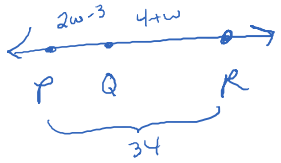
Name_____ Date_____ Period_____

Geometry with Trigonometry Midterm Review

UNIT 1

1. Q is between P and R. $PQ = (2w - 3)$ ft., $QR = (4 + w)$ ft., and $PR = 34$ ft. Find the value of w. **Then find *PQ* and *QR*.** Draw a diagram to help!



$2w - 3 + 4 + w = 34$

$3w + 1 = 34$

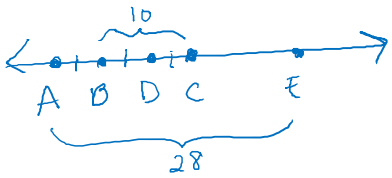
$3w = 33$

$w = 11$

$PQ = 2w - 3 = 2(11) - 3 = 19$

$QR = 4 + w = 4 + (11) = 15$

2. B is between A and C, D is between B and C, and C is between B and E. $AE = 28$ cm., $BC = 10$ cm., and $AB = DB = DC$. **Find *CE*.** Draw a diagram to help!



$BD = DC = 5$

Therefore, $AB = 5$.

So, $AC = 15$.

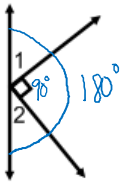
$CE = 28 - 15 = 13$

A) 5 B) 10 C) 12 D) 13 E) 15

3. Use the diagram to the right. $\angle 1$ and $\angle 2$ are _____ angles.

A) complementary B) supplementary C) congruent

D) vertical angles E) a linear pair



4. If $\angle P$ and $\angle R$ are complementary and $m\angle P$ is 4 times the $m\angle R$, find $m\angle P$ and $m\angle R$.

$m\angle P = 4(m\angle R)$

$m\angle P + m\angle R = 90$

$4(m\angle R) + m\angle R = 90$

$5(m\angle R) = 90 \rightarrow m\angle R = 18° \rightarrow m\angle P = 72°$

For #5 -6, find the coordinates of the midpoint.

5. $C(2, 9)$, $D(-2, -1)$

$M\left(\frac{2+-2}{2}, \frac{9+-1}{2}\right) = M(0, 4)$

6. $E(-3, -3)$, $F(9, -15)$

$M\left(\frac{-3+9}{2}, \frac{-3+-15}{2}\right) = M(3, -9)$

7. Given $\overline{AB} \cong \overline{BC}$, $\overline{BC} \cong \overline{CD}$, find the value of x.

$\overline{AB} \cong \overline{CD}$

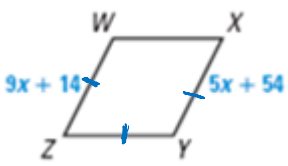
$5x - 8 = 3x + 20$

$2x = 28$

$x = 14$

8. In $WXYZ$, $\overline{WZ} \cong \overline{YZ}$ and $\overline{YX} \cong \overline{YZ}$.

What is the value of x?



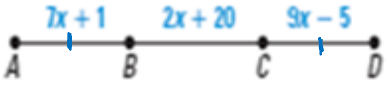
$\overline{WZ} \cong \overline{YX}$

$9x + 14 = 5x + 54$

$4x = 40$

$x = 10$

9. In the diagram, $\overline{AB} \cong \overline{CD}$. Find *CA*.



$7x+1 = 9x-5$

$6 = 2x$

$x = 3$

$CA = 7x+1+2x+20$

$= 9x+21$

$= 9(3)+21$

$= 48$

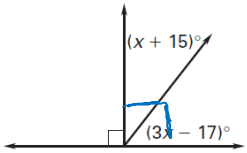
Complete the following sentences.

