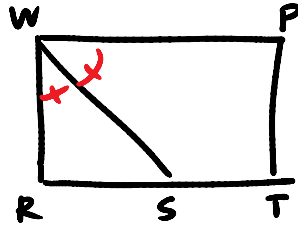
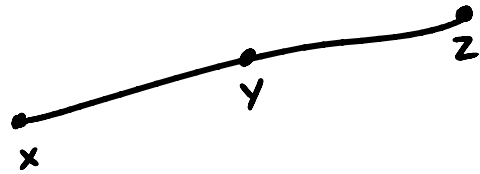


#12 Given:  $\overrightarrow{WS}$  bisects  $\angle RWP$   
 Prove:  $\angle RWS \cong \angle PWS$



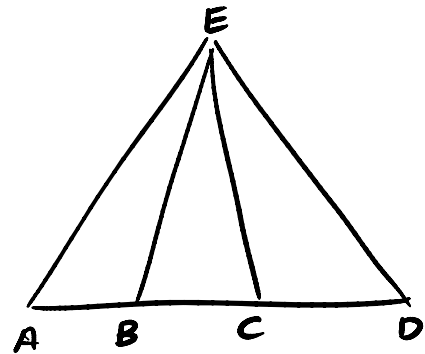
Statements	Reasons
1. $\overrightarrow{WS}$ bisects $\angle RWP$	1. Given
2. $\angle RWS \cong \angle PWS$	2. If a ray bisects an $\angle \rightarrow$ divides the $\angle$ into 2 $\cong$ $\angle$ 's

#13 Given:  $\overline{XY} \cong \overline{YZ}$   
 Prove:  $Y$  is the midpt of  $\overline{XZ}$



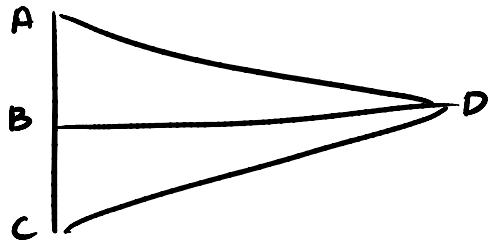
Statements	Reasons
1. $\overline{XY} \cong \overline{YZ}$	1. Given
2. $Y$ is the midpt. of $\overline{XZ}$	2. If a pt. divides a segment into 2 $\cong$ segs then the point is a midpt of the seg.

#14 Given:  $\angle AEB \cong \angle BEC \cong \angle CED$   
 Conclusion:  $\overrightarrow{EB}$  and  $\overrightarrow{EC}$  trisect  $\angle AED$



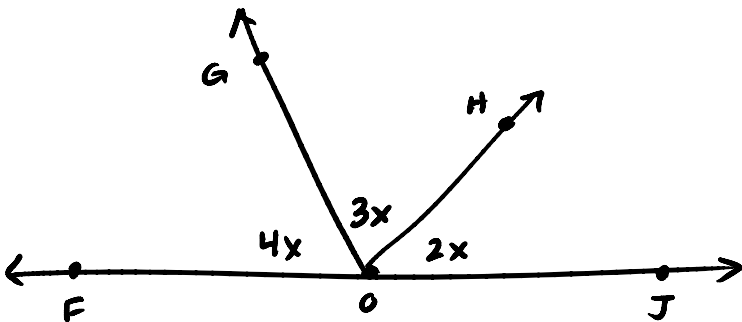
Statements	Reasons
1. $\angle AEB \cong \angle BEC \cong \angle CED$	1. Given
2. $\overrightarrow{EB}$ and $\overrightarrow{EC}$ trisect $\angle AED$	2. If 2 rays divide an angle into 3 $\cong$ $\angle$ 's then the rays trisect the angle

#17 Given: B is the midpt of  $\overline{AC}$   
 Prove:  $\overline{AB} \cong \overline{BC}$



Statements	Reasons
1. B is the midpt of $\overline{AC}$	1. Given
2. $\overline{AB} \cong \overline{BC}$	2. If a point is a midpt of a segment then it divides the segment into 2 $\cong$ segments

