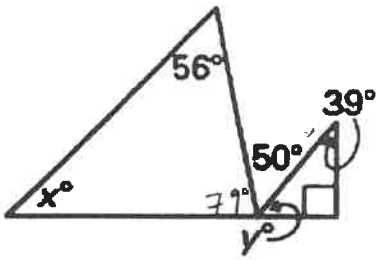
Prove: $\triangle ABC \cong \triangle EFC$



Statements	Reasons
1). Point C is the midpoint of $\overline{BF}$	1). Given
2). $\overline{BC} \cong \overline{CF}$	2). Def of a midpoint
3). $\angle BCA \cong \angle FCE$	3). Vertical Angles
4). $\overline{AC} \cong \overline{CE}$	4). Given
5). $\triangle ABC \cong \triangle EFC$	5). SAS

3) Find the values of x and y.

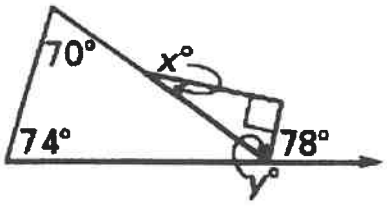
a)



$90 - 39 = 51° = y$ ANS

$x = 45°$ ANS

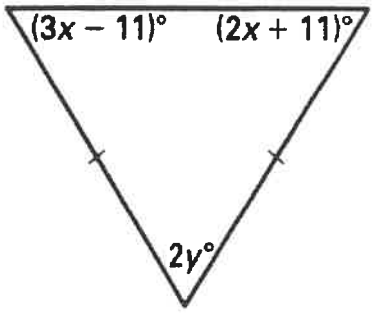
b)



$y = 66°$ ANS

$x = 24°$ ANS

c)



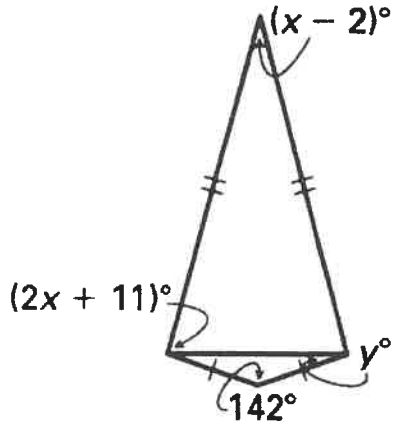
$3x - 11 = 2x + 11$

$x = 22$

$2y = 70°$

$y = 35°$ ANS

d)



$180 - 142 = 38 \div 2 = 19° = y$ ANS

$2(2x+11) + x - 2 = 180$

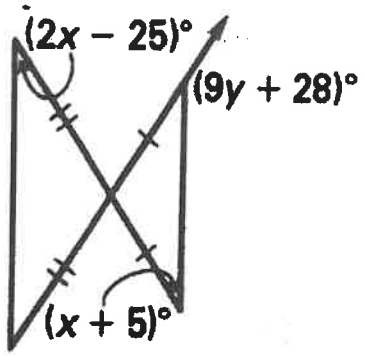
$4x + 22 + x - 2 = 180$

$5x + 20 = 180$

$5x = 160$

$x = 32$ ANS

e)



$2x - 25 = x + 5$

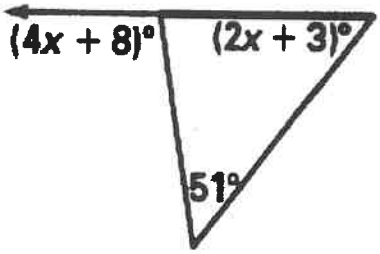
$x = 30$

$9y + 28 + 35 = 180$

$9y = 117$

$y = 13$ AWS

4) Find the measure of the exterior angle.



