



(21) ① Plane  $M$  bisects  $\overline{AB}$ .  $\rightarrow$  ②  $\overline{AO} \cong \overline{BO}$   
 ③  $\overline{PO} \perp \overline{AB} \rightarrow$  ④  $\angle POB$  &  $\angle POA$  are right  $\angle$ s.  $\rightarrow$  ⑤  $\angle POB \cong \angle POA$   
 ⑥  $\overline{PO} \cong \overline{PO}$

$\rightarrow$  ⑦  $\triangle POA \cong \triangle POB$

- ① Given
- ② Def. of segmt bisector.
- ③ Given
- ④  $\perp$  lines form right  $\angle$ s.
- ⑤ All right  $\angle$ s  $\cong$ .
- ⑥ Reflexive property
- ⑦ SAS  $\cong$  SAS

(19) ①  $\overline{AI}$  bisects  $\angle BAC$ .  $\rightarrow$  ②  $\angle BAI \cong \angle CAI$   
 ③  $\overline{AB} \cong \overline{AC}$   
 ④  $\overline{AI} \cong \overline{AI}$

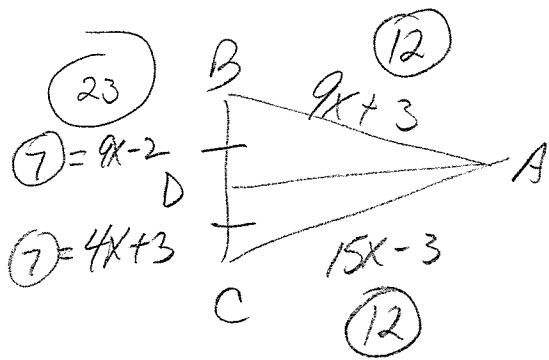
$\rightarrow$  ⑤  $\triangle ABI \cong \triangle ACI$

- ① Given
- ② Def of  $\angle$  bisector.
- ③ Given
- ④ Reflexive Prop
- ⑤ SAS  $\cong$  SAS

(20) ①  $N$  is midpt of  $\overline{AE}$ .  $\rightarrow$  ②  $\overline{AN} \cong \overline{EN}$   
 ③  $\angle 1 \cong \angle 2$   
 ④  $\angle A \cong \angle E$

$\rightarrow$  ⑤  $\triangle ABN \cong \triangle EDN$

- ① Given
- ② Def. of midpt.
- ③ Given
- ④ Given
- ⑤ ASA  $\cong$  ASA



$$9x - 2 = 4x + 3$$

$$5x = 5$$

$$x = 1$$

Since  $AB = 12$  &  $AC = 12$ ,  
 $\overline{AB} \cong \overline{AC}$ .

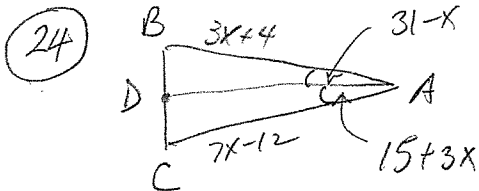
Since  $BD = 7$  &  $CD = 7$ ,

$$\overline{BD} \cong \overline{CD}$$

Also,  $\overline{AD} \cong \overline{AD}$

Therefore  $\triangle ABD \cong \triangle ACD$

by SSS  $\cong$  SSS.



$$AB = 3(4) + 4 = 16$$

$$AC = 7(4) - 12 = 16$$

$$m\angle BAD = 27$$

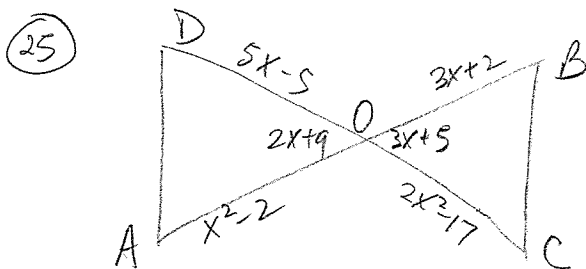
$$m\angle CAD = 27$$

Use:  $31 - x = 15 + 3x$

$$16 = 4x$$

$$4 = x$$

Since  $AB = AC$ ,  $m\angle BAD = m\angle CAD$ ,  
 and  $\overline{AD} \cong \overline{AD}$ ,  $\triangle BDA \cong \triangle CDA$   
 by SAS postulate.



