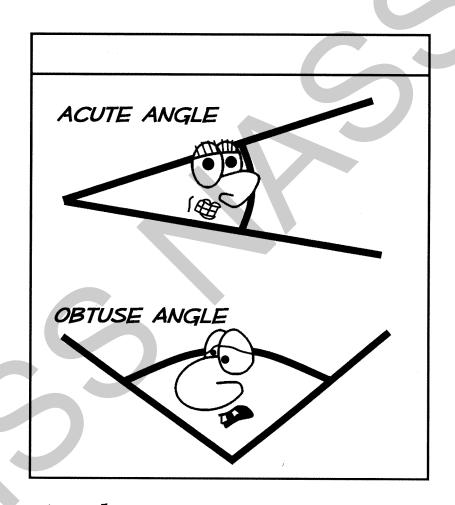
GEOMETRY BOOKLET

Sec 4

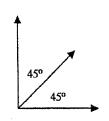


Angles & Congruency

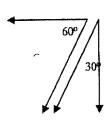
Mrs. Nassif

Classify each angle pair as complementary, supplementary, or adjacent. You can have more than one answer.

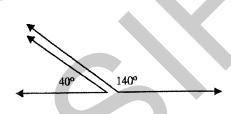
1.



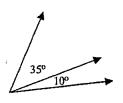
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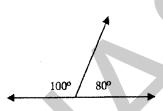
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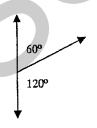
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5.

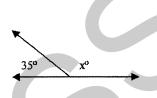


6.

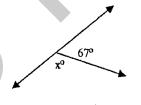


Find the missing angle measure. DO NOT USE A PROTRACTOR!!

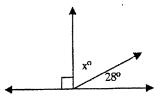
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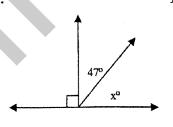
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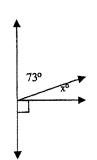
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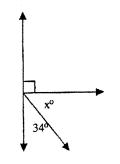
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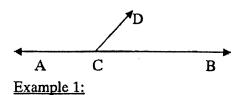
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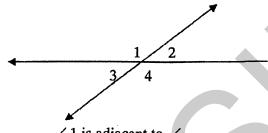
12.



Adjacent Angles



∠ACD is adjacent to ∠____.



 $\angle 1$ is adjacent to $\angle 1$ is adjacent to $\angle 1$

∠4 is adjacent to ∠ ∠4 is adjacent to ∠

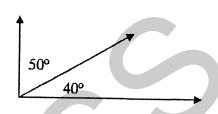
Vertical Angles

 $\angle 1$ and are vertical. $\angle 2$ and are vertical.

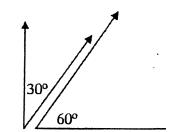
Vertical Angles are _____

Example 2: If $\angle 2 = 25^{\circ}$, what is m $\angle 3$?

Complementary Angles



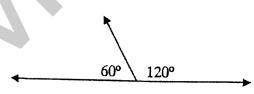
Example 3: What is the complementary angle to 47°?



(_____)

Subtract the given angle from _____ to figure out the _____ angle

Supplementary Angles

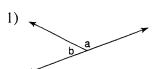


130° 50°

Example 4: What is the supplementary angle to 107°?

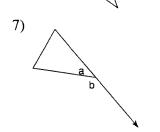
(_____-107 = _____)

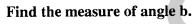
Name the relationship: complementary, supplementary, adjacent, or vertically opposite angles.



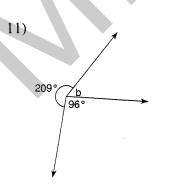
3)