$4x + 8 = 2x + 3 + 51$

$2x = 46$

$x = 23$

$\therefore$ ext. $\angle = 4(23) + 8 = 100^\circ$ AWS

Chapter 5: Relationships within Triangles

1) Define, write the formula, give the formula, or draw and label a picture to help you remember the following terms, formulas, and/or theorems.

a) Midsegment: A segment that connects the midpoints of two sides of a triangle.

b) Midpoint Formula: $\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$

c) Distance Formula: $d=\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$

d) Perpendicular Bisector Theorem: If a point is on the perpendicular bisector of a segment, then it is equidistant from the end points of the segment.

e) Converse of Perpendicular Bisector Theorem: If a point is equidistant from the endpoints of a segment, then it is on the perpendicular bisector of the segment.

f) Angle Bisector Theorem: If a point is on the bisector of angle, then it is equidistant from the two sides of the angle.

g) Converse of Angle Bisector Theorem: If a point is in the interior of an angle and is equidistant from the sides of the angle, then it lies on the bisector of the angle.

h) Circumcenter: The point of concurrency of the perperdicular bisectors.

I) Incenter: The point of concurrency of the angle bisectors.

j) Concurrency of Perpendicular Bisectors of a Triangle Theorem: The perpendicular bisectors of a triangle intersect at a point that is equidistant from the vertices of the triangle.

k) Concurrency of Angle Bisectors of a Triangle Theorem: The angle bisectors of a triangle intersect at a point that is equidistant from the sides of the triangle.

l) Median: A segment whose endpoints are a vertex of the triangle and the midpoint of the opposite sides.

m) Altitude: The perpendicular segment from a vertex to the opposite side or to the line that contains the opposite side.

n) Centroid: The point of concurrency of the medians.

o) Orthocenter: The point of concurrency of the altitudes.

p) Slope Formula: $m=\frac{y_2-y_1}{x_2-x_1}$

2)

Use the diagram. $\overline{DE}$ is the perpendicular bisector of $\overline{AC}$. Find the indicated measure.

Find *AB*. 54

Find *AE*. 40

Find *AD*. 76

Find *BC*. 54

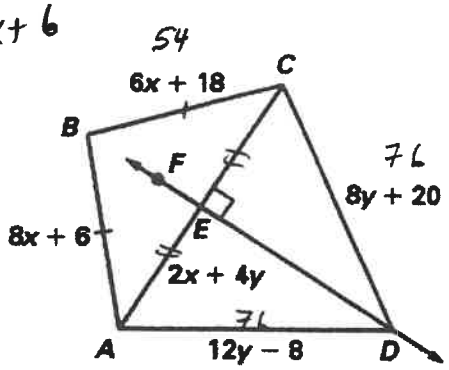
Find *AC*. 80

Find *CD*. 76

$6x+18=8x+6$

$12=2x$

$x=6$



$8y+20=12y-8$

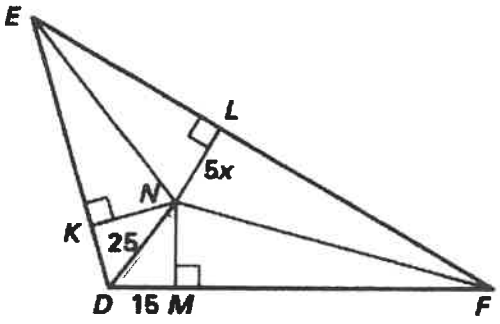
$28=4y$

$y=7$

What is the point E called?

midpoint

3) Find the value of x that makes N the incenter of the triangle. (DN = 25)



$15^2+(5x)^2=25^2$

$225+25x^2=625$

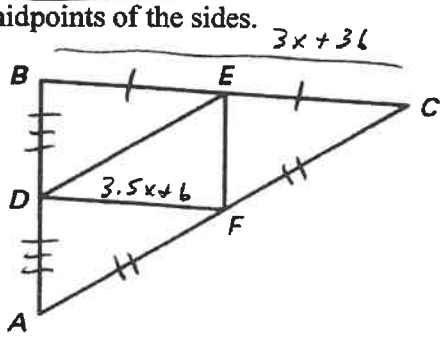
$25x^2=400$

$x^2=16$

$x=4$ ans

4) Use the diagram of triangle ABC where D, E, and F are the midpoints of the sides.

If $DF = 3.5x + 6$ and $BC = 3x + 36$, then $DF =$?



$2(3.5x+6)=3x+36$

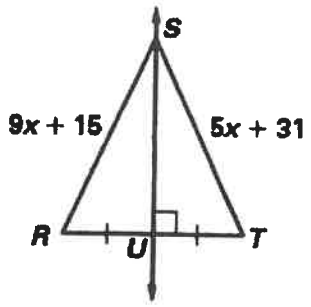
$7x+12=3x+36$

$4x=24$

$x=6$ ∴ $DF=27$ ans

5)

Find the length of $\overline{RS}$.



