

Name: Key

Angle Relationships - Day \_\_\_\_\_

# Advanced Angle Relationships: Notes and Examples

$\overrightarrow{BA}$  and  $\overrightarrow{BC}$  are opposite rays, which means form a straight line.  $\overrightarrow{BF}$  bisects  $\angle CBE$  and  $\overrightarrow{BD}$  bisects  $\angle ABE$ . Justify your steps.

1. What does it mean to bisect an angle? Cut  $\angle$  into 2  $\cong$  parts

2. If  $m\angle EBF = 6x + 4$  and  $m\angle CBF = 7x - 2$ , find  $m\angle EBC$ .

$\angle EBF = \angle CBF$  def of  $\angle$  bisector

$$6x + 4 = 7x - 2$$

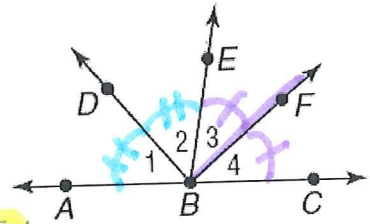
$$4 = x - 2$$

$$6 = x$$

Substitution

Subtraction

addition



$$\angle EBC = \angle EBF + \angle CBF$$

$$\angle EBC = 6(6) + 4 + 7(6) - 2 \quad \boxed{\angle EBC = 80^\circ}$$

3. If  $m\angle 1 = 4x + 10$  and  $m\angle 2 = 5x$ , find  $m\angle 2$ .

$\angle 1 = \angle 2$  def of  $\angle$  bisector

$$4x + 10 = 5x$$

$$10 = x$$

Substitution

Subtraction

$$\angle 2 = 5(10)$$

$$\boxed{m\angle 2 = 50^\circ}$$

4. If  $m\angle 2 = 6y + 2$  and  $m\angle 1 = 8y - 14$ , find  $m\angle ABE$ .

$\angle 1 = \angle 2$

$$8y - 14 = 6y + 2$$

$$2y - 14 = 2$$

$$2y = 16$$

$$\boxed{y = 8}$$

def of  $\angle$  bisector

Substitution

Subtraction

addition

division

$$\angle ABE = \angle 1 + \angle 2$$

$$\angle ABE = 8(8) - 14 + 6(8) + 2$$

$$\boxed{\angle ABE = 100^\circ}$$

5. Based on the above questions, is  $\angle DBF$  a right angle? Explain.

Yes,  $\angle 3 = \frac{1}{2} 80$

$$\angle 3 = 40^\circ$$

$$\angle 2 = 50^\circ$$

$$\angle DBF = \angle 3 + \angle 2$$

$$\angle DBF = 40 + 50$$

$$\boxed{\angle DBF = 90^\circ}$$

Justify your steps.

6. Find x.

$$m\angle 19 = 100 + 20x$$

$$m\angle 20 = 20x$$

$$\angle 19 + \angle 20 = 180$$

$$100 + 20x + 20x = 180$$

$$100 + 40x = 180$$

$$40x = 80$$

$$\boxed{x = 2}$$

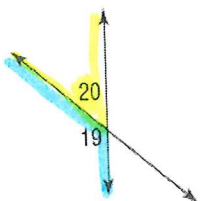
linear pairs are suppl.

Subst.

CLT

Subtraction

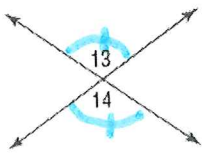
division



7. Find x.

$$m\angle 13 = 2x + 94$$

$$m\angle 14 = 7x + 49$$



$$\angle 13 = 44$$

$$2x + 94 = 7x + 49$$

$$94 = 5x + 49$$

$$45 = 5x$$

$$9 = x$$

Vertical  $\angle$ s are  $\cong$

Substitution

Subtraction

Subtraction

division

8. The measures of two complementary angles are  $m\angle A = 16z - 9$  and  $m\angle B = 4z + 3$ . Find the measures of both angles.

$$\angle A + \angle B = 90$$

$$16z - 9 + 4z + 3 = 90$$

$$20z - 6 = 90$$

$$20z = 96$$

$$z = 4.8$$

def of compl.

Substitution

CLT

addition

division

$$\angle A = 16(4.8) - 9$$

$$\angle A = 67.8^\circ$$

$$\angle B = 4(4.8) + 3$$

$$\angle B = 22.2^\circ$$

9. Find x,  $m\angle PQS$ , and  $m\angle SQR$ .

$$\angle PQR = 90^\circ$$

$$\angle PQS + \angle SQR = \angle PQR$$

$$3x + 8x + 2 = 90$$

$$11x + 2 = 90$$

$$11x = 88$$

$$x = 8$$

def of  $\perp$  (or Right  $\angle$ )

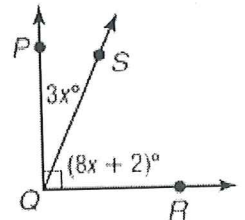
angle addition

substitution

CLT

substitution

division



$$\angle PQS = 3(8)$$

$$\angle PQS = 24^\circ$$

$$\angle SQR = 8(8) + 2$$

$$\angle SQR = 66^\circ$$

10. Find the measures of an angle and its complement if one angle measures 18 degrees more than the other.

$$x + y = 90$$

$$x = y + 18$$

def of compl.

$$y + 18 + y = 90$$

$$2y + 18 = 90$$

$$2y = 72$$

$$y = 36^\circ$$

$$x = 36 + 18$$

$$x = 54^\circ$$

11. The measure of the supplement of an angle is 36 less than the measure of the angle. Find the measures of the angles.

$$x + y = 180$$

$$x = y - 36$$

$$y - 36 + y = 180$$

$$2y - 36 = 180$$

$$2y = 216$$

$$y = 108^\circ$$

$$x = 108 - 36$$

$$x = 72^\circ$$