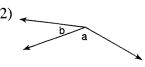
5) a b

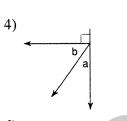


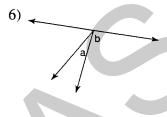


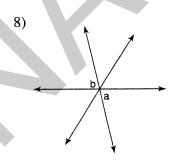
9) b/50°

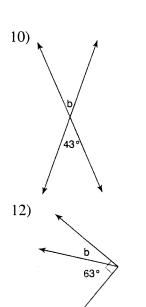




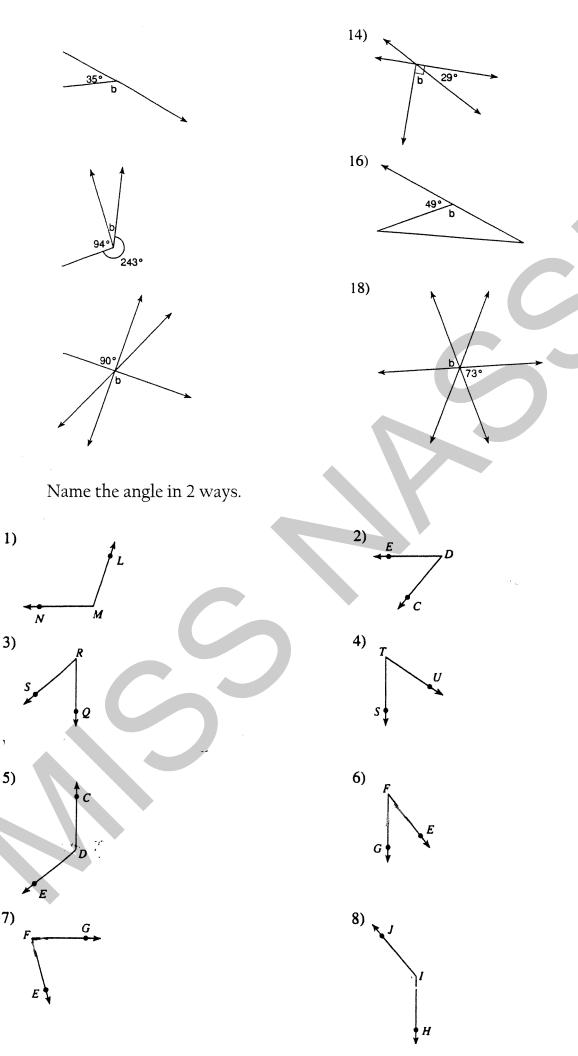










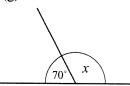


3)

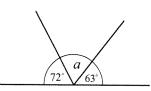
5)

Find the value of x, a, b.

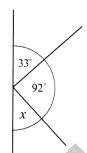
(g)



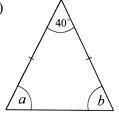
(h)



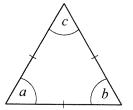
(i)



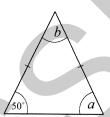
(j)

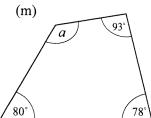


(k)

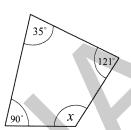


(l)

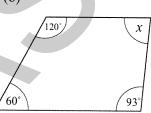




(n)

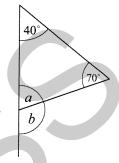


(o)

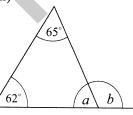


For each triangle, find the angles marked a and b. (a) 2.

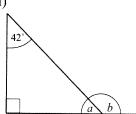
(i)



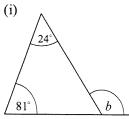
(ii)



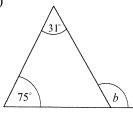
(iii)

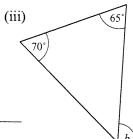


- (b) What do you notice about the angle marked b and the other two angles given in each problem?
- Find the size of the angle b in each problem below without working out the size of any other angles.



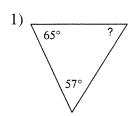
(ii)

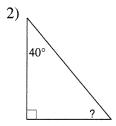


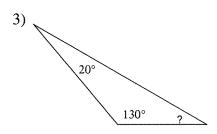


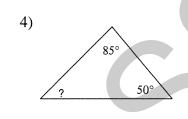
Angles in a Triangle

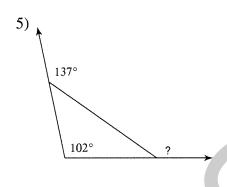
Find the measure of each angle indicated.

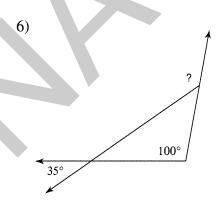


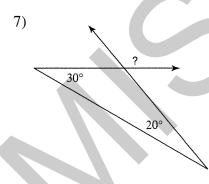


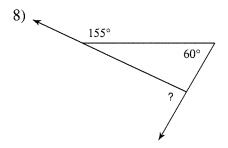


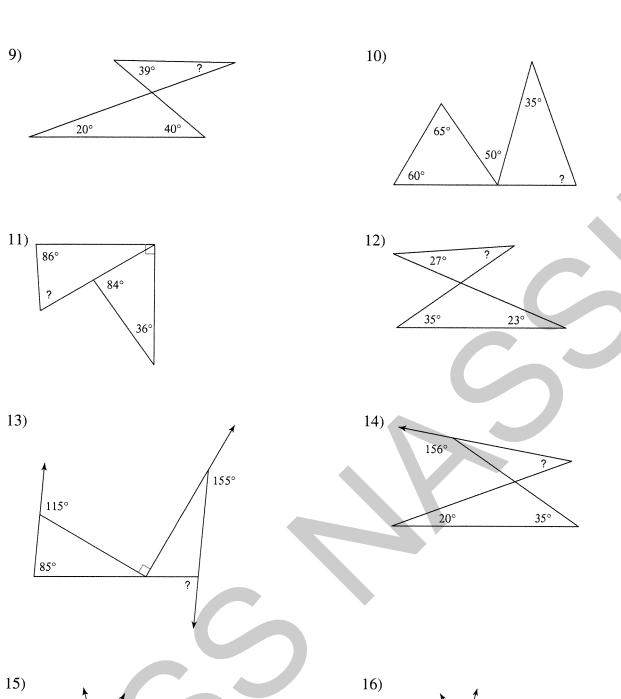


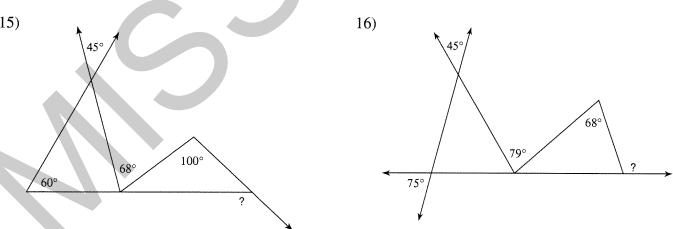








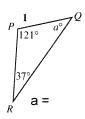


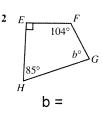


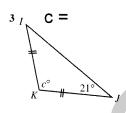
NAME:

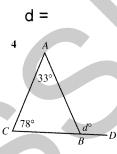
Finding the missing angle

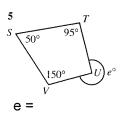
Find the value of the letter indicated.