#18



$$4x + 3x + 2x = 180$$

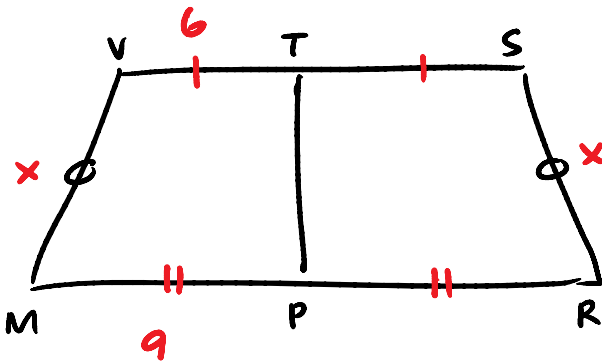
$$9x = 180$$

$$x = 20$$

$$m \angle FOG = 4(20)$$

$$= \boxed{80}$$

#19



Perimeter = 62  
 Find VM

call  $VM = x$

$$6 + 6 + 9 + 9 + x + x = 62$$

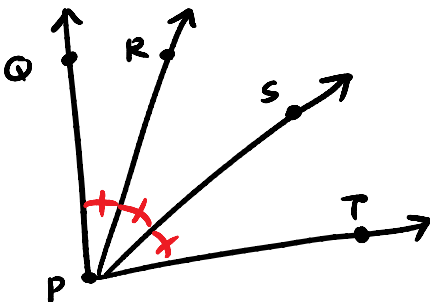
$$30 + 2x = 62$$

$$2x = 32$$

$$x = 16$$

$$\boxed{VM = 16}$$

#20



a. If  $m \angle RPS = 23^\circ 50'$  find  $\angle QPT$

$$\begin{array}{r} \times \quad 3 \\ \hline 69^\circ 150' \\ \hline \boxed{71^\circ 30'} \end{array}$$

b. If  $m \angle QPT = 120^\circ 48' 30''$   
 find  $m \angle QPS$

$$\div 3 \Rightarrow 40^\circ 16' 10'' \Rightarrow \boxed{80^\circ 32' 20''}$$

#21 a. Find the value of  $x$ .

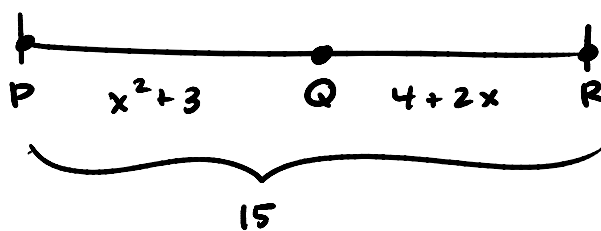
$$x^2 + 3 + 4 + 2x = 15$$

$$x^2 + 2x + 7 = 15$$

$$x^2 + 2x - 8 = 0$$

$$(x+4)(x-2) = 0$$

does not work  $\rightarrow x = -4$   $\boxed{x = 2}$



b. Is Q the midpoint of PR?

$$PQ = (2)^2 + 3 = 7$$

$$QR = 4 + 2(2) = 8$$

**NO**

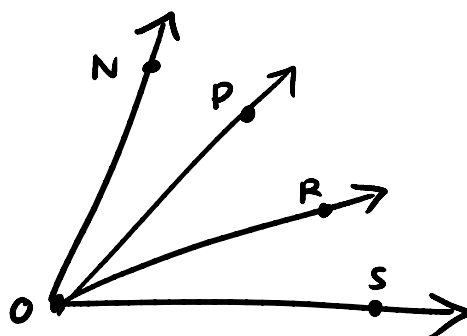
#22 Given:  $\vec{OP}$  and  $\vec{OR}$  trisect  $\angle NOS$

$$m\angle NOP = 3x - 4y$$

$$m\angle POR = x - y$$

$$m\angle ROS = y - 10$$

Find  $m\angle ROS$



$$3x - 4y = x - y$$

$$\boxed{2x - 3y = 0}$$

$$x - y = y - 10$$

$$\boxed{x - 2y = -10}$$

$$2x - 3y = 0 \Rightarrow 2x - 3y = 0$$

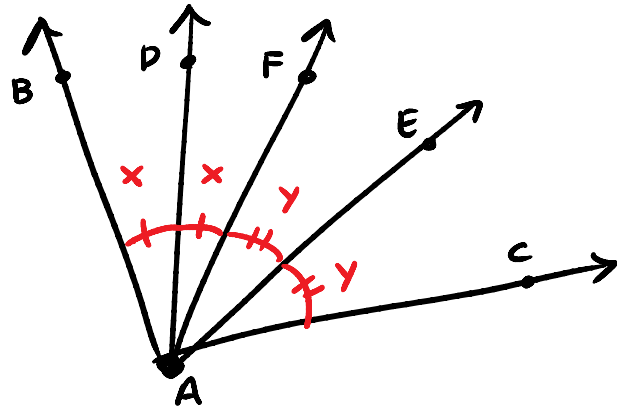
$$-2(x - 2y = -10) \Rightarrow -2x + 4y = 20$$

$$y = 20$$

$$x = 30$$

$$m\angle ROS = 20 - 10 = \boxed{10}$$

#23  $\angle BAC = 120^\circ$   
 $\vec{AD}$  bisects  $\angle BAF$   
 $\vec{AE}$  bisects  $\angle CAF$   
Find  $\angle DAE$



$$\frac{2x}{2} + \frac{2y}{2} = \frac{120}{2}$$

$$x + y = 60$$

Therefore, since  $x + y = \angle DAE$

$$\boxed{\angle DAE = 60^\circ}$$