

Unit 1 Practice Problems:

1. Use the diagram to for the following questions:

a. Name all points that are collinear to points P and Q.

Y, M

b. Name a line.

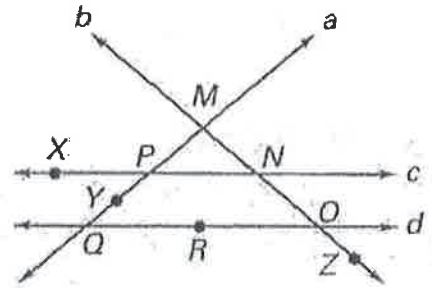
Line a, Line b,  $\overleftrightarrow{PM}$ ,  $\overleftrightarrow{NO}$ ,  $\overleftrightarrow{XN}$ ,  $\overleftrightarrow{QR}$ , Line c, Line d

c. Name a ray.

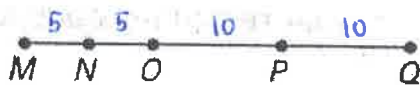
$\overrightarrow{PN}$ ,  $\overrightarrow{PY}$ ,  $\overrightarrow{RO}$ ,  $\overrightarrow{NZ}$ ,  $\overrightarrow{MP}$ ,  $\overrightarrow{RQ}$ ,  $\overrightarrow{OZ}$

d. Name a line segment.

$\overline{MN}$ ,  $\overline{NO}$ ,  $\overline{OR}$ ,  $\overline{RQ}$ ,  $\overline{PY}$ ,  $\overline{MP}$ ,  $\overline{XP}$ ,  $\overline{PN}$



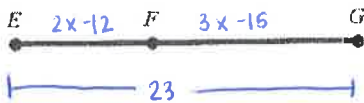
2. Use the diagram to find the length of  $\overline{OQ}$  where  $MQ = 30$ ,  $MN = 5$ ,  $MN = NO$ , and  $OP = PQ$ .



$OQ = 20$

$30 - 10 = 20 \div 2 = 10$

3. If  $EF = 2x - 12$ ,  $FG = 3x - 15$ , and  $EG = 23$ , find the values of  $x$ ,  $EF$  and  $FG$ . The drawing is not to scale.



$2x - 12 + 3x - 15 = 23$

$5x - 27 = 23$

$5x = 50$

$x = 10$

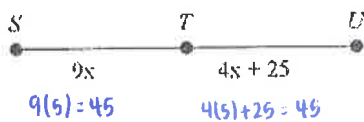
$EF = 2(10) - 12$

$EF = 8$

$FG = 3(10) - 15$

$FG = 15$

4. If T is the midpoint of  $\overline{SU}$ , find the values of  $x$  and  $SU$ .



$9(5) = 45$

$4(5) + 25 = 45$

$9x = 4x + 25$

$5x = 25$

$x = 5$

$SU = 45 + 45$

$SU = 90$

5. The endpoints of two segments are given. Find each segment length. Tell whether the segments are congruent.  $\overline{EF}$ :  $E(1,4)$ ,  $F(5,1)$  and  $\overline{GH}$ :  $G(-3,1)$ ,  $H(1,6)$

$EF = \sqrt{(5-1)^2 + (1-4)^2}$   
 $= \sqrt{(4)^2 + (-3)^2}$   
 $= \sqrt{16+9}$   
 $= \sqrt{25} = 5$

$GH = \sqrt{(1-(-3))^2 + (6-1)^2}$   
 $= \sqrt{(1+3)^2 + (5)^2}$   
 $= \sqrt{(4)^2 + (5)^2} = \sqrt{16+25} = \sqrt{41} \approx 6.4$

The segments are not congruent

6. Find the midpoint of a segment with endpoints  $A(-8, 5)$  and  $B(-2, 7)$ .

$M = \left( \frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right) = \left( \frac{-8 + (-2)}{2}, \frac{5 + 7}{2} \right) = \left( \frac{-10}{2}, \frac{12}{2} \right) = (-5, 6)$

