

## CHAT Geometry – First Semester Extra Credit

Instructions: You only need to print the answer sheet and the construction sheet. The actual packet can be viewed on your computer, if desired, or it can be printed. All that will be handed in is the answer sheet and the construction sheet.

Note: This is an open book worksheet packet. You can use your notes and your book.

### Extra Credit Amount:

5 points for scores of 50% - 60%

8 points for scores of 61% - 74%

10 points for scores of 75% - 90%

12 points for scores of 91% - 100%

CHAT Geometry  
Semester 1 Extra Credit

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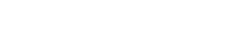
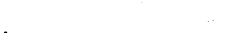
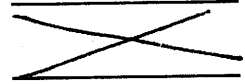
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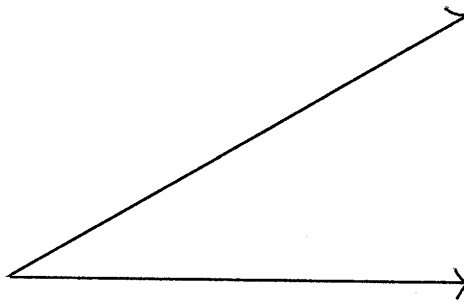


# CHAT Geometry – First Semester Extra Credit

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Construct an angle whose measure is  $2\frac{1}{4}$  times the measure of the original angle.

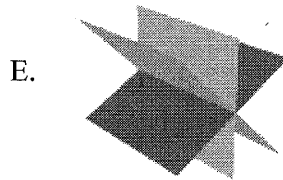
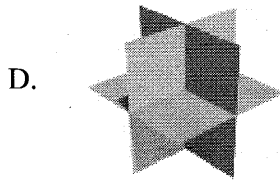
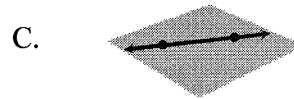
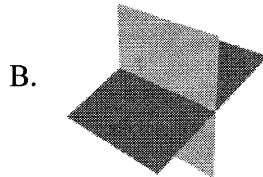
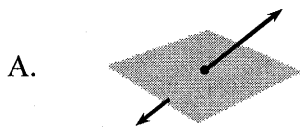
Do the construction.



# CHAT Geometry – First Semester Extra Credit

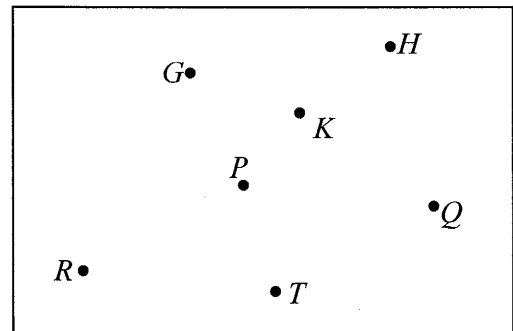
**Part I: Multiple Choice.** Write the letter of the single, correct answer to each problem on the *left* of the problem. (Each problem is worth 1 point.)

**Problems 1-4:** Use the following choices:



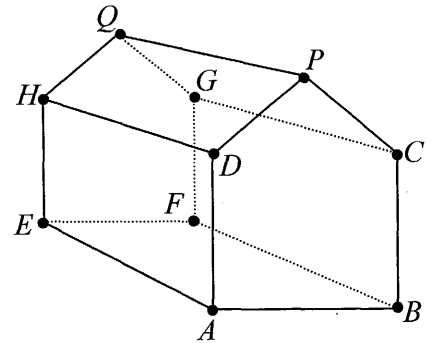
- \_\_\_ 1. Which picture best illustrates the following postulate?  
*“The intersection of two planes is a line.”*
- \_\_\_ 2. Which picture best illustrates the following postulate?  
*“If two points are in a plane, then the line containing them is in that plane.”*
- \_\_\_ 3. Which picture best illustrates the fact that the intersection of three planes can be a line?
- \_\_\_ 4. Which picture best illustrates the fact that the intersection of a line and a plane can be a single point?
- \_\_\_ 5. Which three points in the figure on the right are *collinear*?

- A.  $G, K$  and  $Q$       B.  $H, K$  and  $P$   
 C.  $H, K$  and  $R$       D.  $K, P$  and  $R$   
 E.  $G, P$  and  $T$



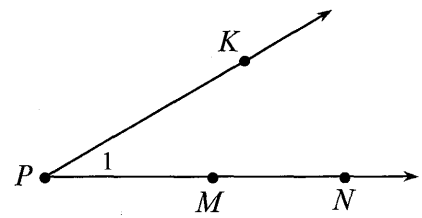
**Problems 6-8:**

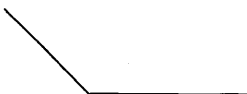
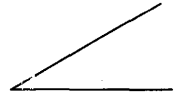
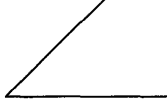

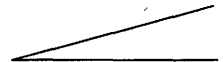
The figure on the right is a 3-dimensional drawing of a shed with no doors or windows. Its roof, sides and floor are parts of seven different planes. Planes  $ABC$  and  $EFG$  (containing the front and back walls) are parallel, as are planes  $ADH$  and  $BCG$  (containing the left and right walls). No other planes determined by the roof, walls or floor of this shed are parallel.