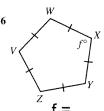


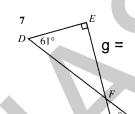


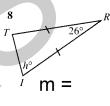


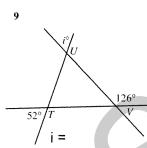


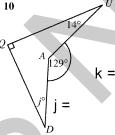


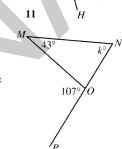


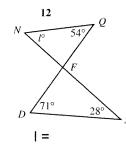


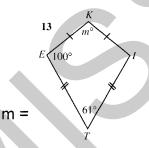


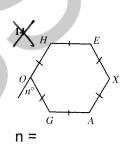


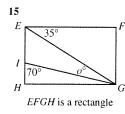


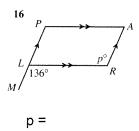


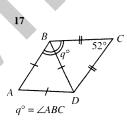


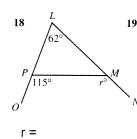


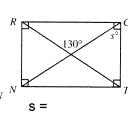


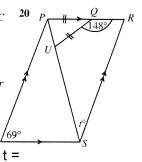








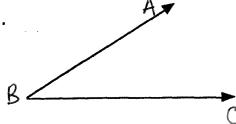


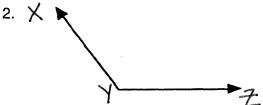


All About Angles - Review

what type of angle? Name the angle.

1.

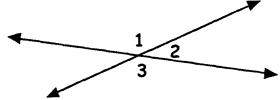




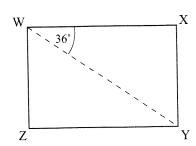
Find the complement of each angle measure.

Find the supplement of each angle measure.

Use the diagram to find each angle measure.



WXYZ is a rectangle.



All About Angles- Review

Use the figure to answer the questions.

1) Name two complementary angles.

____ and ____

2) Name two adjacent acute angles.

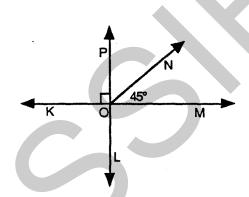
____ and ____

3) Name two vertical angles.

¥KOP and ____

4) Name two supplementary angles.

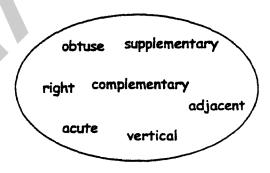
*KOP and ____

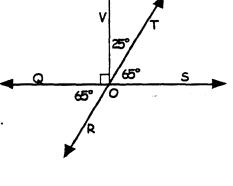


Use the figure and word bank to answer the questions.

- 1) < TOS is an ____ angle
- 2) _____ is a right angle.
- 3) <QOT and < TOS are _____ angles.
- 4) The measure of < ROS = ______.
- 5) _____ and _____ are vertical angles.
- 6) _____ and ____ are complementary angles.

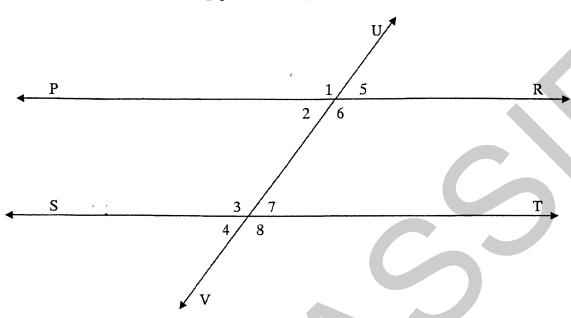
7) <SOR is ______ to < QOR.





Parallel lines cut by a transversal	E	
Line is parallel to line \overrightarrow{EF} is a	A 1/2	
Corresponding Angles	3 4	
∠1 corresponds to ∠ ∠2 corresponds to ∠ ∠3 corresponds to ∠ ∠4 corresponds to ∠	C 5/6	
Corresponding angles are	F	
Example 5: If $\angle 8 = 115^{\circ}$, what is m $\angle 4$?		
Alternate Interior Angles		
Angles 3, 4, 5, and 6 are interior angles (angles that lie 'inside	e' of two parallel lines).	
Interior angles that lie the parallel lin	es and on	
of a transversal	are alternate interior angles.	
∠3 and ∠6 are one pair of alternate interior angles. ∠4 and ∠5 are the second pair of alternate interior angles.		
Example 6: If $\angle 5 = 100^{\circ}$, what is the measure of $\angle 4$?		
Alternate Exterior Angles		
Angles 1, 2, 7, and 8 are exterior angles (angles that lie 'ou	tside' of two parallel lines).	
Exterior angles that lie on the	the parallel lines and on	
of a transversal are pair	s of alternate exterior angles.	
∠ 1 and ∠ 8 are one pair of alternate exterior angles. ∠ 2 and ∠ 7 are a second pair of alternate exterior angles.		
Example 7: If $\angle 1 = 70^{\circ}$, what if the measure of $\angle 8$?		