7. In segment  $\overline{AB}$ , M is the midpoint. Given A(2, 3) and M(5, 7), find the coordinates of the endpoint B.

$$\frac{5}{1} = \frac{2+x_2}{2} \quad \frac{7}{1} = \frac{3+y_2}{2}$$

$$10 = 2 + x_2$$

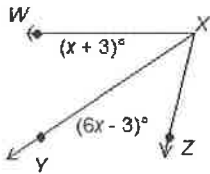
$$14 = 3 + y_2$$

$$\boxed{x_2 = 8}$$

$$\boxed{11 = y_2}$$

$$\Rightarrow \boxed{(8, 11)}$$

8. Given  $m\angle WXZ = 84^\circ$ , find  $m\angle YXZ$ .



$$m\angle WXY + m\angle YXZ = m\angle WXZ$$

$$x+3 + 6x-3 = 84$$

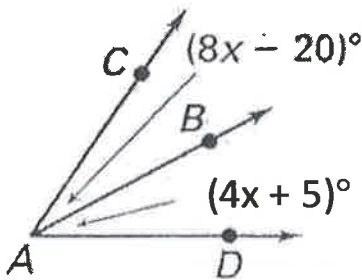
$$7x = 84$$

$$\boxed{x = 12}$$

$$m\angle YXZ = 6(12) - 3$$

$$\boxed{m\angle YXZ = 69^\circ}$$

9.  $\overline{AB}$  bisects  $\angle CAD$ . Find the value of x.



$$8x - 20 = 4x + 5$$

$$4x - 20 = 5$$

$$4x = 25$$

$$\boxed{x = 6.25}$$

10. In the figure below,  $\overline{CE}$  bisects  $\angle DCB$  and  $\overline{CF}$  bisects  $\angle ECB$ . If  $m\angle ECF = 4x+7$  and  $m\angle FCB = 7x-20$ ,

a. Solve for x.

$$4x+7 = 7x-20$$

$$7 = 3x - 20$$

$$27 = 3x \Rightarrow \boxed{x = 9}$$

b. Determine the measure of  $\angle DCE$ .

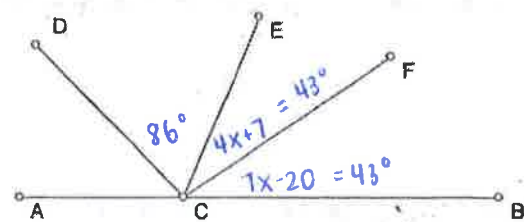
$$m\angle DCE = 43 + 43$$

$$\boxed{m\angle DCE = 86^\circ}$$

c. Determine the measure of  $\angle DCA$ .

$$m\angle DCA + 86 + 43 + 43 = 180$$

$$m\angle DCA + 172 = 180 \Rightarrow \boxed{m\angle DCA = 8^\circ}$$



11.  $\angle 1$  and  $\angle 2$  are complementary. If  $m\angle 1 = 27^\circ$ , what is  $m\angle 2$ ?

$$m\angle 1 + m\angle 2 = 90 \Rightarrow 27 + m\angle 2 = 90$$

$$\boxed{m\angle 2 = 63^\circ}$$

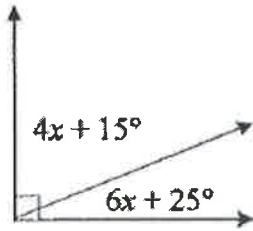
12.  $\angle 3$  and  $\angle 4$  are supplementary. If  $m\angle 4 = 78^\circ$ , what is  $m\angle 3$ ?

