Honors Geometry
Semester 1 Final Study Guide Key

Name:
Period:

Please read ALL of the directions! Show ALL work for FULL credit! Make sure to answer ALL parts of ALL questions!

1) Complete the conjecture based on the pattern you observe in the specific cases.

Conjecture: The product of a number (n-1) and (n+1) is always equal to $n^2 - 1$.

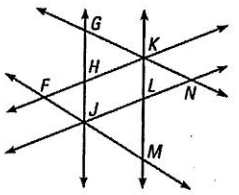
$3 \times 5 = 4^2 - 1$ $\quad 4 \times 6 = 5^2 - 1$ $\quad 5 \times 7 = 6^2 - 1$

$6 \times 8 = 7^2 - 1$ $\quad 7 \times 9 = 8^2 - 1$ $\quad 8 \times 10 = 9^2 - 1$

2) Use the diagram at the right for parts a and b. Name a point that is collinear with the given points.

a. F and H K

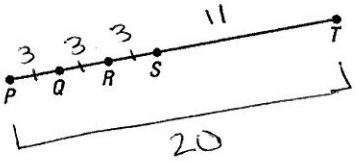
b. M and J F



3) In the diagram of the collinear points, PT = 20, QS = 6, and PQ = QR = RS. Find each length.

a. QR 3

b. RT 14



4) Find the coordinates of the other endpoint of a segment with endpoint T(-8, -1) and midpoint M(0, 3).

$\left(\frac{-8+x}{2}, \frac{-1+y}{2}\right) = (0, 3)$

$\frac{-8+x}{2} = 0$

$-8 + x = 0$

$x = 8$

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

$-1 + y = 6$

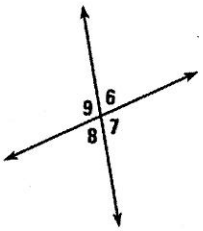
$y = 7$

$\boxed{(8, 7)}$

5) Use the figure at the right.

a. If $m\angle 6 = 72°$, then $m\angle 7 =$ 108°.

b. If $m\angle 8 = 80°$, then $m\angle 6 =$ 80°.

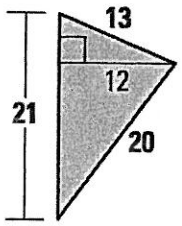


6) Find the area of the figure.

$\frac{1}{2}bh$

$\frac{1}{2}(21)(12) = 126$

126 square units



7) Write the converse of the following statement. If <2 measures 38°, then <2 is acute.

If ∠2 is acute, then ∠2 measures 38°.

8) Rewrite the biconditional statement as a conditional statement and its converse. Two angles are congruent if and only if they have the same measures.

Conditional: If two angles are congruent, then they have the same measures.

Converse: If two angles have the same measures, then they are congruent.

9) Use the Law of Syllogism to write the statement that follows from the pair of true statements.
If the stereo is on, then the volume is loud.
If the volume is loud, then the neighbors will complain.

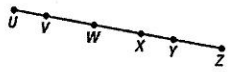
If the stereo is on, then the neighbors will complain.

10) Use the property to complete the statement.
a. Substitution property of equality: If LK + JM = 12 and LK = 2, then JM = 10.

b. Transitive property of equality: If BC = CD and CD = EF, then BC = EF.

11) Write a complete proof by rearranging the reasons listed below.

GIVEN ▶ $\overline{UV} \cong \overline{XY}$, $\overline{VW} \cong \overline{WX}$, $\overline{WX} \cong \overline{YZ}$
PROVE ▶ $\overline{UW} \cong \overline{XZ}$

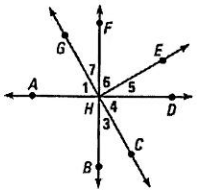


Statements	Reasons
1. $\overline{UV} \cong \overline{XY}$, $\overline{VW} \cong \overline{WX}$, $\overline{WX} \cong \overline{YZ}$	Transitive Property of Segment Congruence (2)
2. $\overline{VW} \cong \overline{YZ}$	Addition property of equality (4)
3. $UV = XY$, $VW = YZ$	Definition of congruent segments (3/7)
4. $UV + VW = XY + YZ$	Given (1)
5. $UV + VW = UW$, $XY + YZ = XZ$	Segment Addition Postulate (5)
6. $UW = XZ$	Definition of congruent segments (3/7)
7. $\overline{UW} \cong \overline{XZ}$	Substitution property of equality (6)

12) Complete the following statements given that m<EHC = m<DHB = m<AHB = 90°.

a) If m<7 = 28°, then m<3 = 28°.

b) If m<3 = 34°, then m<5 = 34°.