- \_\_\_ 6. Which of the following points is *coplanar* with points  $H, Q$  and  $P$ ?
- A. point  $A$     B. point  $B$     C. point  $C$     D. point  $D$     E. point  $E$
- \_\_\_ 7. Name the intersection of *plane*  $HQP$  with *plane*  $ABC$ .
- A.  $\overleftrightarrow{DP}$     B. point  $P$     C.  $\overleftrightarrow{CP}$     D. point  $C$     E.  $\overleftrightarrow{PQ}$
- \_\_\_ 8. What geometric object is the intersection of  $\overleftrightarrow{AB}$  with *plane*  $HQP$ ?
- A. a line    B. a point    C. a plane    D. a puppy    E. a banana

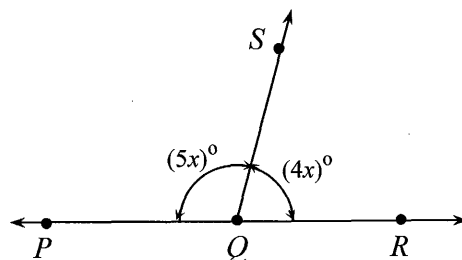
- \_\_\_ 9. Which is NOT a valid name for the angle depicted on the right?
- A.  $\angle KPN$     B.  $\angle MPK$     C.  $\angle P$
- D.  $\angle KNP$     E.  $\angle 1$



- \_\_\_ 10. Which of these angles has a measure closest to  $30^\circ$ ?
- A.     B.     C. 
- D.     E. 

11. In the figure on the right, points  $P$ ,  $Q$  and  $R$  are collinear. What is the measure of  $\angle RQS$ ?

- A.  $40^\circ$       B.  $20^\circ$       C.  $80^\circ$   
 D.  $50^\circ$       E.  $100^\circ$

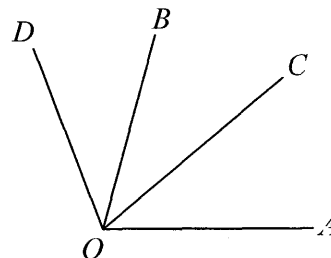


12. If  $\angle A$  and  $\angle B$  are complementary,  $\angle B$  and  $\angle C$  are supplementary, and  $m\angle A = 64^\circ$ , then what is the measure of  $\angle C$ ?

- A.  $64^\circ$       B.  $180^\circ$       C.  $26^\circ$       D.  $90^\circ$       E.  $154^\circ$

13. In this figure,  $m\angle AOB = 70^\circ$ ,  $m\angle COD = 60^\circ$ , and  $m\angle AOD = 100^\circ$ . What is  $m\angle COB$ ?

- A.  $10^\circ$       B.  $65^\circ$       C.  $35^\circ$   
 D.  $60^\circ$       E.  $30^\circ$



**Problems 14-16:** Refer to the figure on the right, in which  $M$ ,  $R$  and  $Q$  are collinear and  $m\angle MRN = 90^\circ$ :

14. Which of the following is a *straight angle*?

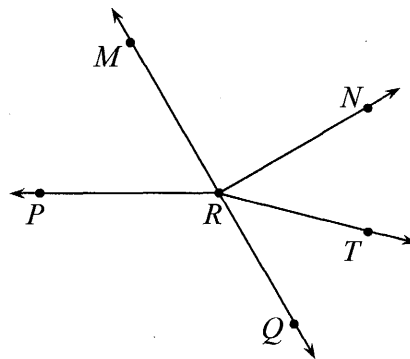
- A.  $\angle MRN$       B.  $\angle PMR$       C.  $\angle MRQ$   
 D.  $\angle PRN$       E.  $\angle NTR$

15. Which of the following is an *obtuse angle*?

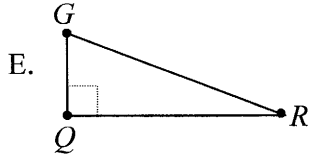
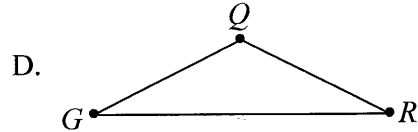
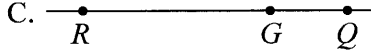
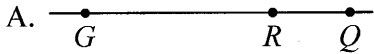
- A.  $\angle MRQ$       B.  $\angle PRN$       C.  $\angle NTR$       D.  $\angle MRN$       E.  $\angle PMR$

16. Which of the following angles is *adjacent* to  $\angle NRT$ ?

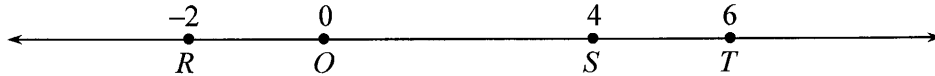
- A.  $\angle QRT$       B.  $\angle MRT$       C.  $\angle PRM$       D.  $\angle PRN$       E.  $\angle PMR$



17. In which of the following diagrams is it true that  $GQ + RQ = GR$ ?



18. Point  $P$  (not shown) on the number line is 5 units from point  $T$  and 3 units from point  $S$ .



Where is point  $P$  located?

- A. Between  $R$  and  $O$       B. Between  $O$  and  $S$       C. Between  $S$  and  $T$   
 D. To the left of  $R$       E. To the right of  $T$

19. Towns  $A$ ,  $B$  and  $C$  are located along a straight highway. Town  $B$  is between  $A$  and  $C$ , and the distance from  $B$  to  $C$  is 17 miles more than the distance from  $A$  to  $B$ . If  $A$  and  $C$  are 95 miles apart, how far is it from town  $B$  to town  $C$ ?