$$m\angle 3 + m\angle 4 = 180$$

$$m\angle 3 + 78 = 180$$

$$\boxed{m\angle 3 = 102^\circ}$$

13. Solve for x.



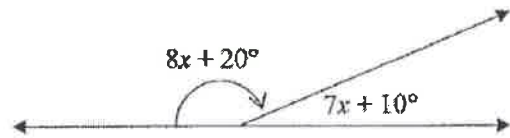
$$4x + 15 + 6x + 25 = 90$$

$$10x + 40 = 90$$

$$10x = 50$$

$$x = 5$$

14. Solve for x.



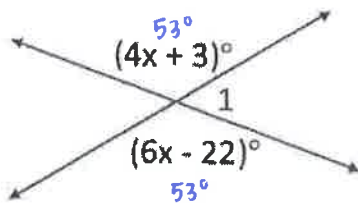
$$8x + 20 + 7x + 10 = 180$$

$$15x + 30 = 180$$

$$15x = 150$$

$$x = 10$$

15. Use the diagram. Find the value of x and m∠1.



$$4x + 3 = 6x - 22$$

$$3 = 2x - 22$$

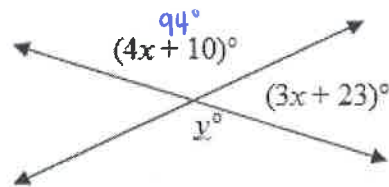
$$25 = 2x$$

$$x = 12.5$$

$$53 + m\angle 1 = 180$$

$$m\angle 1 = 127$$

16. Please solve for x and y.



$$4x + 10 + 3x + 23 = 180$$

$$7x + 33 = 180$$

$$7x = 147$$

$$x = 21$$

$$y = 94$$

## Unit 2: Practice Problems

17. Find the value of the variable if  $m \parallel l$ ,  $m\angle 1 = 2x + 44$  and  $m\angle 5 = 5x + 38$ . The diagram is not to scale. Justify your work with a theorem or postulate.

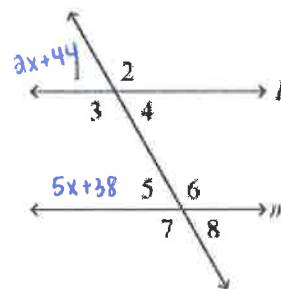
$$2x + 44 = 5x + 38$$

$$44 = 3x + 38$$

$$6 = 3x$$

$$x = 2$$

by corresponding angles postulate



18. If  $m\angle 3 = 135^\circ$ , then  $m\angle 7 = \underline{135^\circ}$

Name the angle pair! corresponding angles

19. If  $m\angle 6 = 60^\circ$  and  $m\angle 8 = 5x^\circ$ , then  $x = \underline{12}$

Name the angle pair! vertical angles

20. If  $m\angle 2 = 78^\circ$ , then  $m\angle 8 = \underline{78^\circ}$

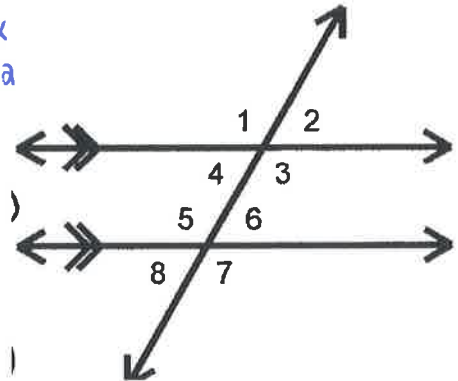
Name the angle pair! alternate exterior angles

21. If  $m\angle 4 = 4x+7$  and  $m\angle 5 = 5x+11$ , then  $x = \underline{18}$

Name the angle pair! consecutive interior angles

22. If  $m\angle 3 = 7x+8$  and  $m\angle 5 = 8x-6$ , then  $x = \underline{14}$

Name the angle pair! alternate interior angles



$60 = 5x$   
 $x = 12$

$4x+7+5x+11=180$   
 $9x+18=180$   
 $9x=162$   
 $x=18$

$7x+8=8x-6$   
 $8=x-6$   
 $x=14$

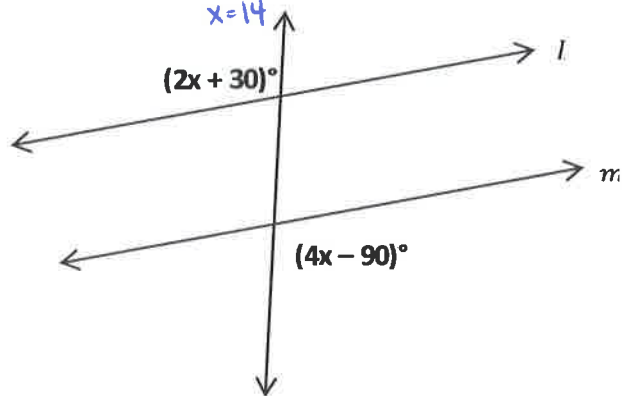
23. Which value of  $x$  will make lines  $l$  and  $m$  parallel?

$2x+30 = 4x-90$

$30 = 2x-90$

$120 = 2x$

$x=60$  by alternate exterior angles converse



24. What is the slope of the line passing through the points  $(-8, 1)$  and  $(-5, -8)$ ?

$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-8 - 1}{-5 - (-8)} = \frac{-9}{-5 + 8} = \frac{-9}{3} = -3$   $m = -3$

25. Decide whether the lines with the given equations are perpendicular, parallel, or neither.

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

$m = \frac{1}{2}$

$m = \frac{1}{2}$

parallel  
both equations have slopes of  $\frac{1}{2}$

26. Determine whether  $\overline{WX}$  and  $\overline{YZ}$  are parallel, perpendicular, or neither given the following points:

$W(-2, -1)$ ,  $X(4, 1)$ ,  $Y(-2, 1)$  and  $Z(-5, 2)$ .

