

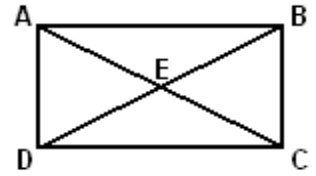
## Advanced Geometry – Unit 1 Review

### “Terms Hodgepodge”

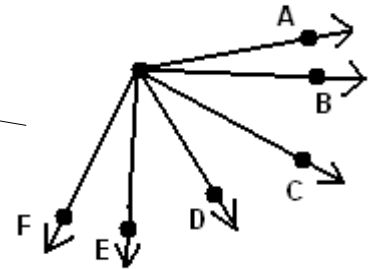
1.) Complete the postulate: “Through any three noncollinear points, there is exactly one \_\_\_\_\_”

2.) How many different angles are in the figure? (Ignore straight angles)

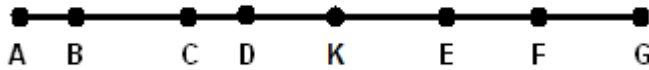
3.) Name all of the line segments in the figure.



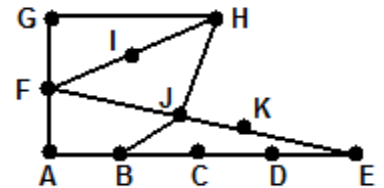
4.) How many different angles are in the figure?



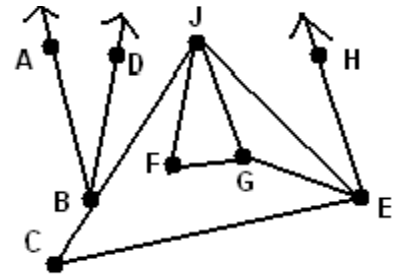
5.) How many different segments are in the figure?



6.) What is the probability that a randomly chosen segment in the figure contains B?



7.) What is the probability a randomly chosen angle in the figure has vertex J? (Ignore straight angles.)



### “Box Principle”

- 1.) There are twenty different rides at a local fair. Twenty-one different kids each ride a single ride. Show that at least two of them must have gone on the same ride by identifying the boxes and the pigeons.
- 2.) There are nineteen people living in an apartment complex. Twenty letters arrive in the mail. Show that at least one person gets multiple letters by identifying the boxes and the pigeons.
- 3.) People in a room choose their favorite letter of the alphabet. What is the fewest number of people that must be in the room to guarantee that at least 10 of them have the same favorite letter?
- 4.) Six numbers are chosen from the list  $\{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$ . Show that at least one pair of the chosen numbers has an even product. (Identify the boxes you will use.)
- 5.) Scholars choose their favorite of the forty-three presidents. What is the fewest number of people that must be in the room to guarantee that at least 7 of them have the same favorite president?
- 6.) A lock for a locker has a single letter and number combination (numbers from 01 – 99). What is the fewest number of locks that must be produced to guarantee the same lock combination is used three times?

## “General Sequences”

- 2.) Most likely next #: -8, -10, -9, -5, 2, \_\_\_\_\_
- 3.) General rule for:  $1/2, 1/4, 1/8, 1/16, 1/32, 1/64, \dots$  ( $a_n = ???$ )
- 4.) General rule for: 120, 60, 40, 30, 24, 20, ... ( $a_n = ???$ )
- 5.) General rule for: 12, 40, 90, 168, 280, 432, .... ( $a_n = ???$ )
- 6.) Most likely next #: 0, 40, 72, 92, 96, 80, \_\_\_\_\_
- 7.) General rule for: 2, 7, 24, 77, 238, 723, ... ( $a_n = ???$ )

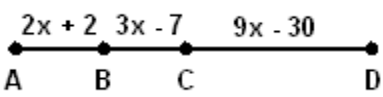
## “Arithmetic Sequences”