- A. 42 miles      B. 29 miles      C. 56 miles      D. 45 miles      E. 39 miles

20. The process of making a *conjecture* based on a series of observed patterns is known as

- A. deductive reasoning      B. obfuscation      C. proof  
 D. inductive reasoning      E. brawling

21. When a *conjecture* has been proved, it becomes a

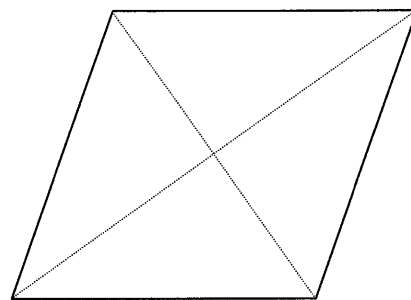
- A. postulate      B. diagram      C. theorem      D. definition      E. assertion

22. Which of the following is the *converse* of the statement, “if a quadrilateral is a square, then its four sides are congruent”?

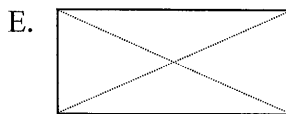
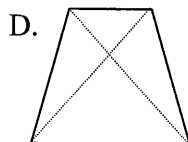
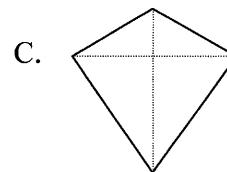
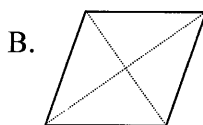
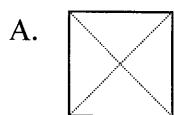
- A. If the four sides of a quadrilateral are congruent, then it is a square.
- B. If a square is a quadrilateral, then its four sides are congruent.
- C. If the four sides are congruent, then it is a quadrilateral square.
- D. If four sides are congruent, then the square is a quadrilateral.
- E. If a square has four congruent sides, then it is a quadrilateral

23. The figure on the right is a rhombus. Which of the following statements about it is NOT true?

- A. Its diagonals bisect each other.
- B. Its diagonals are congruent.
- C. Its diagonals are perpendicular.
- D. Each pair of opposite angles are congruent.
- E. Each pair of consecutive angles are supplementary.

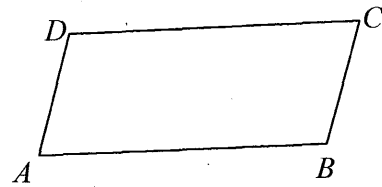


24. Which of the following figures is a counterexample to the false statement, “if the diagonals of a quadrilateral are congruent and bisect each other, then the quadrilateral is a square”?





25. Given quadrilateral  $ABCD$ , which statement would allow the conclusion that  $ABCD$  is a parallelogram?

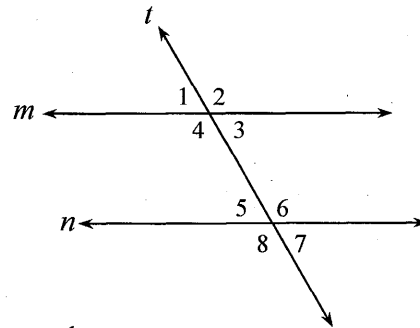


- A.  $\angle A \cong \angle C$       B.  $\overline{AD} \cong \overline{BC}$   
 C.  $m\angle A + m\angle D = 180^\circ$       D.  $\overline{AD} \parallel \overline{BC}$       E. None of these

26. Which of the following statements is *always true* regarding a parallelogram?

- A. The diagonals are perpendicular to each other.  
 B. The sum of the angles is  $180^\circ$ .  
 C. Opposite sides are both parallel and congruent.  
 D. There cannot be a right angle in any parallelogram.  
 E. Consecutive angles are complementary.

**Problems 27-29:** In the figure on the right, lines  $m$  and  $n$  are cut by transversal  $t$ .



27.  $\angle 1$  and  $\angle 5$  are:

- A. corresponding angles      B. vertical angles  
 C. alternate interior angles      D. alternate exterior angles  
 E. same side exterior angles

28.  $\angle 3$  and  $\angle 5$  are:

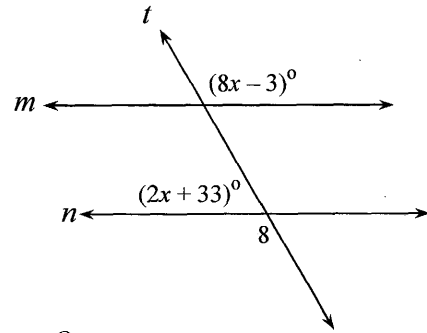
- A. corresponding angles      B. vertical angles      C. alternate interior angles  
 D. alternate exterior angles      E. same side exterior angles

29.  $\angle 5$  and  $\angle 7$  are:

- A. corresponding angles      B. vertical angles      C. alternate interior angles  
 D. alternate exterior angles      E. same side exterior angles

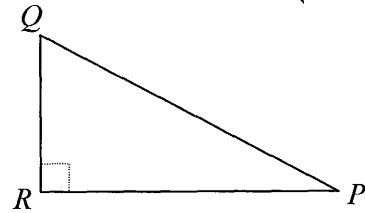
30. In the figure on the right, lines  $m$  and  $n$  are parallel. Find  $m\angle 8$ .