Slope of  $\overline{WX} = \frac{1 - (-1)}{4 - (-2)} = \frac{1+1}{4+2} = \frac{2}{6} = \frac{1}{3}$

Slope of  $\overline{YZ} = \frac{2 - 1}{-5 - (-2)} = \frac{2-1}{-5+2} = \frac{1}{-3}$

neither  
The slopes are not the same and are not opposite reciprocals

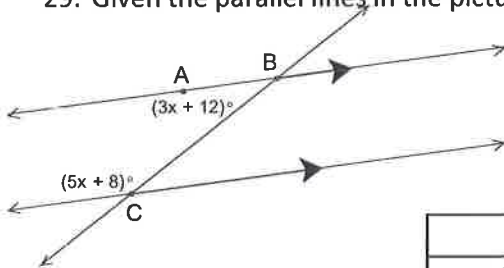
27. Find the equation of a line which contains the point (2, 5) and is parallel to the line  $y = 3x + 5$ .

new slope =  $\frac{3}{1}$  through (2, 5)  $\Rightarrow y = mx + b$   $y = mx + b$   
 $m$   $x$   $y$   $y = 3x + b$   
 $5 = 3(2) + b$   
 $5 = 6 + b$   
 $b = -1$

28. Find the equation of a line which contains the point (4, -5) and is perpendicular to the line  $y = 2x + 3$ .

new slope =  $-\frac{1}{2}$  through (4, -5)  $y = mx + b$   $y = mx + b$   
 $m$   $x$   $y$   $y = -\frac{1}{2}x + b$   
 $-5 = -\frac{1}{2}(4) + b$   
 $-5 = -2 + b$   
 $-3 = b$

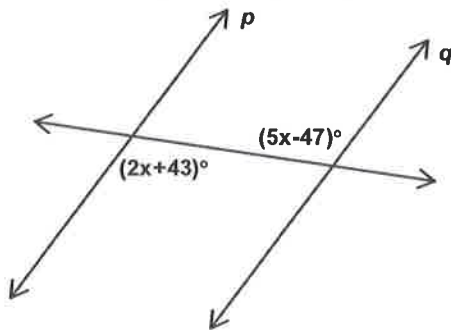
29. Given the parallel lines in the picture, please prove that the  $m\angle ABC = 72^\circ$ .



Statements	Reasons
1. Diagram w/values	1. Given
2. $(3x + 12) + (5x + 8) = 180$	2. Consecutive Int. Angles Thm
3. $8x + 20 = 180$	3. Combine Like Terms
4. $8x = 160$	4. Subtraction Prop
5. $x = 20$	5. Division Prop
6. $m\angle ABC = 3(20) + 12$	6. Substitution Prop
7. $m\angle ABC =$	7. Simplification

30. Given that  $p \parallel q$ , please solve for  $x$ .

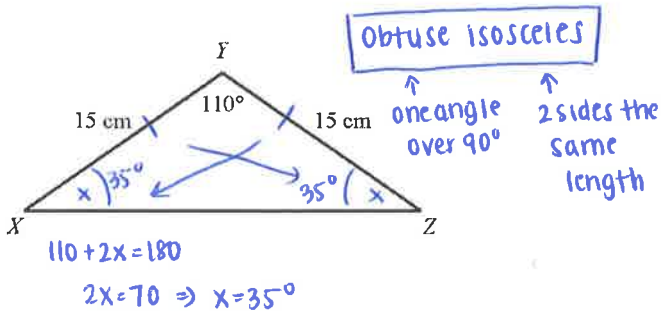
Justify every step using the same "proof" strategy.