10. The intersection of two lines is a point.

11. The intersection of two planes is a line.

12. The intersection of a line and a plane is a point.

13. Find the value of x.



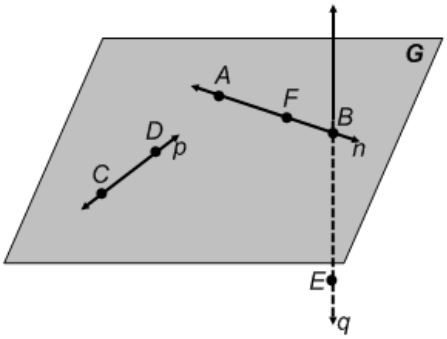
$x + 15 + 3x - 17 = 90$

$4x - 2 = 90$

$4x = 92$

$x = 23$

Use the diagram to the right.



14. What is another name for plane *G*?

one possible answer: plane DAF

15. What is another name for line *p*?

$\overleftrightarrow{CD}$ or $\overleftrightarrow{DC}$

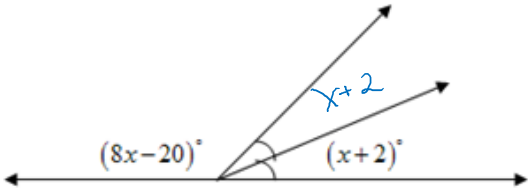
16. Name the intersection of lines *n* and *q*.

B

17. Name the opposite ray of $\overrightarrow{FB}$.

$\overrightarrow{FA}$

18. Find the value of x.



$8x - 20 + x + 2 + x + 2 = 180$

$10x - 16 = 180$

$10x = 196$

$x = 19.6$

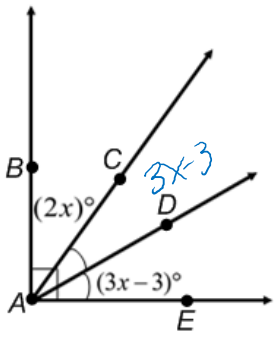
For #19 & 20, use the diagram to the right.

19. Find the value of x:

$2x + 3x - 3 + 3x - 3 = 90$

$8x - 6 = 90$

$8x = 96 \rightarrow x = 12$

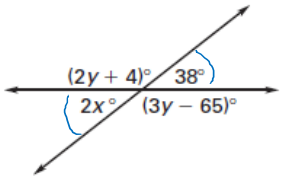


20. a) $m\angle CAD =$ $3(12)-3 = 33$

b) $m\angle BAD =$ $5x-3 = 5(12)-3 = 57$

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

21.



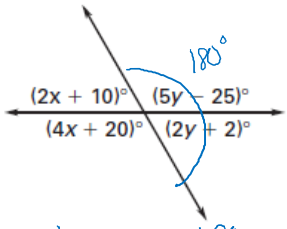
$2x = 38$

$x = 19$

$2y + 4 = 3y - 65$

$69 = y$

22.



$2x + 10 + 4x + 20 = 180$

$6x + 30 = 180$

$6x = 150$

$x = 25$

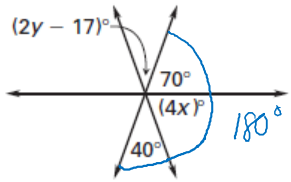
$5y - 25 + 2y + 2 = 180$

$7y - 23 = 180$

$7y = 203$

$y = 29$

23.



$70 + 4x + 40 = 180$

$4x + 110 = 180$

$4x = 70$

$x = 17\frac{1}{2}$

$2y - 17 + 70 + 4x = 180$

$2y + 53 + 4(17\frac{1}{2}) = 180$

$2y + 53 + 70 = 180$

$2y + 123 = 180$

$2y = 57$

$y = 28\frac{1}{2}$

UNIT 3

24. **Find the slope of the line that passes through the following points.**

a. (1, 1) and (4, 10) (x_1, y_1) (x_2, y_2)

$m = \frac{10-1}{4-1} = \frac{9}{3} = 3$

b. (2, 5) and (2, -7). (x_1, y_1) (x_2, y_2)

$m = \frac{-7-5}{2-2} = \frac{-12}{0}$ undefined

Write the equation in slope-intercept form for the line described.