- A.  $45^\circ$       B.  $117^\circ$       C.  $75^\circ$   
 D.  $135^\circ$       E.  $113^\circ$



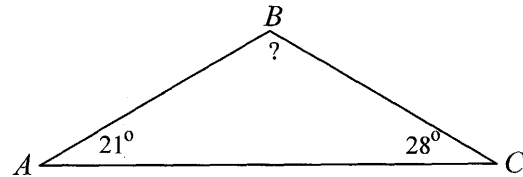
31. In the triangle on the right,  $m\angle P = 25^\circ$ . What is the measure of  $\angle Q$ ?

- A.  $75^\circ$       B.  $105^\circ$       C.  $55^\circ$   
 D.  $25^\circ$       E.  $65^\circ$



32. What is the measure of  $\angle B$  in this triangle?

- A.  $49^\circ$       B.  $41^\circ$       C.  $131^\circ$   
 D.  $139^\circ$       E.  $141^\circ$

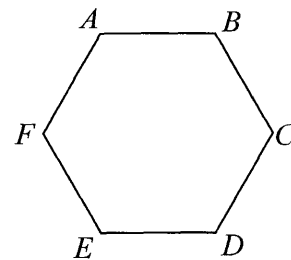


33. In a quadrilateral, two of the angles each have a measure of  $110^\circ$ , and the measure of a third angle is  $90^\circ$ . What is the measure of the remaining angle?

- A.  $50^\circ$       B.  $130^\circ$       C.  $90^\circ$       D.  $140^\circ$       E. None of these

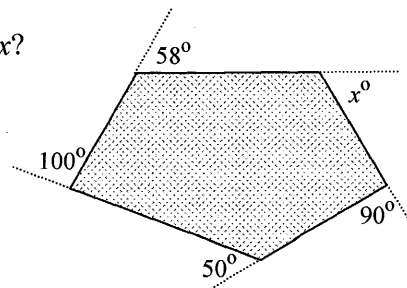
34.  $ABCDEF$  is a regular hexagon. What is the measure of  $\angle A$ ?

- A.  $108^\circ$       B.  $72^\circ$       C.  $120^\circ$   
 D.  $60^\circ$       E.  $144^\circ$



35. In the pentagon at the right, what is the value of  $x$ ?

- A. 62      B. 118      C. 58  
 D. 158      E. 82

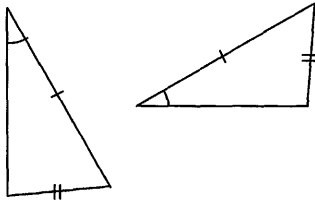


- \_\_\_ 42. If the slope a certain line is  $-\frac{2}{3}$ , then which of the following is the slope of a line *perpendicular* to that line?
- A.  $\frac{2}{3}$       B. 2      C.  $-\frac{3}{2}$       D.  $\frac{3}{2}$       E. -3

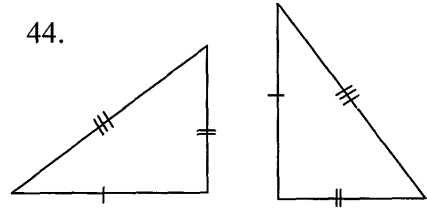
**Problems 43-46:** Use the following choices for the two triangles given.

- A. The triangles are congruent by **SAS**.
- B. The triangles are congruent by **ASA**.
- C. The triangles are congruent by **SSS**.
- D. The triangles are congruent by **SAA**.
- E. The triangles might not be congruent.

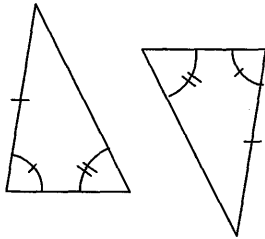
\_\_\_ 43.



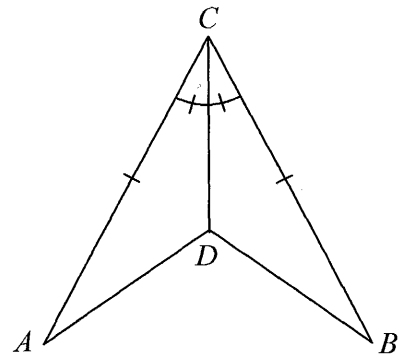
\_\_\_ 44.



\_\_\_ 45.

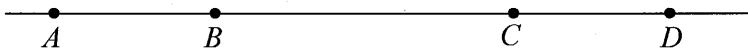


\_\_\_ 46.  $\triangle ACD$  and  $\triangle BCD$ :

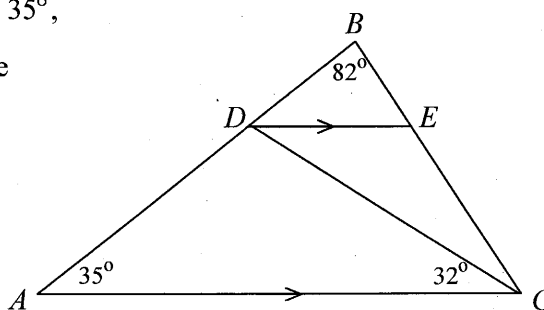


**Part II: Written.** Show all work.

47. In the figure below,  $AC = BD$ ,  $AB = CD$ ,  $BC = 2CD$ , and  $AD = 132$ . What is the length of  $AC$ ?



48. In  $\triangle ABC$ ,  $\overline{DE} \parallel \overline{AC}$ ,  $m\angle B = 82^\circ$ ,  $m\angle A = 35^\circ$ , and  $m\angle ACD = 32^\circ$ . Find the indicated angle measures:

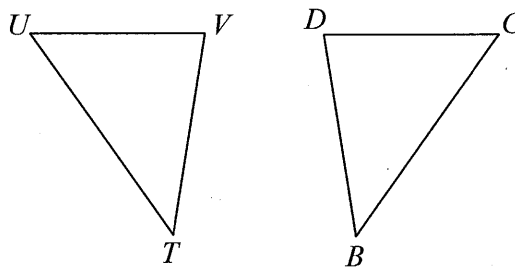


$m\angle BDE =$  \_\_\_\_\_

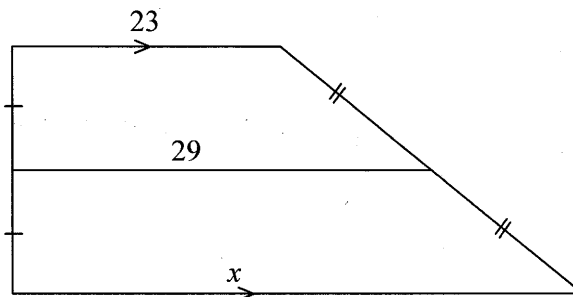
$m\angle EDC =$  \_\_\_\_\_

$m\angle ECD =$  \_\_\_\_\_

49. If  $\triangle TUV \cong \triangle BCD$ ,  $m\angle V = x^\circ$ ,  $CD = y$ ,  $m\angle D = 80^\circ$ , and  $UV = 13$ , find the values of  $x$  and  $y$ .

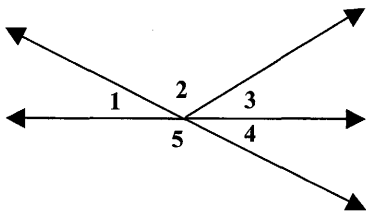


50. Find the value of  $x$ :



# CHAT Geometry – First Semester Extra Credit

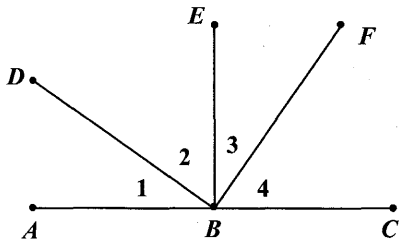
1. Use the figure below.



Which best describes the pair of angles:  $\angle 4$  and  $\angle 5$ ?

- A. vertical
- B. adjacent
- C. linear pair
- D. complementary

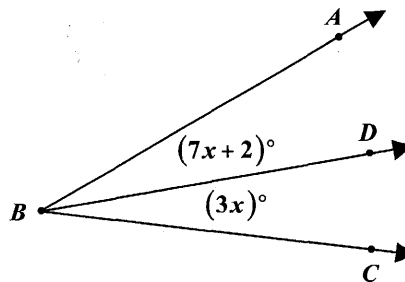
2. In the diagram below,  $\angle DBF$ ,  $\angle EBC$ , and  $\angle EBA$  are right angles.



Which best describes the pair of angles:  $\angle 1$  and  $\angle 4$ ?

- A. vertical
- B. adjacent
- C. supplementary
- D. complementary

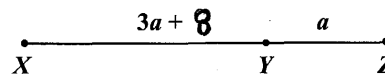
3. In the diagram below,  $m\angle ABC = 42^\circ$ .



What is the value of  $x$ ?

- A. 2
- B.  $3\frac{1}{2}$
- C. 4
- D.  $4\frac{2}{5}$

4. In the figure below,  $Y$  is between  $X$  and  $Z$  and  $XZ = 40$  cm.



What is the value of  $a$ ?

- A. 4
- B. 8
- C. 12
- D. 16

5. What is the distance between points  $A(-2, -6)$  and  $B(-2, -3)$ ?

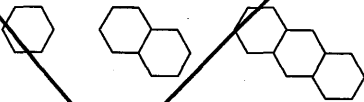
- A. 3
- B.  $\sqrt{41}$
- C. 9
- D.  $\sqrt{89}$

# CHAT Geometry – First Semester Extra Credit

6. What are the coordinates of the midpoint of the segment joining the points  $A(-3, -4)$  and  $B(4, 2)$ ?

- A.  $(-3\frac{1}{2}, 3)$
- B.  $(-\frac{1}{2}, -1)$
- C.  $(\frac{1}{2}, -1)$
- D.  $(\frac{1}{2}, -3)$

7. In the pattern below, the sides of each regular hexagon have a length of 1 unit.



What is the perimeter of the 5<sup>th</sup> figure?

- A. 18 units
- B. 22 units
- C. 26 units
- D. 30 units

8. In the scientific method, after one makes a conjecture, one tests the conjecture. What type of reasoning is used?

- A. conclusive
- B. deductive
- C. inductive
- D. scientific

9. All donks are widgets. Which statement can be written using the rules of logic?

- A. A donk is a widget if and only if it is an object.
- B. An object is a donk if and only if it is a widget.
- C. If an object is a widget, then it is a donk.
- D. If an object is a donk, then it is a widget.