- 2.) What makes a list an "arithmetic sequence"?
- 3.) Find the general rule if  $a_5 = -17$  and  $a_{17} = -65$
- 4.) Find the general rule if  $a_{13} = -41$  and  $a_{27} = -83$
- 5.) Find  $a_{100}$  if  $a_{10} = -19$  and  $a_{31} = -208$
- 6.) Find  $a_{314}$  if  $a_{10} = 22$  and  $a_{52} = 190$
- 7.) Find  $a_{200}$  if  $a_8 = -13$  and  $a_8 + a_9 + a_{10} = -48$

## “Geometric Sequences”

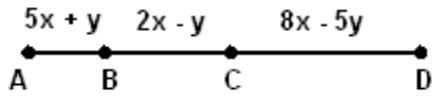
- 2.) Find the general rule if  $a_5 = -96$  and  $a_8 = 768$
- 3.) Find the general rule if  $a_3 = 32$  and  $a_6 = 2048$
- 4.) (all positive terms) Find the general rule if  $a_1 = 162$  and  $a_5 = 2$
- 5.) (alternating terms) Find the general rule if  $a_1 = 1250$  and  $a_5 = 2$
- 6.) Find the general rule if  $a_3 = -24$  and  $a_3 * a_4 * a_5 = 110592$
- 7.) Find the general rule: 960, 1440, 2160, 3240, 4860, 7290, ...

**“Segment Addition”**

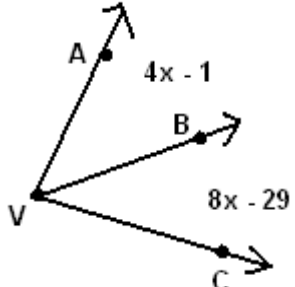
3.)   $x =$   
 $BC =$   
**C is the midpoint of  $\overline{AD}$**

4.) Three people (A, B, C) stand on a straight road. C is between A and B. The distance from C to B is 12 more than triple the distance from A to C. If there is a total of 92 miles between A and B, find CB.

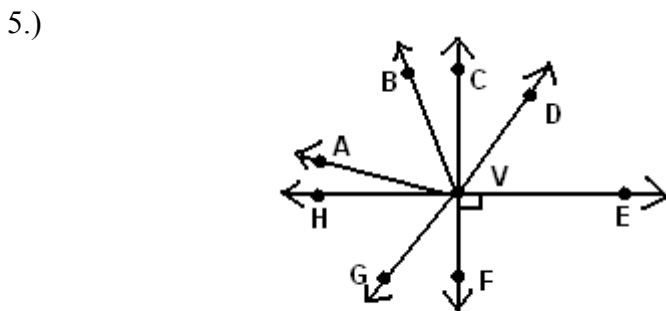
5.) Al, Bill, and Cindy are standing in different places in a long line (Al is between Bill and Cindy). The distance from Bill to Al is 6 less than triple the distance from Al to Cindy. If the distance between Bill and Cindy is 28 yards, find the distance between Bill and Al.

6.)   $x =$   
 $y =$   
**CD is twelve more than twice AB**  $CD =$   
**BC is one more than AB**

**“Angle Addition”**

3.)  **Given:**  
**The complement of  $\angle AVC$  is  $30^\circ$**   
**Find:**  
 $x =$   
 $m\angle BVC =$

4.) Two angles are supplementary. One is 28 less than triple the other. What are the measures of the two angles?

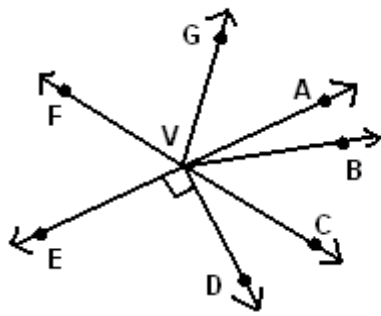


**Given:**  $m\angle HVA = (5x - 5y)$  **Find:**  $x =$   
 $m\angle BVC = (2x + 2y + 1)$   $y =$   
 $m\angle DVE = (10x + 4y)$   
 $m\angle HVG = (6x + 9y)$   $m\angle BVA =$   
 $m\angle GVF = (8x + y)$

H, V, E are collinear  
 C, V, F are collinear

$\angle AVH \cong \angle BVC$

6.)