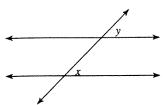
Practice: Answer the following questions using the figure below.



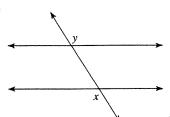
- 1. Name a transversal.
- 2. Name the four pairs of corresponding angles.
- 3. Name the two pairs of alternate interior angles.
- 4. Name the two pairs of alternate exterior angles.
- 5. Name four pairs of vertical angles.
- 6. Name 8 pairs of supplementary angles.
- 7. If $\angle 5 = 63^{\circ}$, then find the measure of each of the missing angles.

Identify each pair of angles as corresponding, alternate interior, alternate exterior, or supplementary.

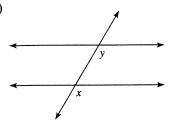
1)



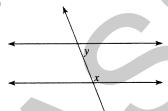
2)



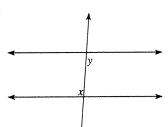
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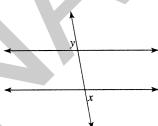
4)



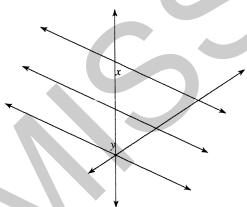
5)

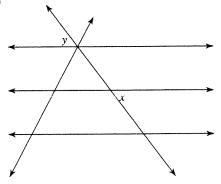


6)

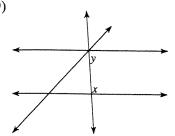


7)

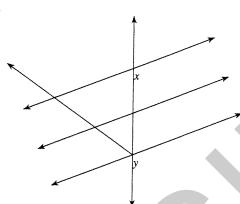




9)

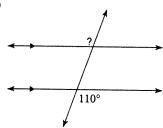


10)

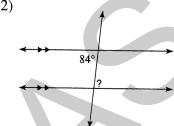


Find the measure of each angle indicated.

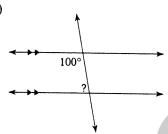
11)

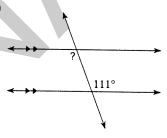


12)

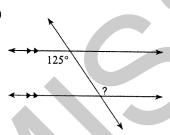


13)

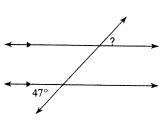


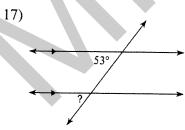


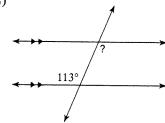
15)



16)

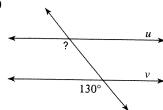




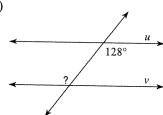


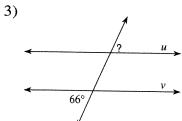
Find the measure of the indicated angle

1)

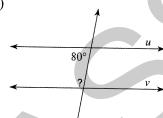


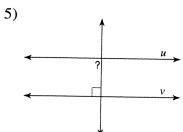
2)



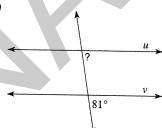


4)

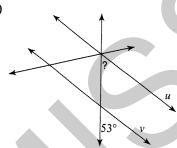




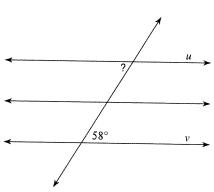
6)

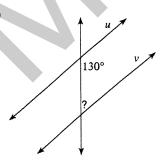


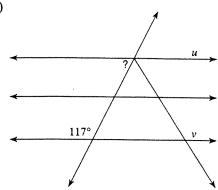
7)



8)



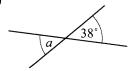




Exercises

1. Find the angles marked in each diagram, giving reasons for your answers.

(a)



(b)



(c)

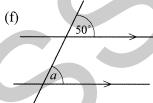


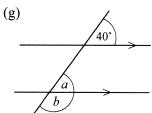
(d)

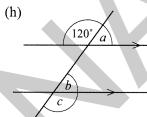


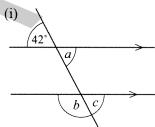
(e)

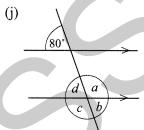


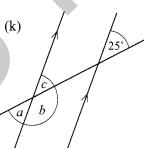




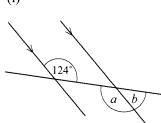


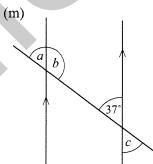




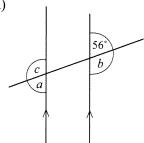


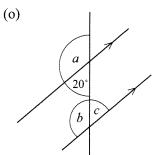
(1)





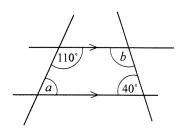
(n)