10. Which statement is the inverse of: *If  $x = 5$ , then  $x > 3$ ?*

- A. If  $x = 3$ , then  $x < 5$ .
- B. If  $x \leq 3$ , then  $x \neq 5$ .
- C. If  $x > 3$ , then  $x = 5$ .
- D. If  $x \neq 5$ , then  $x \leq 3$ .

11. Which is a valid counterexample of the converse of the statement: *If Hedley lives in North Las Vegas, then he lives in Nevada?*

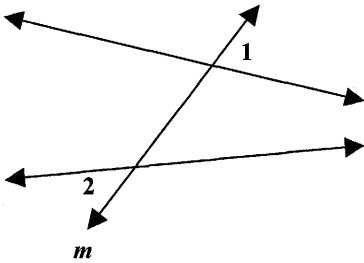
- A. Hedley lives in Phoenix.
- B. Hedley lives in California.
- C. Hedley lives in Reno.
- D. Hedley lives in the United States.

12. Which is the contrapositive to the statement: *If  $n$  is odd, then  $n^2 + 2n + 1$  is even.*

- A. If  $n^2 + 2n + 1$  is odd, then  $n$  is even.
- B. If  $n^2 + 2n + 1$  is even, then  $n$  is odd.
- C. If  $n$  is even, then  $n^2 + 2n + 1$  is odd.
- D. If  $n$  is even, then  $n^2 + 2n + 1$  is even.

# CHAT Geometry – First Semester Extra Credit

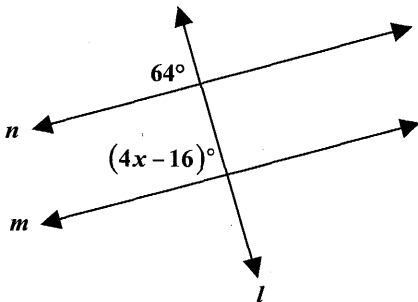
13. In the figure below, line  $m$  is a transversal.



Which best describes the pair of angles:  $\angle 1$  and  $\angle 2$ ?

- A. alternate exterior
- B. alternate interior
- C. corresponding
- D. vertical

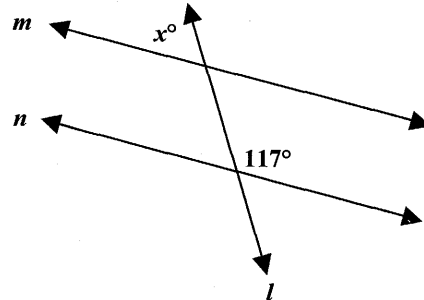
14. In the figure below,  $n \parallel m$  and  $l$  is a transversal.



What is the value of  $x$ ?

- A. 33
- B. 29
- C. 20
- D. 16

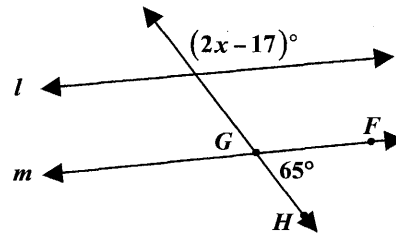
15. In the figure below,  $n \parallel m$  and  $l$  is a transversal.



What is the value of  $x$ ?

- A. 180
- B. 117
- C. 63
- D. 53

16. In the figure below,  $m\angle FGH = 65^\circ$ .

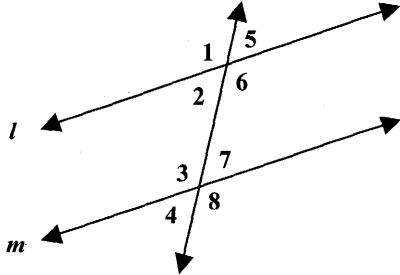


What value of  $x$  would make line  $l$  parallel to line  $m$ ?

- A. 41
- B. 49
- C. 65
- D. 66

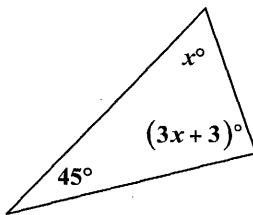
# CHAT Geometry – First Semester Extra Credit

17. In the figure below, lines  $l$  and  $m$  are parallel.



Which statement is true?

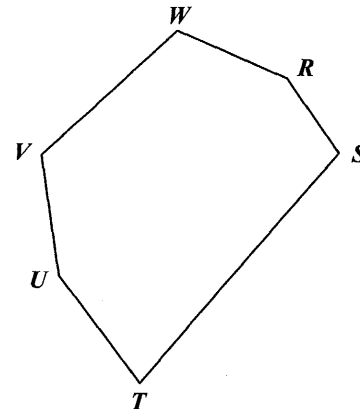
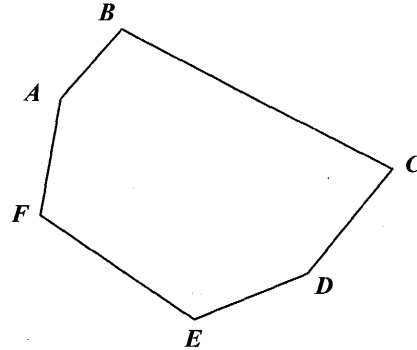
- A.  $\angle 1$  and  $\angle 3$  are congruent.
  - B.  $\angle 1$  and  $\angle 8$  are supplementary.
  - C.  $\angle 2$  and  $\angle 4$  are supplementary.
  - D.  $\angle 6$  and  $\angle 7$  are congruent.
18. Which is a valid classification for a triangle?
- A. Acute right
  - B. Isosceles scalene
  - C. Isosceles right
  - D. Obtuse equiangular
19. Use the triangle below.