25. Passes through the point (-5, 2) and is perpendicular to the line $y = -\frac{5}{6}x + 2$.

$m = \frac{6}{5}$

pt: (-5, 2)

$y - y_1 = m(x - x_1)$

$y - 2 = \frac{6}{5}(x - -5)$

$y - 2 = \frac{6}{5}(x + 5)$

$y - 2 = \frac{6}{5}x + 6$

$y = \frac{6}{5}x + 8$

26. Passes through the point (8, 1) and is parallel to the line $y = 2x + 4$.

$m = 2$

pt: (8, 1)

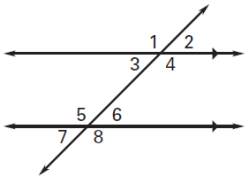
$y - y_1 = m(x - x_1)$

$y - 1 = 2(x - 8)$

$y - 1 = 2x - 16$

$y = 2x - 15$

Use the diagram to determine whether the given angles are congruent or supplementary.



27. $\angle 2$ and $\angle 6$

$\cong$

(corr. $\angle$'s)

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

Supp.

(cons. int. $\angle$'s)

29. $\angle 4$ and $\angle 7$

Supp.

($\angle 7 \cong \angle 6$, $\angle 6$ supp to $\angle 4$)

Decide whether the lines are parallel, perpendicular or neither.

30. $y = 4x - 3$ $m=4$
$y = 2x - 3$ $m=2$
neither

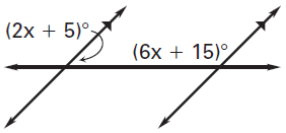
31. $y = 2x + 5$ $m=2$
$y = -\frac{1}{2}x + 2$ $m=-\frac{1}{2}$
perpendicular

32. $y = 5x + 7$ $m=5$
$y = 5x - 7$ $m=5$
parallel

33. $y = -2x + 4$ $m=-2$
$y = -\frac{1}{2}x - 8$ $m=-\frac{1}{2}$
neither

Solve for x.

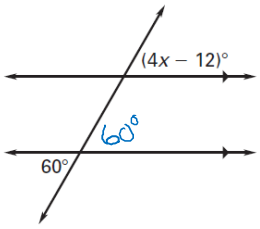
34.



* cons. int. ∠'s

$2x + 5 + 6x + 15 = 180$
$8x + 20 = 180$
$8x = 160$
$x = 20$

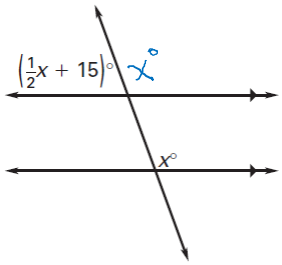
35.



* corr. ∠'s

$4x - 12 = 60$
$4x = 72$
$x = 18$

36.



$2\left(\frac{1}{2}x + 15 + x\right) = (180)2$
$x + 30 + 2x = 360$
$3x + 30 = 360$
$3x = 330$
$x = 110$

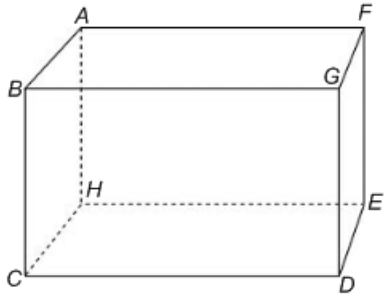
Use the diagram of the rectangular prism below to complete each statement.

37. A segment that appears to be parallel to $\overline{FE}$: $\overline{GD}$ or $\overline{AH}$ or $\overline{BC}$

38. A segment that appears to be perpendicular to $\overline{CD}$: $\overline{BC}$ or $\overline{CH}$ or $\overline{DE}$ or $\overline{GD}$

39. A segment that appears to be skew to $\overline{BC}$: $\overline{AF}$ or $\overline{HE}$ or $\overline{GF}$ or $\overline{DE}$

40. A plane that appears to be parallel to plane *ABC*: plane FED



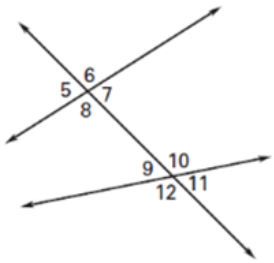
Classify the relationship between each pair of angles as *alternate interior*, *alternate exterior*, *corresponding*, or *consecutive interior angles*.