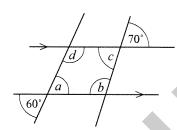


2. Find the size of the angles marked a, b, c, etc. in each of the diagrams below.

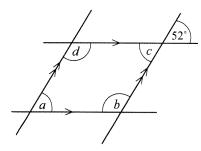
(a)



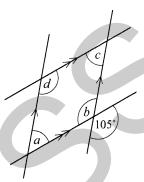
(b)



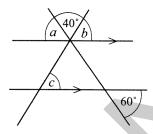
(c)



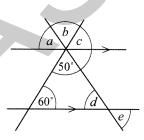
(d)



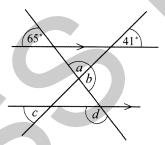
(e)



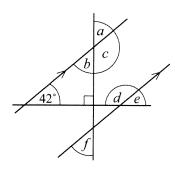
(f)



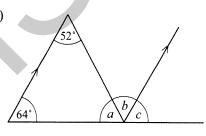
(g)



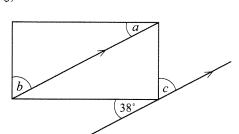
(h)



(i)



(j)



Use the geometric properties and theorems you have learned to solve for x in each diagram and write the property or theorem you use in each case.

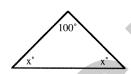
1.



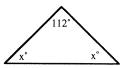
2.



3.



4.



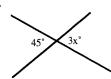
5.



6.



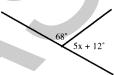
7.



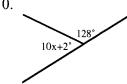
8.



9



10.



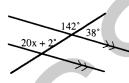
11.



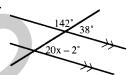
12.



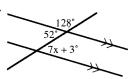
13.



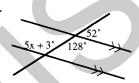
14.



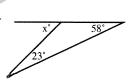
15.



16.



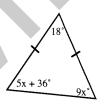
17.



18.



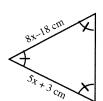
19



20.

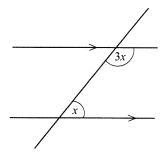


21.

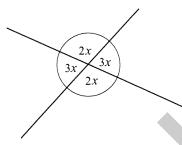


3. By considering each diagram, write down an equation and find the value of x.

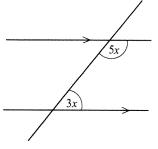
(a)



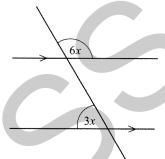
(b)



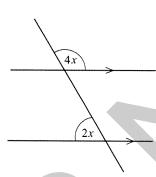
(c)



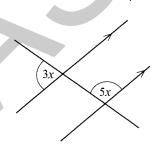
(d)



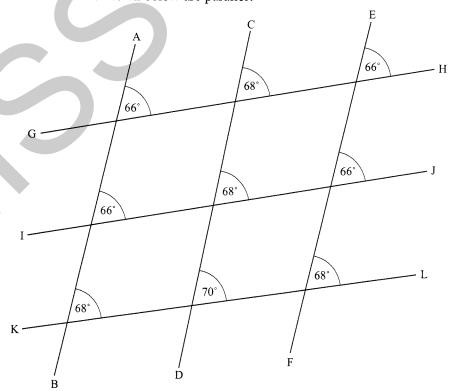
(e)



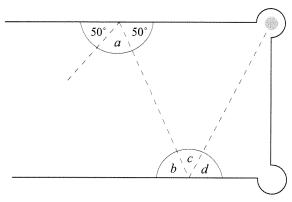
f)



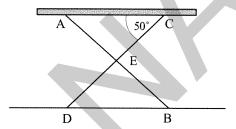
4. Which of the lines shown below are parallel?



5. The diagram shows the path of a pool ball as it bounces off cushions on opposite sides of a pool table.



- (a) Find the angles a and b.
- (b) If, after the second bounce, the path is parallel to the path before the first bounce, find c and d.
- 6. A workbench is standing on a horizontal floor. The side of the workbench is shown.

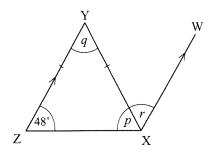


The legs AB and CD are equal in length and joined at E. AE = EC

(a) Which two lines are parallel?

Angle ACD is 50°.

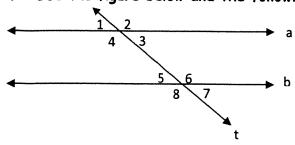
- (b) Work out the size of angle BAC giving a reason for your answer.
- 7. In the diagram, XY = ZY and ZY is parallel to XW.



- (a) Write down the size of angle p.
- (b) Calculate the size of angle q. Give a reason for your answer.
- (c) Give a reason why angle q = angle r.

A. Parallel Lines

Use the figure below and the following word bank to fill in the blanks.



- A. Alternate Interior Angles
- B. Supplementary
- C. Corresponding Angles
- D. Vertical Angles
- E. Alternate Exterior Angles

∠4 and ∠5 are called_____

angles, and are ____

 \angle 3 and \angle 5 are called_____ angles, and are ____

∠1 and ∠7 are called_____ angles, and are

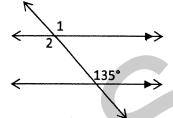
∠3 and ∠7 are called_____ ___ angles, and are ____

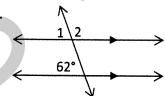
∠5 and ∠6 are called_____ angles, and are _____

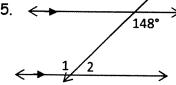
 $\angle 1$ and $\angle 3$ are called angles, and are _____

Find the $m \angle 1$ and $m \angle 2$.