What is the value of  $x$ ?

- A. 29
- B. 33
- C. 44
- D. 49

20. In the figures below,  
 $ABCDEF \cong RSTUVW$ .



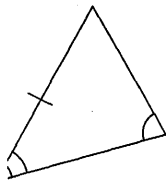
Which side of  $RSTUVW$  corresponds to  $\overline{DE}$ ?

- A.  $\overline{RW}$
- B.  $\overline{SR}$
- C.  $\overline{UT}$
- D.  $\overline{UV}$



# CHAT Geometry – First Semester Extra Credit

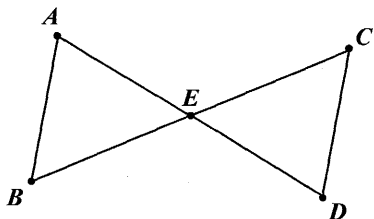
21. Use the triangles below.



Which congruence postulate or theorem would prove that these two triangles are congruent?

- A. angle-angle-side
- B. angle-side-angle
- C. side-angle-side
- D. side-side-side

22. In the diagram below,  $\overline{AB} \cong \overline{DC}$  and  $\overline{AB} \parallel \overline{DC}$ .



Which congruence postulate or theorem would prove that these two triangles are congruent?

- A. side-side-side
- B. angle-angle-angle
- C. side-angle-side
- D. angle-side-angle

23. Given that  $\triangle RST \cong \triangle XYZ$ ,  $m\angle R = (6n+1)^\circ$ ,  $m\angle Y = 108^\circ$ , and  $m\angle Z = (9n-4)^\circ$ , what is the value of  $n$ ?

- A.  $\frac{5}{3}$
- B. 5
- C.  $\frac{107}{6}$
- D.  $\frac{179}{6}$

24. Given that  $\triangle PQR \cong \triangle JKL$ ,  $PQ = 4x+12$ ,  $JK = 7x-6$ ,  $KL = 2x+17$ , and  $JL = 5x-7$ , what is the value of  $x$ ?

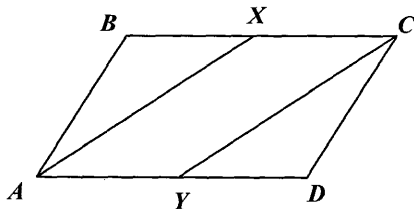
- A.  $2\frac{1}{2}$
- B. 6
- C.  $12\frac{4}{7}$
- D. 19

# CHAT Geometry – First Semester Extra Credit

25. The statements for a proof are given below.

**Given:** Parallelogram  $ABCD$   
 $\overline{BX} \cong \overline{DY}$

**Prove:**  $\angle BAX \cong \angle YCD$



**Proof:**

STATEMENTS	REASONS
1. Parallelogram $ABCD$ $\overline{BX} \cong \overline{DY}$	1. Given
2. $\angle B \cong \angle D$	2.
3. $\overline{AB} \cong \overline{DC}$	3.
4. $\triangle ABX \cong \triangle CDY$	4.
5. $\angle 1 \cong \angle 2$	5.

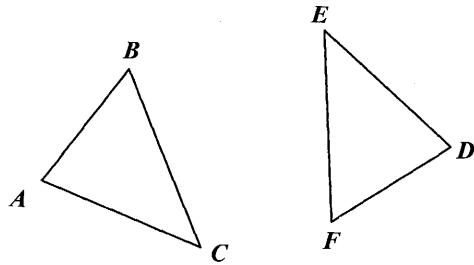
What is the reason that the statement in Step 4 is true?

- A. side-angle-side
- B. angle-side-angle
- C. Opposite sides of a parallelogram are congruent.
- D. Corresponding angles of congruent triangles are congruent.

26. The statements for a proof are given below.

**Given:**  $\overline{AB} \cong \overline{FD}$   
 $\angle B \cong \angle D$   
 $\angle A \cong \angle F$

**Prove:**  $\overline{BC} \cong \overline{DE}$



**Proof:**

STATEMENTS	REASONS
1. $\overline{AB} \cong \overline{FD}$	1. Given
2. $\angle B \cong \angle D$	2. Given
3. $\angle A \cong \angle F$	3. Given
4. $\triangle ABC \cong \triangle FDE$	4. _____
5. $\overline{BC} \cong \overline{DE}$	5. Corresponding Parts of Congruent Triangles are Congruent

What is the missing reason that would complete this proof?

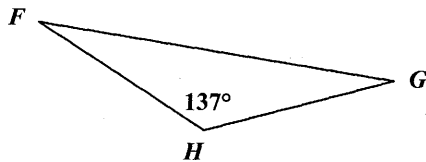
- A. side-side-side
- B. side-angle-side
- C. angle-side-angle
- D. angle-angle-side

# CHAT Geometry – First Semester Extra Credit

27. Given that  $\triangle DEF \cong \triangle LMN$ ,  
 $m\angle D = (2x + 15)^\circ$ ,  $m\angle L = [3(x - 2)]^\circ$ ,  
 and  $DF = 4(x - 17)$ , what is  $LN$ ?