41. ∠6 and ∠10 are Corresponding angles.

42. ∠7 and ∠9 are alt. interior angles.

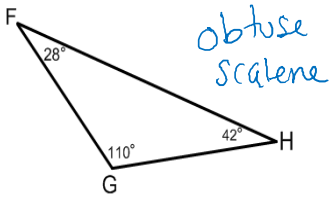
43. ∠8 and ∠9 are Consecutive interior angles.

44. ∠5 and ∠11 are alt. exterior angles.

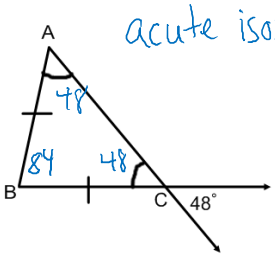


UNIT 4

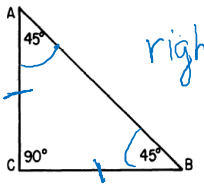
Classify the following triangles by angles and sides.

45. 

obtuse scalene

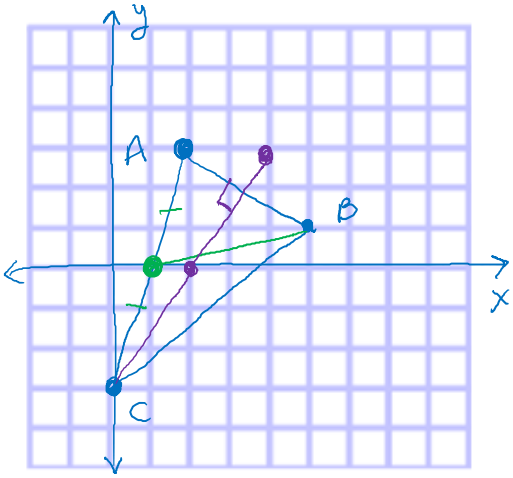
46. 

acute isosceles

47. 

right isosceles

48. The vertices of ΔABC are at $A(2, 3)$, $B(5, 1)$, and $C(0, -3)$.



a) Draw a median from vertex *B*.

start at B, go to midpt. of $\overline{AC}$

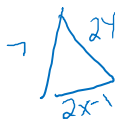
midpt of $\overline{AC}$: (1,0)

b) Draw an altitude from vertex *C*.

start at C, go ⊥ to $\overline{AB}$

m of $\overline{AB} = \frac{2}{-3}$ → m of altitude $= \frac{3}{2}$

49. Determine the possible values for *x*, if the sides lengths of a triangle are 7 yds., 24 yds., and $(2x - 1)$ yds.



① $7 + 24 > 2x - 1$

$31 > 2x - 1$

$32 > 2x$

$16 > x$

② $24 + 2x - 1 > 7$

$2x + 23 > 7$

$2x > -16$

$x > -8$

③ $2x - 1 + 7 > 24$

$2x + 6 > 24$

$2x > 18$

$x > 9$

④ $2x - 1 > 0$

$2x > 1$

$x > \frac{1}{2}$

$9 < x < 16$

Determine whether it is possible to draw a triangle with sides of the given lengths. Explain.

50. 12, 11, 17

$11 + 12 > 17$

$23 > 17$ ✓

Yes the sum of any 2 sides is greater than the 3rd.

51. 1, 2, 3

$1 + 2 > 3$

$3 > 3$ x

No the sum of 1 and 2 is not greater than 3.