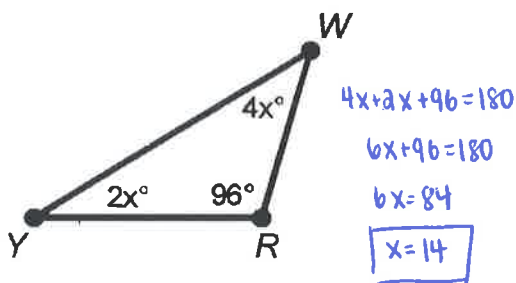
Statements	Reasons
1. Diagram w/values	1. Given
2. $2x + 43 = 5x - 47$	2. Alt. Interior Angles Thm
3. $43 = 3x - 47$	3. Subtraction Prop
4. $90 = 3x$	4. Addition Prop
5. $x = 30$	5. Division Prop

**Unit 3: Practice Problems**

31. Classify  $\triangle XYZ$  according to its angle measures and side lengths.



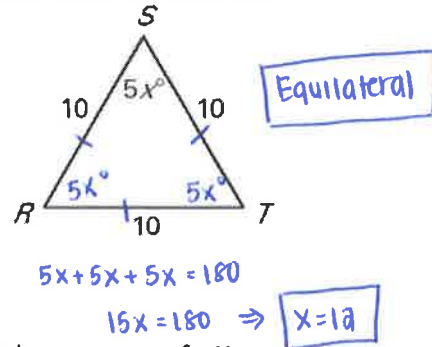
33. Find the measure of  $\angle YWR$ .



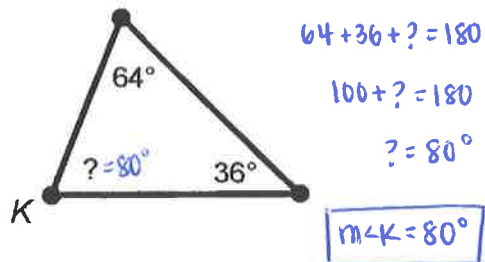
$m\angle YWR = 4(14)$

$m\angle YWR = 56^\circ$

32. Classify  $\triangle RST$  according to its side lengths and find value of  $x$ .



34. Find the measure of  $\angle K$ .



35. The three angles of a triangle are  $(x + 30)^\circ$ ,  $(4x + 30)^\circ$  and  $(10x - 30)^\circ$ . Classify the triangle by its angle measures.

$x + 30 + 4x + 30 + 10x - 30 = 180$

$15x + 30 = 180$

$15x = 150$

$x = 10$

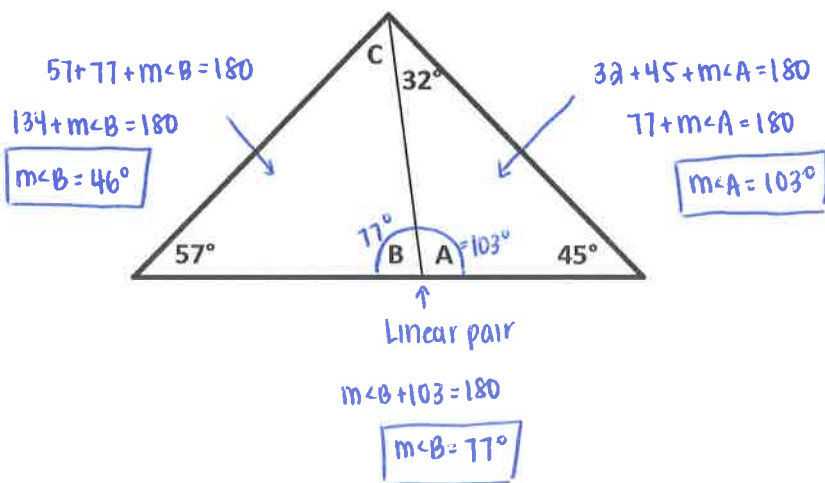
angles:  $10 + 30 = 40^\circ$

$4(10) + 30 = 70^\circ$

$10(10) - 30 = 67^\circ$

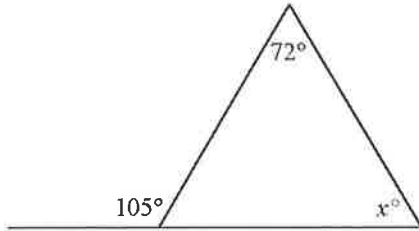
Obtuse  $\triangle$

36. Find the measures of angles A, B, and C.



For examples #42-43, find the value of  $x$ . The diagrams are not drawn to scale.

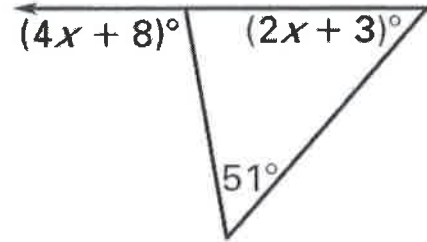
37.



$$105 = 72 + x$$

$$x = 33$$

38.