3.



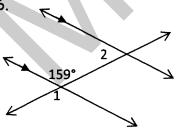




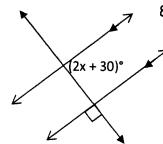
m∠1 =

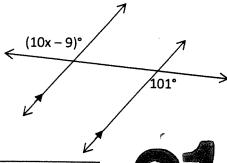
m∠2 =

 $m\angle 1 = \underline{\qquad} m\angle 2 = \underline{\qquad}$



7.





m∠1 = ____ m∠2 = __

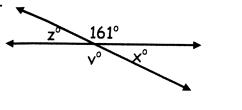


True/False:

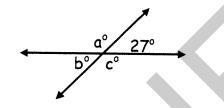
- 10. Two complementary angles MUST be adjacent.
- 11. If two lines intersect, vertical angles are two angles that are adjacent.
- 12. Two supplementary angles always form a linear pair. _

Find the measures of the missing angles:

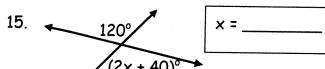
13.



14.

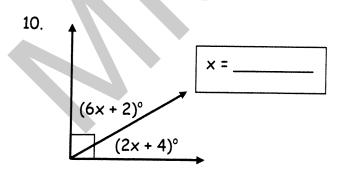


Find the value of x for each of the following:



x = 16. $(3x + 10)^{\circ}$

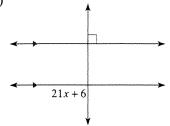
x = 8. 9. $(8x - 55)^{\circ}$ x = $(3x + 35)^{\circ}$ $(5x - 50)^3$ $(3x + 20)^{\circ}$



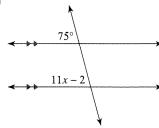
11.	x =
$(x+15)^{\circ}$ $(7x+11)^{\circ}$	

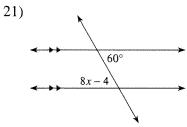
Solve for x.

19)

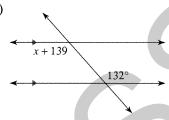


20)

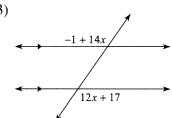




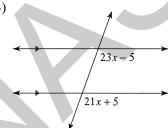
22)



23)

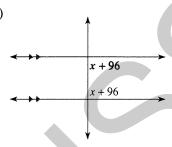


24)

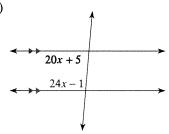


Find the measure of the angle indicated in bold.

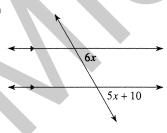
25)

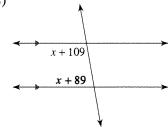


26)

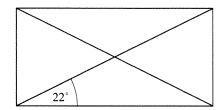


27)





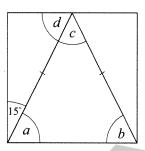
3. The diagram below shows a rectangle with its diagonals drawn in.



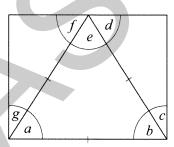
Find the sizes of all the other angles.

4. Find the angles marked with letters in each of the following diagrams. In each diagram the lines all lie inside a rectangle.

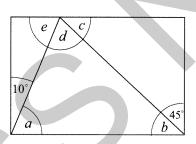
(a)



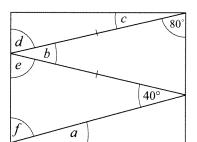
(b)



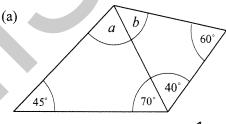
(c)



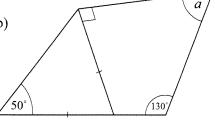
(d)

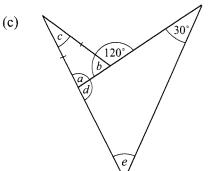


5. Find the angles marked with letters in each quadrilateral below.

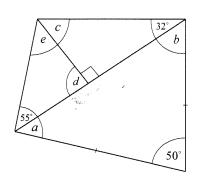


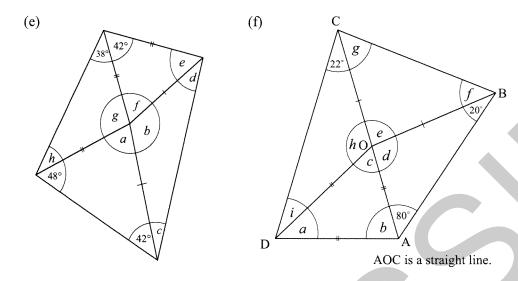
(b)



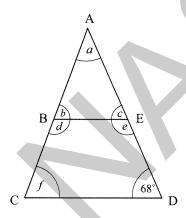


(d)



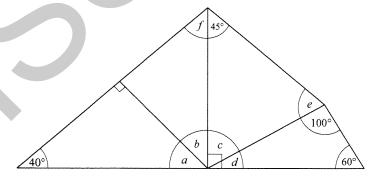


6. A swing is built from two metal frames as shown below.



The lengths of AB and AE are the same and the lengths of AC and AD are the same. Find the sizes of the angles a, b, c, d, e and f.