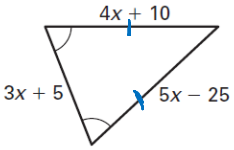
52. 9, 41, 30

$9 + 30 > 41$

$39 > 41$ x

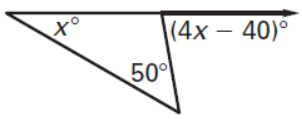
No the sum of 9 and 30 is not greater than 41.

Find the value of *x*.

53. 

$4x + 10 = 5x - 25$

$35 = x$

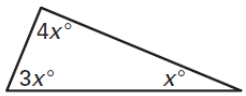
54. 

$4x - 40 = x + 50$

$3x = 90$

$x = 30$

55.

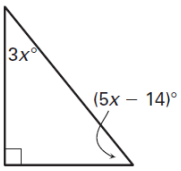


$3x + 4x + x = 180$

$8x = 180$

$x = 22.5$

56.



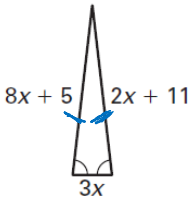
$3x + 5x - 14 = 90$

$8x - 14 = 90$

$8x = 104$

$x = 13$

57.

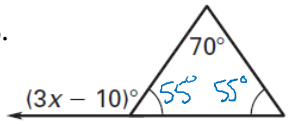


$8x + 5 = 2x + 11$

$6x = 6$

$x = 1$

58.



$180 - 70 = 110$

$\frac{110}{2} = 55$

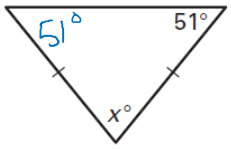
$3x - 10 + 55 = 180$

$3x + 45 = 180$

$3x = 135$

$x = 45$

59.

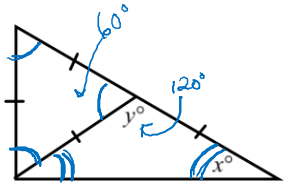


$x + 51 + 51 = 180$

$x + 102 = 180$

$x = 78$

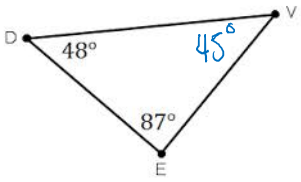
60.



$y = 120$

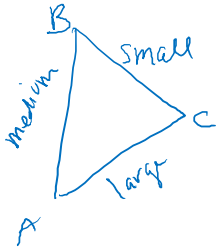
$x = 30$

61. List the <u>sides</u> in order from ***smallest*** *to* ***largest***.



$DE < VE < DV$

62. Given ΔABC and $BC < BA < AC$. List the angles from ***smallest to largest.*** *(Draw a diagram to help!)*



$m\angle A < m\angle C < m\angle B$

63. Determine if lengths 12, 17, 9 can represent the lengths of the sides of a triangle.

$12+9>17$ $\quad 21>17$ Yes. The sum of any 2 sides is greater than the 3rd.