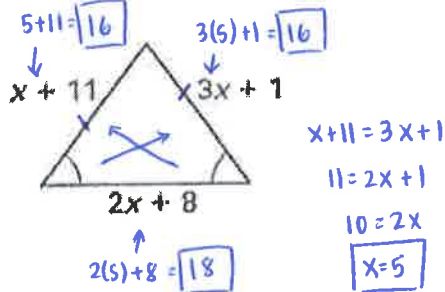
$$4x + 8 = 51 + 2x + 3$$

$$4x + 8 = 2x + 54$$

$$2x + 8 = 54$$

$$2x = 46 \Rightarrow x = 23$$

39. Please find the value of  $x$  and all of the side lengths.



$$x + 11 = 3x + 1$$

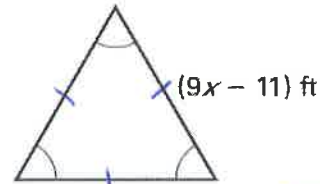
$$11 = 2x + 1$$

$$10 = 2x$$

$$x = 5$$

$$2(5) + 8 = 18$$

40. Please find the value of  $x$  and classify by the side lengths.



$$(5x + 16) \text{ ft}$$

$$5x + 16 = 9x - 11$$

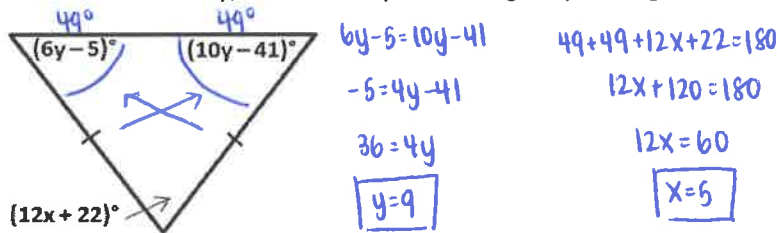
$$16 = 4x - 11$$

$$27 = 4x$$

$$x = 6.75$$

Equilateral

41. Find the value of  $x$  and  $y$ , then classify the triangle by its angles.



$$6y - 5 = 10y - 41$$

$$-5 = 4y - 41$$

$$36 = 4y$$

$$y = 9$$

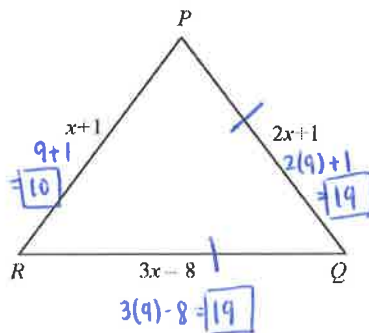
$$49 + 49 + 12x + 22 = 180$$

$$12x + 120 = 180$$

$$12x = 60$$

$$x = 5$$

42. Find the value of  $x$  and the perimeter of  $\triangle PQR$  if  $\triangle PQR$  is an isosceles triangle where  $\overline{PQ} \cong \overline{QR}$ ,  $PR = x + 1$ ,  $PQ = 2x + 1$ , and  $RQ = 3x - 8$ .



$$2x + 1 = 3x - 8$$

$$1 = x - 8$$

$$x = 9$$

$$\text{Perimeter} = 10 + 19 + 19$$

$$P = 48 \text{ units}$$



For questions #43-46, use  $\triangle ABC$  with coordinates  $A(1, 7)$ ,  $B(5, 2)$  and  $C(0, -2)$ .

43. Draw the triangle in the coordinate plane.

44. Find the slopes of each side.

$$m_{\overline{AB}} = \frac{2-7}{5-1} = \frac{-5}{4} \quad m_{\overline{BC}} = \frac{-2-2}{0-5} = \frac{-4}{-5} = \frac{4}{5} \quad m_{\overline{AC}} = \frac{-2-7}{0-1} = \frac{-9}{-1} = 9$$

opposite reciprocal slopes

45. Find the length of each side.

$$AC = \sqrt{(-2-7)^2 + (0-1)^2} = \sqrt{(-9)^2 + (-1)^2} = \sqrt{81+1} = \sqrt{82} \approx 9.1$$

$$AB = \sqrt{(2-7)^2 + (5-1)^2} = \sqrt{(-5)^2 + (4)^2} = \sqrt{25+16} = \sqrt{41} \approx 6.4$$