7. The diagram shows a wooden frame that forms part of the roof of a house.



Find the sizes of the angles a, b, c, d, e and f.



Information

The word 'geometry' is derived from the Greek words, ge (earth) and metrein (to measure). Euclid's masterpiece, 'The Elements', survived as the basic textbook for over 2 000 years. The geometry we are studying in this unit is sometimes referred to as Euclidean geometry.

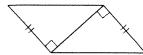
Geometry, Angles

1) Complementary angles add up to degrees	,
2) Supplementary angles add up to degrees	is ———— degrees.
3) The complement of a 36° angle is degrees	20) The complement of a 40° angle is°.
4) The supplement of a 125° angle is degrees	21) The supplement of a 58 degree angle is degrees.
5) The number of degrees in a straight line is	, and a second
6) The measure of one complementary angle is 56°. What is the measure of the other complementary angle?	23) The measure of the vertex angle of an isosceles triangle is 70°. Find the measure
7) The supplement of a 95° angle is degrees	of one of the base angles degrees
8) The complement of a 27° angle measures ————— degrees.	24) The supplement of a 75° angle is degrees.25) The complement of a 23° angle is degrees.
9) The supplement of a 45° angle measures degrees.	26) The supplement of a 98° angle is degrees.
10) The supplement of a 102° angle measures degrees.	27) The angle vertically opposite to 45° measures
11) The sum of the measures of the angles in a triangle is degrees.	does the third angle measure? 29) A triangle with 2 equal sides is called
12) Two angles in a triangle add up to 140°. What does the third angle measure?	30) The measure of the vertex angle of an
13) The complement of a 30° is degrees.	isosceles triangle is 80°. Find the measure of one of the base angles degrees.
14) The sum of the measures of the angles in a rectangle is degrees.	31) A Quadrilateral with 4 equal angles is called a degrees. 32) The supplement of an 89° angle is degrees.
15) The sum of three of the angles of a rectangle is 270°. What is the measure of the fourth	32) The supplement of an 89° angle is degrees.33) The complement of a 19° angle is degrees.
angle? 16) The measure of one angle of a square is degrees.	34) A triangle with 3 different sides is called
17) A right angle measuresdegrees.	35) A pair of complementary angles have a measure of x and 2x. Find x. x = degrees.
8) The complement of a 62° angle measures ————————————————————————————————————	36) A pair of supplementary angles have a measure of x and 2x. Find x. x = degrees

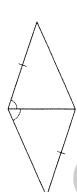
Congruent Triangles

Are the 2 triangles congruent? By which rule?

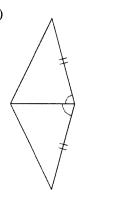
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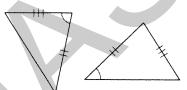
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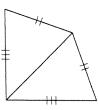
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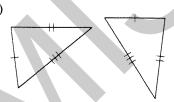
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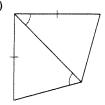
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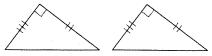


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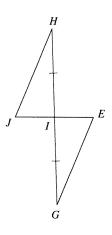
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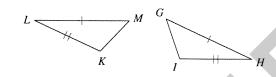


State what additional information is required in order to know that the triangles are congruent for the reason given.

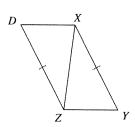
11) SAS



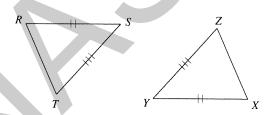
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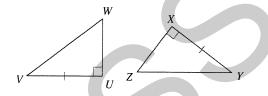
13) SSS



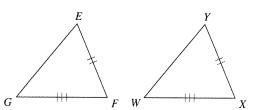
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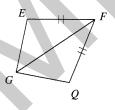
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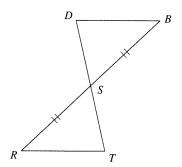
16) SSS



17) SAS

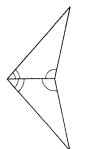


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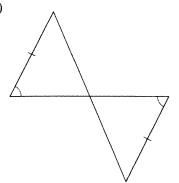


State if the two triangles are congruent. If they are, state how you know.

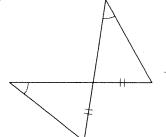
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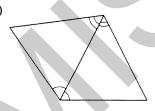
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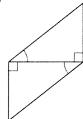
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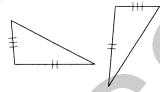
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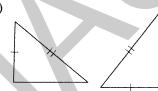


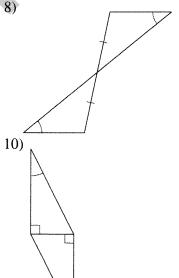
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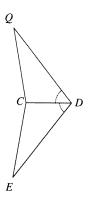




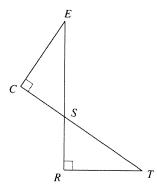


State what additional information is required in order to know that the triangles are congruent for the reason given.