13) Use the following answer choices for parts a-d.

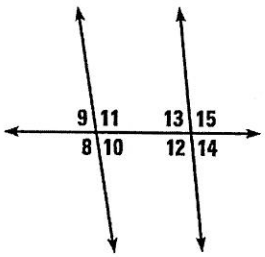
A) Corresponding B) Alternate Interior C) Alternate Exterior D) Same-Side Interior

a) <8 and <12 are Corresponding angles.

b) <9 and <14 are Alt. Exterior angles.

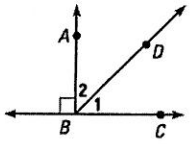
c) <10 and <12 are Same-Side Interior angles.

d) <11 and <12 are Alt. Interior angles.



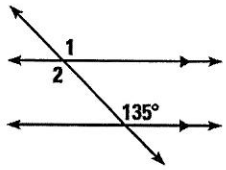
14) What can you conclude about the labeled angles?

$\overline{AB} \perp \overline{CB}$



∠1 & ∠2 are complementary

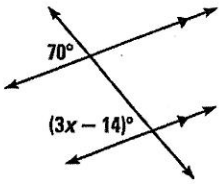
15) Find m<1 and m<2.



m∠1 = 135°

m∠2 = 135°

16) Find the value of x.



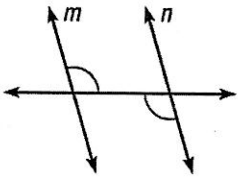
3x − 14 = 70

3x = 84

x = 28

17) Is it possible to prove that lines m and n are parallel? If so, state the postulate or theorem you would use.

Yes, Alt. Interior Converse

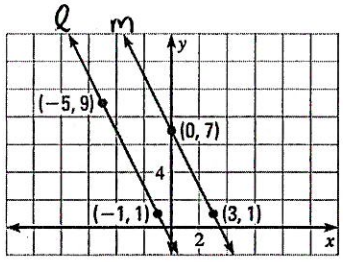


18) Write an equation of the lie that passes through P(0, -6) and has a slope of m = -2.

$y = mx + b$ (b)

$y = -2x - 6$

19) Find the slope of each line. Are the lines parallel?



$l \rightarrow \frac{9-1}{-5-1} \rightarrow \frac{8}{-4} \rightarrow -2$

$m \rightarrow \frac{7-1}{0-3} \rightarrow \frac{6}{-3} \rightarrow -2$

yes, they are parallel

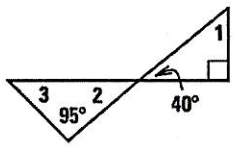
20) Line j is perpendicular to the line with the equation $y = 1/2x - 1$ and line j passes through P(0,3). Write an equation of the line j.

$m = -2$

5

$y = -2x + 3$

21) Find the measures of all of the numbered angles.



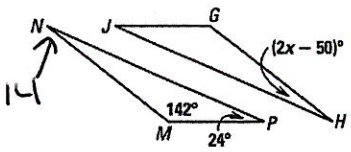
$m\angle 1 = 50°$ (180-90-40)

$m\angle 2 = 40°$ (vertical $\angle$s)

$m\angle 3 = 45°$ (180-95-40)

22) Use the given information to find the indicated variables.

Given $\angle M \cong \angle G$ and $\angle N \cong \angle H$, find the value of x.



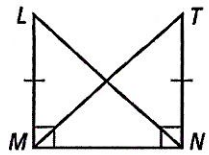
$2x - 50 = 14$

$2x = 64$

$x = 32$

23) Decide whether enough information is given to prove that the triangles are congruent. If there is enough information, state the congruence postulate you would use.

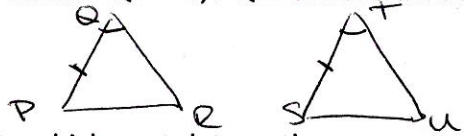
$\triangle LMN, \triangle TNM$



yes, SAS

24) State the third congruence that must be given to prove that $\Delta PQR \cong \Delta STU$ using the indicated postulate or theorem. (Hint: First sketch ΔPQR and ΔSTU. Mark the triangles with the given information.)

Given: <Q ≅ <T, PQ ≅ ST. Use the AAS Congruence Theorem.

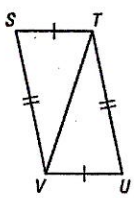


$\angle R \cong \angle U$

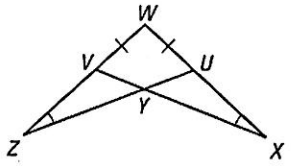
25) State which postulate or theorem you can use to prove that the triangles are congruent. Then explain how proving that the triangles are congruent proves the given statement.

