27. Given: $\triangle ABC$

Prove: $m\angle 1 + m\angle 2 + m\angle 3 = 180$

Statements	Reasons
1. Draw $\overrightarrow{CD}$ through $C \parallel$ to $\overleftrightarrow{AB}$.	1. Through a pt. outside a line, there is exactly 1 line $\parallel$ to the given line.
2. $\angle 2 \cong \angle 5$, or $m\angle 2 = m\angle 5$	2. If 2 $\parallel$ lines are cut by a trans., then alt. int. ∠s are $\cong$.
3. $\angle 1 \cong \angle 4$, or $m\angle 1 = m\angle 4$	3. If 2 $\parallel$ lines are cut by a trans., then corr. ∠s are $\cong$.
4. $m\angle ACD + m\angle 4 = 180$; $m\angle ACD = m\angle 3 + m\angle 5$	4. ∠ Add. Post.
5. $m\angle 3 + m\angle 4 + m\angle 5 = 180$	5. Substitution Prop.
6. $m\angle 1 + m\angle 2 + m\angle 3 = 180$	6. Substitution Prop.

28.

Statements	Reasons
1. $m\angle JGI = m\angle H + m\angle I$	1. The meas. of an ext. ∠ of a △ = the sum of the meas. of the 2 remote int. ∠s.
2. $m\angle H = m\angle I$	2. Given
3. $m\angle JGI = 2m\angle H$	3. Substitution Prop.
4. $\frac{1}{2}m\angle JGI = m\angle H$	4. Div. Prop. of =
5. $\overrightarrow{GK}$ bisects $\angle JGI$.	5. Given
6. $m\angle 1 = \frac{1}{2}m\angle JGI$	6. ∠ Bis. Thm.
7. $m\angle 1 = m\angle H$	7. Substitution Prop.
8. $\overline{GK} \parallel \overline{HI}$	8. If 2 lines are cut by a trans. and corr. ∠s are $\cong$, then the lines are $\parallel$.

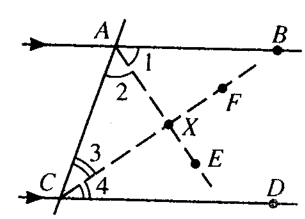
29. $2x + y + 125 = 180$, $2x + y = 55$, $y = 55 - 2x$; $(x + 2y) + (2x + y) = 90$, $(x + 2y) + 55 = 90$, $x + 2y = 35$; $x + 2(55 - 2x) = 35$, $x + 110 - 4x = 35$, $3x = 75$, $x = 25$; $2x + y = 55$, $50 + y = 55$, $y = 5$

30. $(5x + y) + (5x - y) + 100 = 180$, $10x = 80$, $x = 8$; $2x + y = 5x - y$, $2y = 3x$, $2y = 24$, $y = 12$

31. $\angle 1 \cong \angle 2 \cong \angle 5$; $\angle 3 \cong \angle 4 \cong \angle 6$

C **32.** $\angle 7 \cong \angle 8$, $\angle 11 \cong \angle 12$

33. **a–b.** Check students' drawings. See figure at the right.



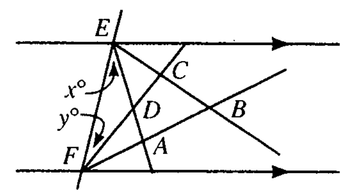
c. The angle measures 90, so the bisectors are $\perp$.

d. Given: $\overleftrightarrow{AB} \parallel \overleftrightarrow{CD}$; $\overrightarrow{AE}$ bisects $\angle BAC$; $\overrightarrow{CF}$ bisects $\angle ACD$.

Prove: $\overleftrightarrow{AE} \perp \overleftrightarrow{CF}$

Statements	Reasons
1. $\overleftrightarrow{AB} \parallel \overleftrightarrow{CD}$	1. Given
2. $m\angle BAC + m\angle ACD = 180$	2. If 2 ∥ lines are cut by a trans., then s-s. int. $\angle$s are supp.; def. of supp. $\angle$s
3. $\frac{1}{2}m\angle BAC + \frac{1}{2}m\angle ACD = 90$	3. Div. Prop. of =
4. $\overrightarrow{AE}$ bisects $\angle BAC$; $\overrightarrow{CF}$ bisects $\angle ACD$.	4. Given
5. $m\angle 2 = \frac{1}{2}m\angle BAC$; $m\angle 3 = \frac{1}{2}m\angle ACD$	5. $\angle$ Bis. Thm.
6. $m\angle 2 + m\angle 3 = 90$	6. Substitution Prop.
7. $m\angle AXF = m\angle 2 + m\angle 3$	7. The meas. of an ext. $\angle$ of a $\triangle$ = the sum of the meas. of the 2 remote int. $\angle$s
8. $m\angle AXF = 90$	8. Substitution Prop.
9. $\overleftrightarrow{AE} \perp \overleftrightarrow{CF}$	9. Def. of $\perp$ lines

34. Since $3x$ and $3y$ are meas. of s-s. int. $\angle$s, $3x + 3y = 180$, and $x + y = 60$. Then $m\angle EDF = m\angle CDA = 180 - (x + y) = 120$. $\angle EBF$ is the third $\angle$ of a $\triangle$ with $\angle$s of meas. $2x$ and $2y$, so $m\angle CBA = 180 - (2x + 2y) = 180 - 120 = 60$. Then, in $ABCD$, $m\angle CDA + m\angle CBA = 120 + 60 = 180$. Also, $\angle BCD$ is an ext. $\angle$ of $\triangle ECF$ with remote int. $\angle$s of meas. $2x$ and y, so $m\angle BCD = 2x + y$. Similarly, $m\angle BAD = 2y + x$. So, $m\angle BCD + m\angle BAD = 3x + 3y = 180$. Therefore, in $ABCD$ opp. $\angle$s are supp.



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1–4. Sketches and angle measures will vary. **1.** False; true for acute $\triangle$s **2.** False; true for acute $\triangle$s **3.** True **4.** False; true for rt. $\triangle$s

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1. convex polygon **2.** nonconvex polygon **3.** not a polygon **4.** nonconvex polygon **5.** not a polygon **6.** nonconvex polygon **7.** It has the same shape. **8.** $(102 - 2)180 = 18{,}000$; 360