$$AO = 14$$

$$DO = 15$$

$$BO = 14$$

$$CO = 15$$

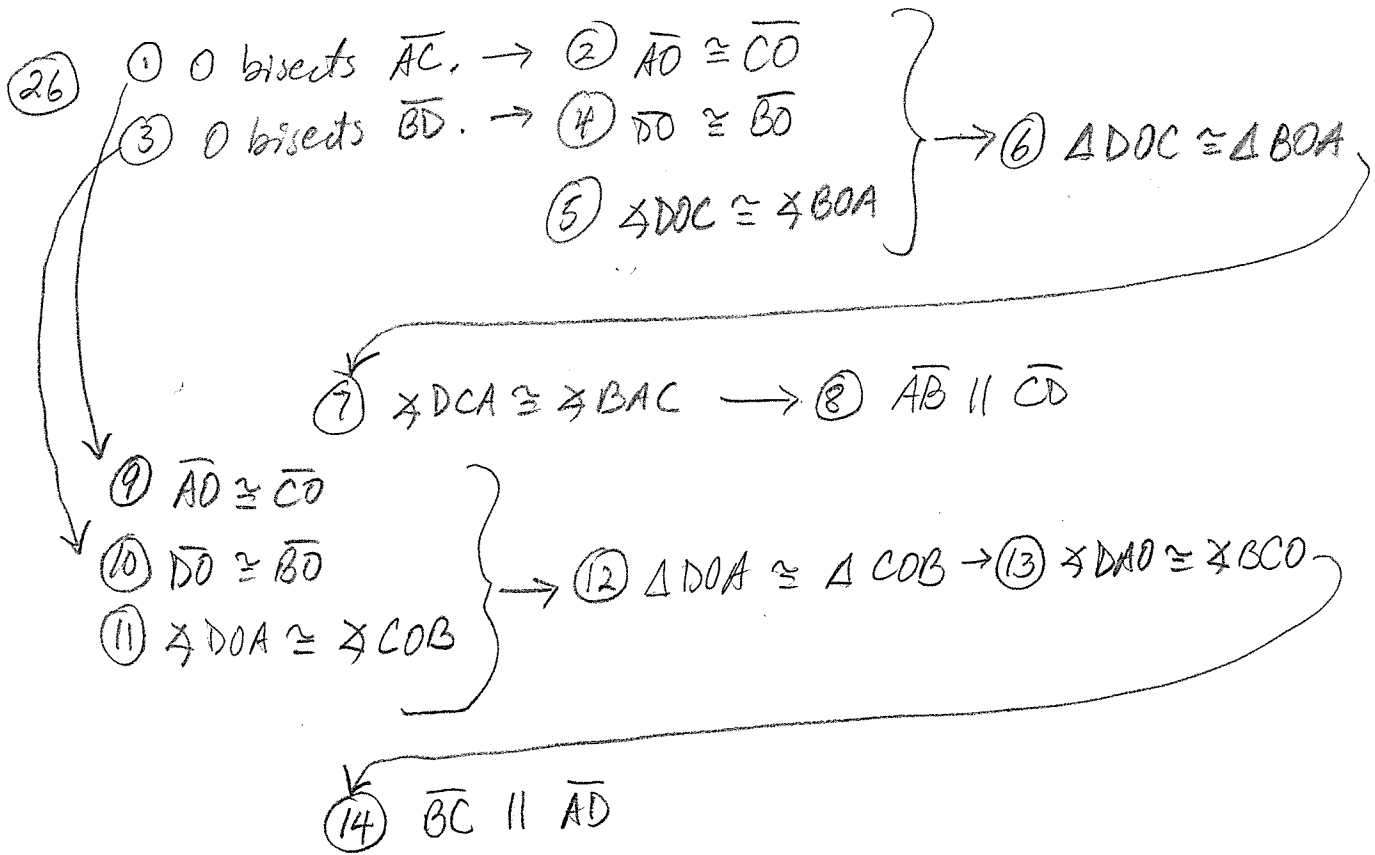
$$m\angle AOD = 17$$

$$m\angle BOC = 17$$

Use:  $2x + 9 = 3x + 5$

$$4 = x$$

Since  $AO = BO$  and  $DO = CO$ ,  
 $\overline{AB}$  and  $\overline{CD}$  bisect each other.



### Reasons

- ① Given
- ② Def of seg. bisector
- ③ Given
- ④ Def of seg bisector
- ⑤ Vertical  $\angle$ s  $\cong$ .
- ⑥ SAS  $\cong$  SAS
- ⑦ CPCTC
- ⑧ 2 lines  $\angle \cong$  alt. int.  $\angle$ s  $\rightarrow$  2  $\parallel$  lines
- ⑨ Given
- ⑩ Given
- ⑪ Vertical  $\angle$ s  $\cong$ .
- ⑫ SAS  $\cong$  SAS
- ⑬ CPCTC
- ⑭ 2 lines  $\angle \cong$  alt. int.  $\angle$ s  $\rightarrow$  2  $\parallel$  lines