SSS, CPCTC

PROVE ▶ $\angle STV \cong \angle UVT$

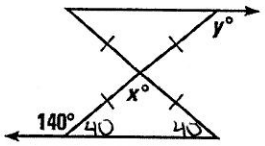


26) **GIVEN** ▶ $\overline{VW} \cong \overline{UW}$
$\angle X \cong \angle Z$
PROVE ▶ $\triangle XWV \cong \triangle ZWU$



Statements	Reasons
1. $\overline{VW} \cong \overline{UW}$	1. ? Given
2. $\angle X \cong \angle Z$	2. ? Given
3. ? $\angle W \cong \angle W$	3. Reflexive Property of Congruence
4. $\triangle XWV \cong \triangle ZWU$	4. ? AAS

27) Solve for x and y.



x = 100

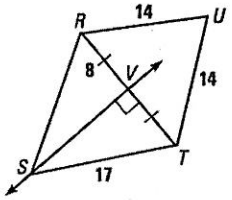
y = 140

28) a) In the diagram, SV ⊥ RT and VR ≅ VT. Find VT.

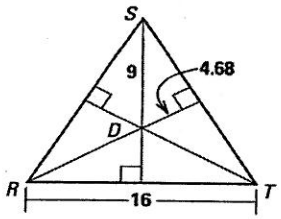
8

b) In the diagram, SV ⊥ RT and VR ≅ VT. Find SR.

17



29) The perpendicular bisectors of RST meet at point D. Find DR.



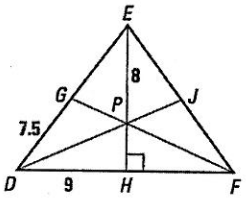
9

(⊥ bisectors meet @ pt. that is equidistant from each vertex)

30) Use the figure and the given information: P is the centroid of ΔDEF, EH ⊥ DF. DH = 9, DG = 7.5, EP = 8, and DE = FE.

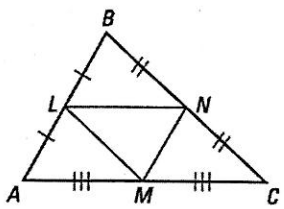
a) Find the length of FH. 9

b) Find the length of EH. 12



EP = 8 ⇒ PH = 4

31) If LM = 3x + 7 and BC = 7x + 6, then LM = 31.



2(3x+7) = 7x+6

6x+14 = 7x+6

8 = x

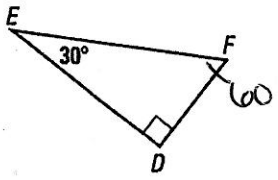
LM

3(8)+7

24+7

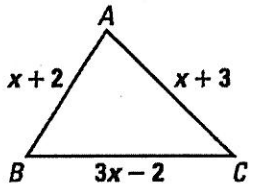
31

32) List the sides in order from shortest to longest.



$\overline{DF}$
$\overline{DE}$
$\overline{EF}$

33) Solve the inequality AB + AC > BC for the following triangle.



$x+2+x+3 > 3x-2$

$2x+5 > 3x-2$

$7 > x$

$(x < 7)$

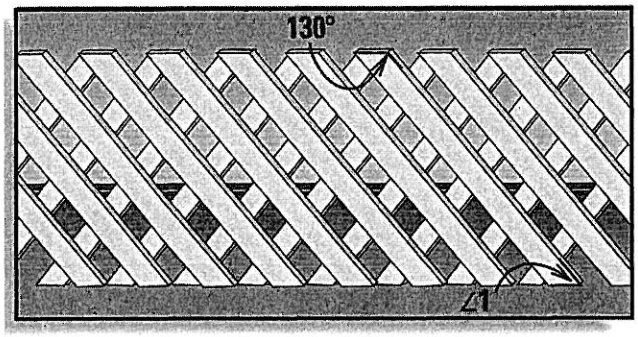
34) Suppose you are studying bacteria in a biology class. The table shows the number of bacteria after n doubling periods.

n (periods)	0	1	2	3	4	5
Billions of Bacteria	3	6	12	24	48	96

You want to predict the number of bacteria after 8 doubling periods. What would your prediction be?

768 billion

35) You are making a lattice fence out of pieces of wood called slats. You want the top of each slat to be parallel to the bottom. At what angle should you cut <1? Why?



$m\angle 1 = 50°$, $\angle 1$ & the given $\angle$ are same-side interior $\angle$s which are supplementary