64. Identify the special segment (perpendicular bisector, angle bisector, altitude, or median).

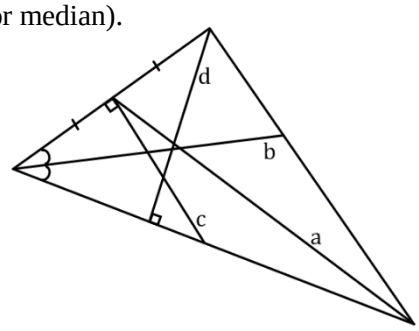
a. median

b. angle bisector

c. perp. bisector

d. altitude

must pass through a vertex

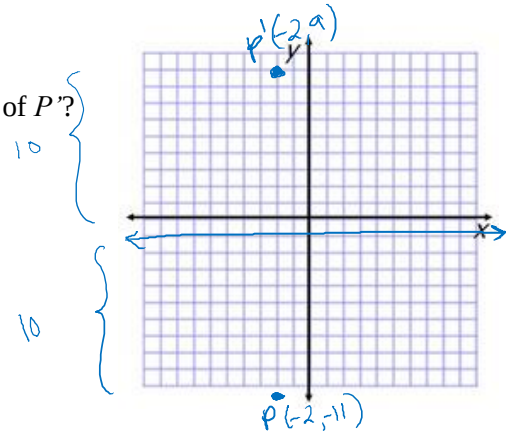


UNIT 5

65. Point $P(-2, -11)$ is reflected in the line $y = -1$. What are the coordinates of P'?

horizontal

$P(-2,-11) \rightarrow P'(-2,9)$

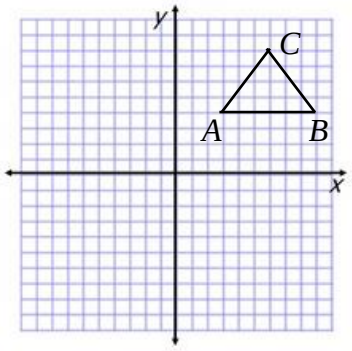


66. Find the image of ΔABC after the transformation described.
Translation: $(x, y) \rightarrow (x, y+1)$; Reflection: in $x = 1$.

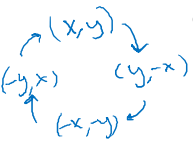
$A'(3,4) \rightarrow A'(3,5) \rightarrow A''(-1,5)$

$B'(9,4) \rightarrow B'(9,5) \rightarrow B''(-7,5)$

$C'(6,8) \rightarrow C'(6,9) \rightarrow C''(-4,9)$



67. Rotate point $A(-2, 5)$ …

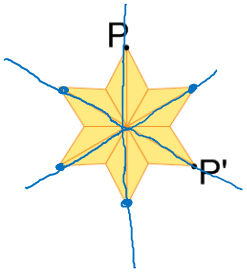


a. 90° cw about the origin $\quad A(-2,5) \rightarrow A'(5,2)$

b. 180° cw about the origin $\quad A(-2,5) \rightarrow A'(2,-5)$

c. 90° ccw about the origin $\quad A(-2,5) \rightarrow A'(-5,-2)$

68. Find the angle of rotation that maps P onto P'.



6 wedges

$\frac{360}{6} = 60°$

120 ° cw $\quad$ 240 ° ccw

UNIT 6

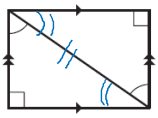
69. Given $\Delta ABC \cong \Delta HIJ$, complete the statements below. Draw a diagram to help.

a) $\angle I \cong \angle$ B

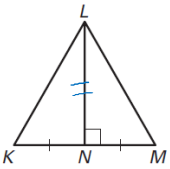
b) $\overline{CA} \cong$ $\overline{JH}$

c) $\Delta IHJ \cong \Delta$ BAC

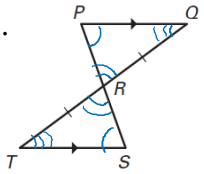
Is it possible to prove the triangles are congruent? Write yes or no. If possible, tell which congruence postulate or theorem you would use (ASA, SAS, AAS, SSS, or HL).

70. 

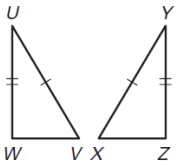
Yes. AAS or ASA

71. 

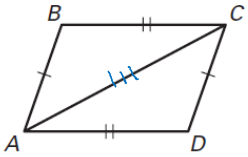
Yes. SAS

72. 

Yes AAS or ASA

73. 

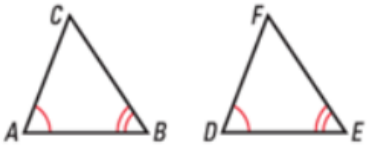
No

74. 

Yes. SSS

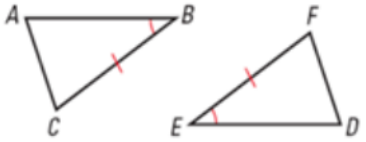
75. To prove these two triangles congruent by ASA,

it must also be given that $\overline{AB} \cong \overline{DE}$.