Given:

$$\begin{aligned}
 m \angle DVC &= (18x + 30y) \\
 m \angle CVB &= (10x - 2y - 1) \\
 m \angle BVA &= (4x - 4y + 1) \\
 m \angle GVA &= (12x - 8y + 3)
 \end{aligned}$$

E, V, A are collinear

$$\angle FVG \cong \angle GVA$$

$m \angle FVE$  is eight more than  $m \angle FVG$

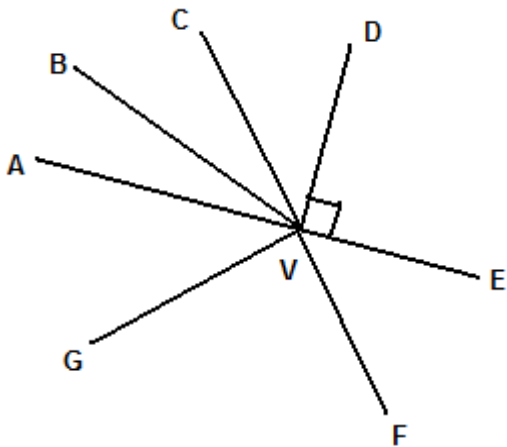
Find:

$$x =$$

$$y =$$

$$m \angle FVE =$$

7.)



Given:

$$m \angle AVB = 51x + 17y - 31$$

$$m \angle CVD = 7x + 4y - 18$$

$$m \angle FVG = 18x + 11y - 37$$

$$m \angle AVF = 4x + 8y + 27$$

A, V, E are collinear

$\vec{VB}$  bisects  $\angle AVC$

$m \angle AVG$  is  $21^\circ$  more than  $m \angle EVF$

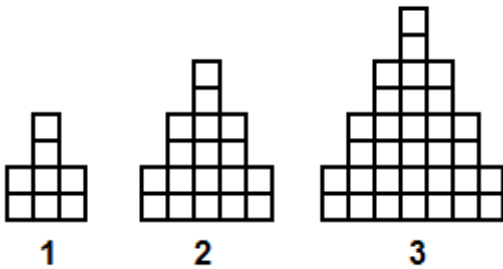
Find:

$$x = \underline{\hspace{2cm}}$$

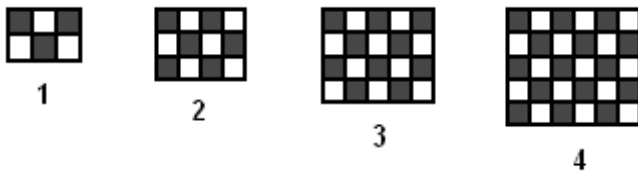
$$y = \underline{\hspace{2cm}}$$

**“Picture Patterns”**

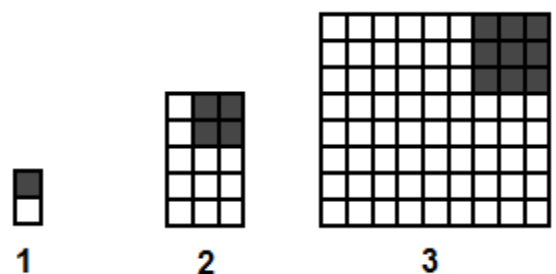
4.) How many unit squares are needed to build the  $n$ th figure? ( $a_n = ???$ )



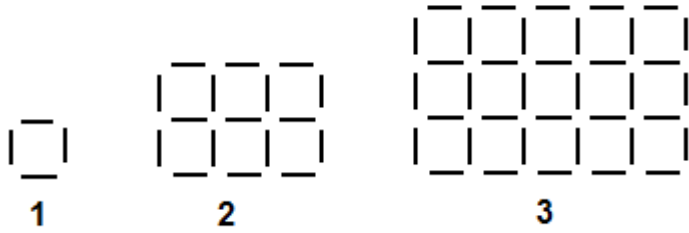
5.) How many shaded unit squares are found in the  $n$ th figure? ( $a_n = ???$ )



6.) How many white unit squares are needed to build the  $n$ th figure? ( $a_n = ???$ )



7.) How many match-sticks would be needed to construct the 75<sup>th</sup> figure?