$9x + 15 = 5x + 31$

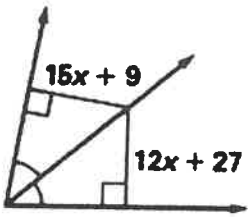
$4x = 16$

$x = 4$

$9(4) + 15 = 51$ ANS

6) Find the value of x.

a)

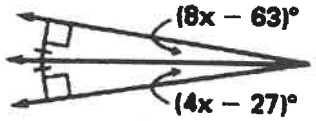


$15x + 9 = 12x + 27$

$3x = 18$

$x = 6$ ANS

b)



$8x - 63 = 4x - 27$

$4x = 36$

$x = 9$ ANS

7) Suppose that P is the incenter. FP = 50. PV = 2x + 4 and PT = 4x – 6. Show your work.

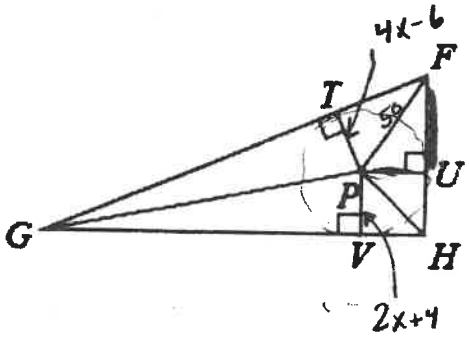
Find the value of x.

$4x - 6 = 2x + 4$

$2x = 10$

$x = 5$

5 ANS



Find the length of PU.

$2(5) + 4$

14 ANS

Find the length of UF.

$14^2 + UF^2 = 50^2$

$UF^2 = 2304$

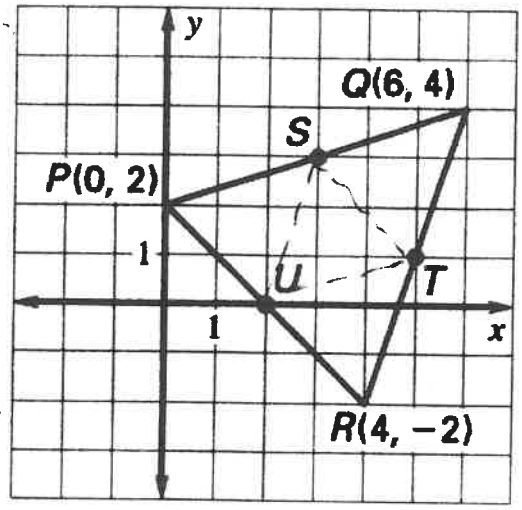
$UF = 48$ ANS

8) Find the coordinates of the endpoints of each midsegment of triangle PQR. You **MUST** use the midpoint formula to receive credit for your work.

$S = \left(\frac{0+6}{2}, \frac{2+4}{2}\right) = (3, 3)$ Ans

$T = \left(\frac{6+4}{2}, \frac{4+-2}{2}\right) = (5, 1)$ Ans

$U = \left(\frac{0+4}{2}, \frac{2+-2}{2}\right) = (2, 0)$ Ans



Draw in the midsegments.

9) What is the length of RQ?

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

$= \sqrt{4 \cdot 10}$

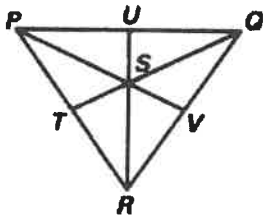
$= 2\sqrt{10}$ Ans

10) What is the length of US?

$\frac{1}{2}(2\sqrt{10}) = \sqrt{10}$ Ans

11) Point S is the centroid of triangle PQR. Use the given information to find the value of x.

***QS* = 3x + 5 and *QT* = 4x + 11**



$QS = \frac{2}{3} QT$

$3x + 5 = \frac{2}{3}(4x + 11)$

$3x + 5 = \frac{8}{3}x + \frac{22}{3}$

$\frac{9}{3}x + \frac{15}{3} = \frac{8}{3}x + \frac{22}{3}$

$\frac{1}{3}x = \frac{7}{3}$

$x = 7$ Ans

✓ $QS = 26$

$QT = 39$