76. To prove these two triangles congruent by AAS,

it must also be given that $\angle A \cong \angle D$.

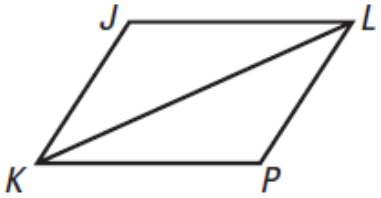


77. **Use the diagram to the right to complete the following.**

a. Name the included side between $\angle$ P and $\angle$ KLP. $\overline{PL}$.

b. Name the included angle between $\overline{JK}$ and $\overline{JL}$. $\angle J$.

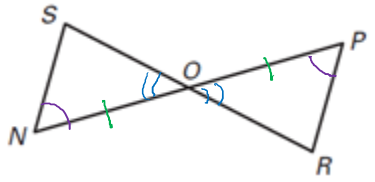
c. Name the included side between $\angle$ JKL and $\angle$ JLK. $\overline{KL}$.



78. **Complete the proof.**

Given: O is the midpoint of $\overline{NP}$
$\angle N \cong \angle P$

Prove: $\overline{SO} \cong \overline{RO}$

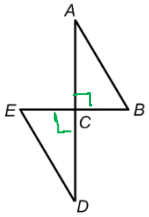


Statements	Reasons
1) O is midpoint of $\overline{NP}$	1) Given
2) $\overline{NO} \cong \overline{PO}$	2) If a pt. is the midpt. of a segment, then it divides the seg. into 2 $\cong$ segments.
3) $\measuredangle N \cong \measuredangle P$	3) Given
4) $\measuredangle SON \cong \measuredangle ROP$	4) If 2 $\measuredangle$'s are vertical $\measuredangle$'s, then they are $\cong$.
5) $\triangle SON \cong \triangle ROP$	5) If the AAA of a $\triangle$ are $\cong$ to the AAA of another $\triangle$, then the $\triangle$'s are $\cong$.
6) $\overline{SO} \cong \overline{RO}$	6) If 2 $\triangle$'s are $\cong$, then all the corresponding parts are $\cong$.

79. **Complete the proof.**

Given: $\overline{AD} \perp \overline{EB}$

Prove: $m\angle ECD = m\angle BCA$



Statements	Reasons
1) $\overline{AD} \perp \overline{EB}$	1) Given
2) $\angle ECD$ and $\angle BCA$ are rt $\angle$s	2) If 2 seg. are $\perp$, then they form right angles.
3) $\measuredangle ECD \cong \measuredangle BCA$	3) If angles are right, then they are congruent.
4) $m\angle ECD = m\angle BCA$	4) If 2 $\measuredangle$'s are $\cong$, then their measures are equal.

Formulas for Coordinate Geometry

Slope	$m = \frac{y_2 \quad y_1}{x_2 \quad x_1}$	• (x_1, y_1) = a point on the line • (x_2, y_2) = a 2nd point on the line • m = rise/run
Distance	$d = \sqrt{(x_2 \quad x_1)^2 + (y_2 \quad y_1)^2}$	• (x_1, y_1) = a point on the line • (x_2, y_2) = a 2nd point on the line • distance = length of segment
Midpoint	$M\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$	• (x_1, y_1) = a point on the line • (x_2, y_2) = a 2nd point on the line • Hint: Take the <u>average</u>!
Slope-Intercept Form of a Line	$y = mx + b$	• m = slope • b = y-intercept • (x, y) = a point on the line
Point-Slope Form of a Line	$y - y_1 = m(x - x_1)$	• (x_1, y_1) = a point on the line • m = slope • optional to use, but must then change to slope-intercept form

Finding the Missing Side Length of a Right Triangle

Pythagorean Theorem	$a^2 + b^2 = c^2$	• for <u>right</u> triangles only • must be given 2 of the 3 side lengths • c = length of hypotenuse (side opposite right angle)