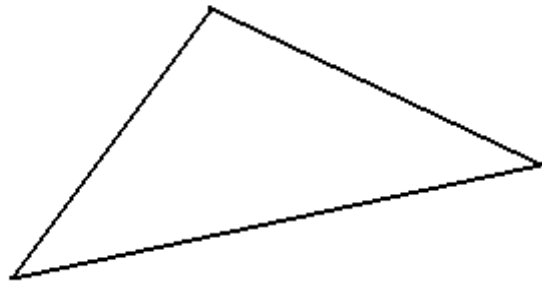
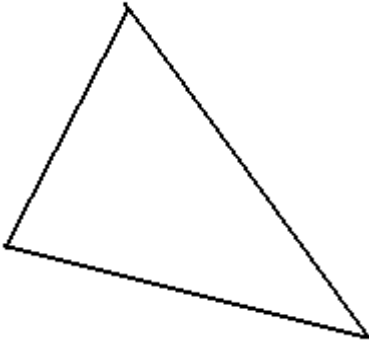


**Construction of Points in Triangles**

1. This is the point where the angle bisectors intersect.
2. This is the point where the perpendicular bisectors intersect.

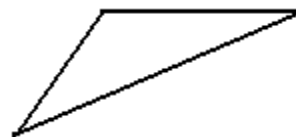
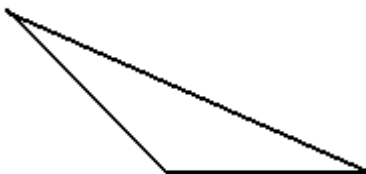
3. Construct the centroid.

4. Construct the inscribed circle:



5. Construct the circumscribed circle

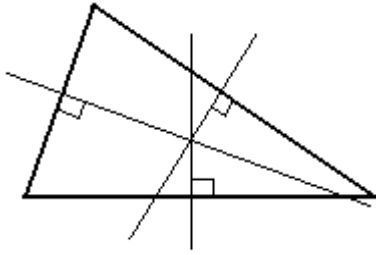
6. Construct the orthocenter:



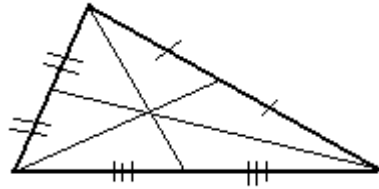
## Identifying Triangle Points

Provide the name of the special point being illustrated in each figure.

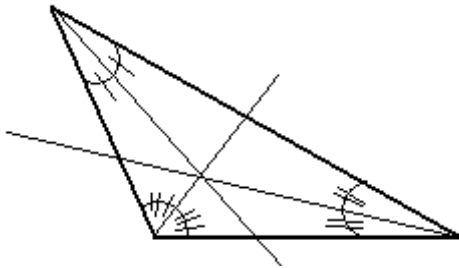
3.)



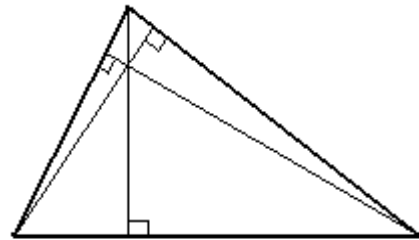
4.)



5.)



6.)



## “Gauss”

4.)  $1 + 2 + 3 + \dots + 874 + 875 + 876 = ??$

5.)  $894 + 895 + 896 + \dots + 1452 + 1453 + 1454 = ??$

6.)  $767 + 775 + 783 + \dots + 6535 + 6543 + 6551 = ??$