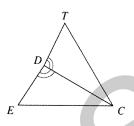
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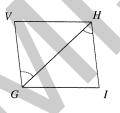
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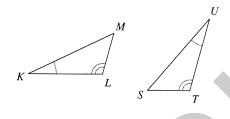
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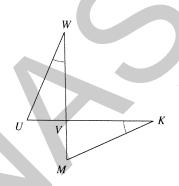
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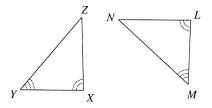
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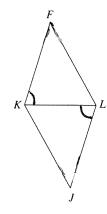
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16) SAS

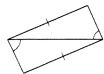


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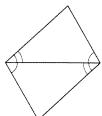


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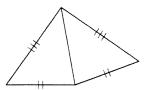
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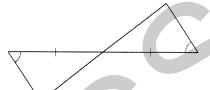
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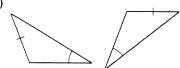


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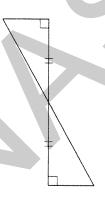


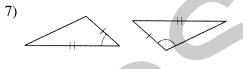
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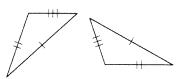


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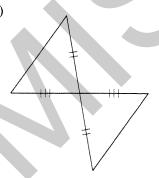


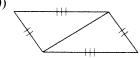


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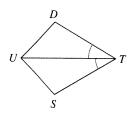
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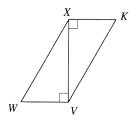


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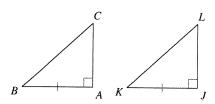
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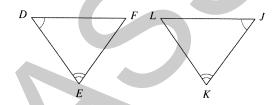
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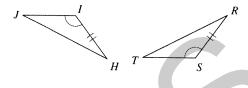
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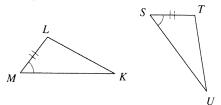
14) ASA



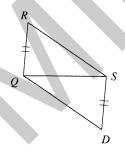
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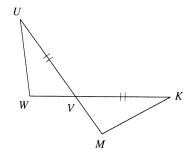
16) ASA



17) SSS

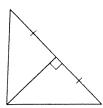


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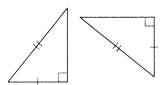


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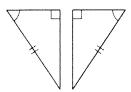
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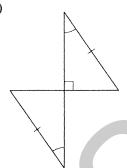
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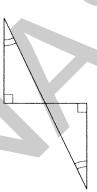
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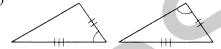
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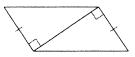
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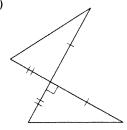


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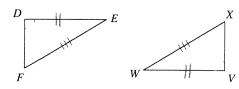
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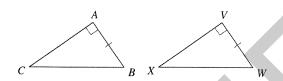


State what additional information is required in order to know that the triangles are congruent for the reason given.

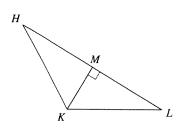
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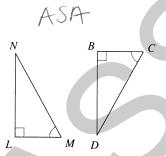
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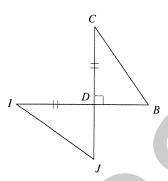
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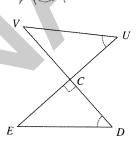
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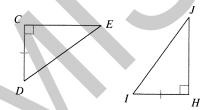
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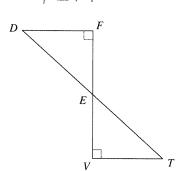


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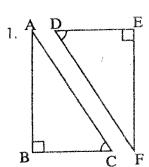


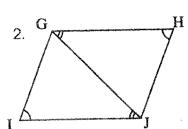


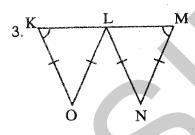
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Congruent Triangles

Are the 2 triangles congruent? By which rule?



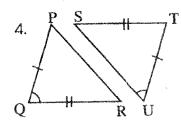


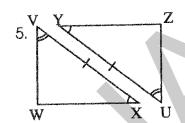


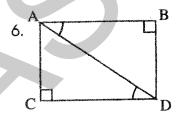
Y/N? Statement:_

Y/N? Statement:_

Y/N? Statement:



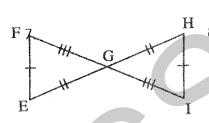


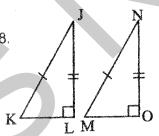


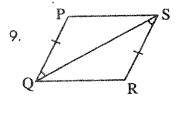
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Y/N? Statement:

Y/N? Statement:____



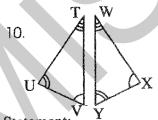




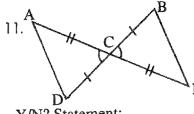
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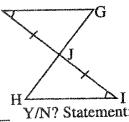
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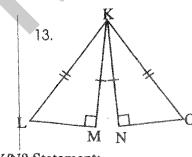
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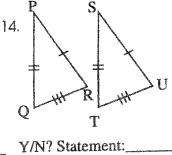
Y/N? Statement:



Y/N? Statement:



Y/N? Statement:



15.

12.

Y/N? Statement:__