- A. 16
- B. 21
- C. 57
- D. 67

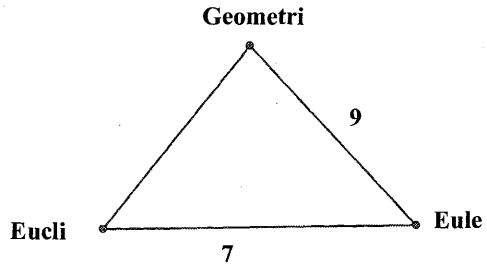
28. In the isosceles triangle below,  
 $m\angle H = 137^\circ$ .



What is the measure of  $\angle F$ ?

- A.  $21.5^\circ$
- B.  $26.5^\circ$
- C.  $43^\circ$
- D.  $53^\circ$

29. Three towns form a triangle on the map below.



Which statement does NOT represent possible distances between Euclid and Geometria?

- A. Between 2 and 7 miles apart.
- B. Between 7 and 9 miles apart.
- C. Between 9 and 16 miles apart.
- D. Between 49 and 81 miles apart.

- ~~30. The  $\triangle RST$  is constructed with vertices  $R(-5, 2)$ ,  $S(4, 1)$ , and  $T(2, -1)$ . What is the length of  $\overline{ST}$ ?~~

- A.  $\sqrt{90}$
- B.  $\sqrt{58}$
- C.  $\sqrt{8}$
- D. 2

31. In  $\triangle ABC$ ,  $\angle B$  is a right angle and  $m\angle A = 40^\circ$ . Which list shows the sides in order from longest to shortest?

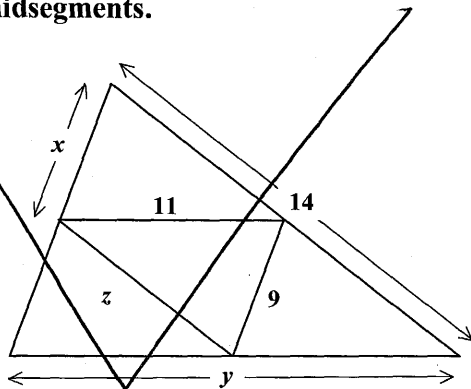
- A.  $\overline{AB}$ ,  $\overline{BC}$ ,  $\overline{AC}$
- B.  $\overline{BC}$ ,  $\overline{AB}$ ,  $\overline{AC}$
- C.  $\overline{AC}$ ,  $\overline{BC}$ ,  $\overline{AB}$
- D.  $\overline{AC}$ ,  $\overline{AB}$ ,  $\overline{BC}$

# CHAT Geometry – First Semester Extra Credit

32. A triangle has two sides that have lengths of 7 cm and 17 cm. Which could represent the length of the third side of the triangle?

- A. 24 cm
- B. 18 cm
- C. 10 cm
- D. 7 cm

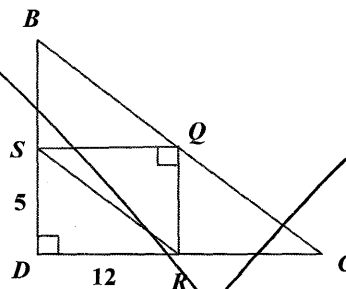
33. The triangle below contains three midsegments.



What are the values of  $x$ ,  $y$ , and  $z$ ?

- A.  $x = 9, y = 22, z = 7$
- B.  $x = 9, y = 11, z = 14$
- C.  $x = 9, y = 22, z = 14$
- D.  $x = 18, y = 11, z = 7$

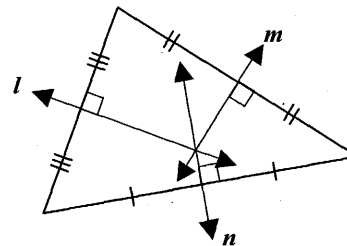
34. In  $\triangle BCD$ ,  $\overline{SR}$  is a midsegment.



What is the length of  $\overline{QC}$ ?

- A. 34
- B. 26
- C. 17
- D. 13

35. The triangle below shows a point of concurrency. Lines  $l$ ,  $m$ , and  $n$ , are perpendicular bisectors of the triangle's sides.



What is the name of the point of concurrency in the triangle?

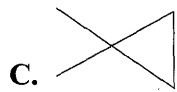
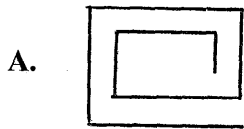
- A. centroid
- B. incenter
- C. orthocenter
- D. circumcenter

# CHAT Geometry – First Semester Extra Credit

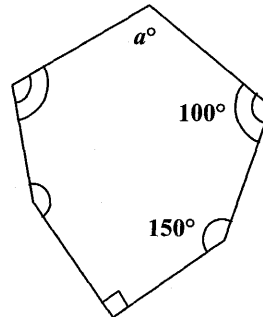
36. How many sides does a nonagon have?

- A. 7
- B. 9
- C. 11
- D. 19

37. Which figure is a polygon?



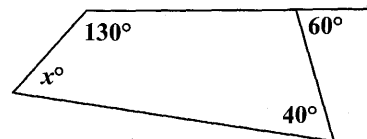
38. A hexagon is shown below.



What is the value of  $a$ ?

- A. 90
- B. 100
- C. 130
- D. 150

39. Use the figure below.



What is the value of  $x$ ?

- A. 70
- B. 60
- C. 50
- D. 40