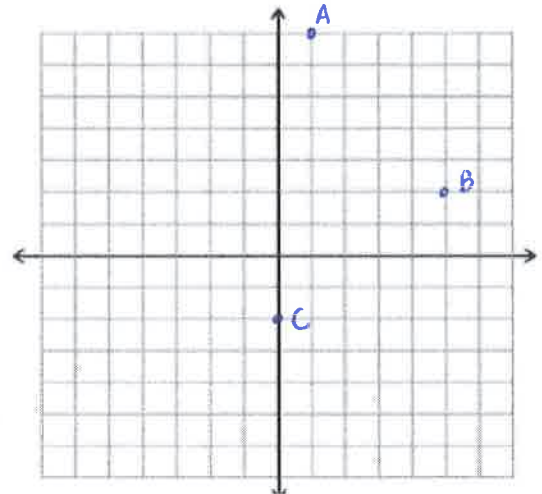
$$BC = \sqrt{(-2-2)^2 + (0-5)^2} = \sqrt{(-4)^2 + (-5)^2} = \sqrt{16+25} = \sqrt{41} \approx 6.4$$

Since 2 sides are the same, isosceles  $\triangle$

46. Prove that  $\triangle ABC$  is an isosceles right triangle.

$\overline{AB} \cong \overline{BC}$  : Isosceles triangle

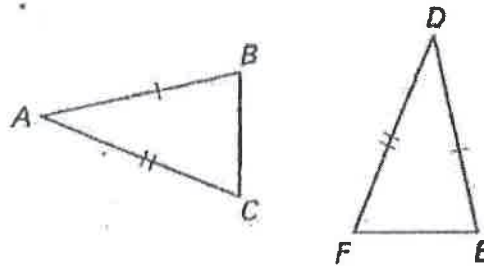
$\overline{AB} \perp \overline{BC}$  : Right triangle



47. Use the diagram. Which additional congruence is needed to prove  $\triangle ABC \cong \triangle DEF$ ?

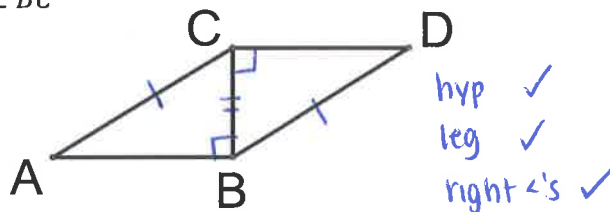
a.) By SSS  $\overline{BC} \cong \overline{FE}$

b.) By SAS  $\angle A \cong \angle D$



48. Given :  $\overline{AC} \cong \overline{DB}$ ,  $\overline{AB} \perp \overline{CB}$ ,  $\overline{DC} \perp \overline{BC}$

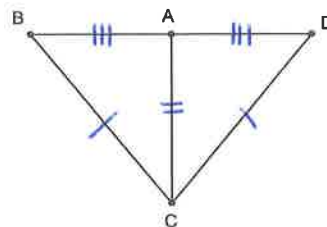
Prove :  $\angle CAB \cong \angle BDC$



Statements	Reasons
1. $\overline{AC} \cong \overline{DB}$ , $\overline{AB} \perp \overline{CB}$ , $\overline{DC} \perp \overline{BC}$	1. Given
2. $\angle CBA$ and $\angle BCD$ are right angles	2. Definition of perpendicular lines
3. $\triangle CBA$ and $\triangle BCD$ are right triangles	3. Definition of Right Triangles
4. $\overline{CB} \cong \overline{CB}$	4. Reflexive Prop
5. $\triangle CAB \cong \triangle BCD$	5. HL
6. $\angle CAB \cong \angle BDC$	6. CPCTC



49. Given : A is the midpoint of  $\overline{BD}$ ,  $\overline{BC} \cong \overline{DC}$   
 Prove :  $\triangle ABC \cong \triangle ADC$



Statements	Reasons
1. A is the midpoint of $\overline{BD}$ , $\overline{BC} \cong \overline{DC}$	1. Given
2. $\overline{AC} \cong \overline{AC}$	2. Reflexive Property
3. $\overline{AB} \cong \overline{AD}$	3. Definition of midpoint
4. $\triangle ABC \cong \triangle ADC$	4. SSS

Unit 4 Review: See Unit 4 Test Review Packet