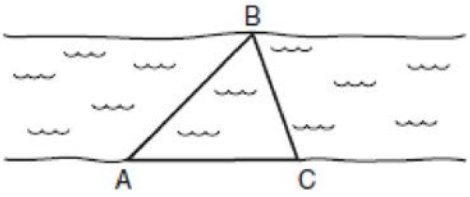
## G.G.34: Angle Side Relationship: Determine either the longest side of a triangle given the three angle measures or the largest angle given the lengths of three sides of a triangle

1 On the banks of a river, surveyors marked locations $A$, $B$, and $C$. The measure of $\angle ACB = 70°$ and the measure of $\angle ABC = 65°$.




Which expression shows the relationship between the lengths of the sides of this triangle?
1) $AB < BC < AC$
2) $BC < AB < AC$
3) $BC < AC < AB$
4) $AC < AB < BC$

2 In $\triangle ABC$, $m\angle A = 60$, $m\angle B = 80$, and $m\angle C = 40$. Which inequality is true?
1) $AB > BC$
2) $AC > BC$
3) $AC < BA$
4) $BC < BA$

3 In $\triangle ABC$, $m\angle B < m\angle A < m\angle C$. Which statement is *false*?
1) $AC > BC$
2) $BC > AC$
3) $AC < AB$
4) $BC < AB$

4 In $\triangle ABC$, $m\angle A = 95$, $m\angle B = 50$, and $m\angle C = 35$. Which expression correctly relates the lengths of the sides of this triangle?
1) $AB < BC < CA$
2) $AB < AC < BC$
3) $AC < BC < AB$
4) $BC < AC < AB$

5 In $\triangle RST$, $m\angle R = 58$ and $m\angle S = 73$. Which inequality is true?
1) $RT < TS < RS$
2) $RS < RT < TS$
3) $RT < RS < TS$
4) $RS < TS < RT$

6 In scalene triangle $ABC$, $m\angle B = 45$ and $m\angle C = 55$. What is the order of the sides in length, from longest to shortest?
1) $\overline{AB}, \overline{BC}, \overline{AC}$
2) $\overline{BC}, \overline{AC}, \overline{AB}$
3) $\overline{AC}, \overline{BC}, \overline{AB}$
4) $\overline{BC}, \overline{AB}, \overline{AC}$

7 In $\triangle ABC$, $m\angle A = 65$ and $m\angle B$ is greater than $m\angle A$. The lengths of the sides of $\triangle ABC$ in order from smallest to largest are
1) $\overline{AB}, \overline{BC}, \overline{AC}$
2) $\overline{BC}, \overline{AB}, \overline{AC}$
3) $\overline{AC}, \overline{BC}, \overline{AB}$
4) $\overline{AB}, \overline{AC}, \overline{BC}$

8 In $\triangle ABC$, $\angle A \cong \angle B$ and $\angle C$ is an obtuse angle. Which statement is true?
1) $\overline{AC} \cong \overline{AB}$ and $\overline{BC}$ is the longest side.
2) $\overline{AC} \cong \overline{BC}$ and $\overline{AB}$ is the longest side.
3) $\overline{AC} \cong \overline{AB}$ and $\overline{BC}$ is the shortest side.
4) $\overline{AC} \cong \overline{BC}$ and $\overline{AB}$ is the shortest side.

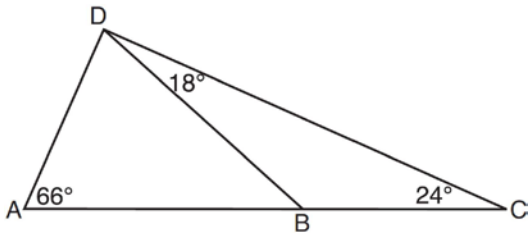
9 In $\triangle ABC$, $AB = 7$, $BC = 8$, and $AC = 9$. Which list has the angles of $\triangle ABC$ in order from smallest to largest?
1) $\angle A, \angle B, \angle C$
2) $\angle B, \angle A, \angle C$
3) $\angle C, \angle B, \angle A$
4) $\angle C, \angle A, \angle B$

10 In $\triangle PQR$, $PQ = 8$, $QR = 12$, and $RP = 13$. Which statement about the angles of $\triangle PQR$ must be true?
1) $m\angle Q > m\angle P > m\angle R$
2) $m\angle Q > m\angle R > m\angle P$
3) $m\angle R > m\angle P > m\angle Q$
4) $m\angle P > m\angle R > m\angle Q$

11 In $\triangle ABC$, $AB = 4$, $BC = 7$, and $AC = 10$. Which statement is true?
1) $m\angle B > m\angle C > m\angle A$
2) $m\angle B > m\angle A > m\angle C$
3) $m\angle C > m\angle B > m\angle A$
4) $m\angle C > m\angle A > m\angle B$

12 For which measures of the sides of $\triangle ABC$ is angle $B$ the largest angle of the triangle?
1) $AB = 2, BC = 6, AC = 7$
2) $AB = 6, BC = 12, AC = 8$
3) $AB = 16, BC = 9, AC = 10$
4) $AB = 18, BC = 14, AC = 5$

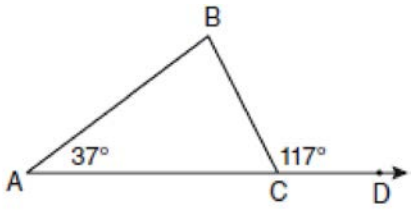
13 As shown in the diagram of $\triangle ACD$ below, $B$ is a point on $\overline{AC}$ and $\overline{DB}$ is drawn.




If $m\angle A = 66$, $m\angle CDB = 18$, and $m\angle C = 24$, what is the longest side of $\triangle ABD$?
1) $\overline{AB}$
2) $\overline{DC}$
3) $\overline{AD}$
4) $\overline{BD}$

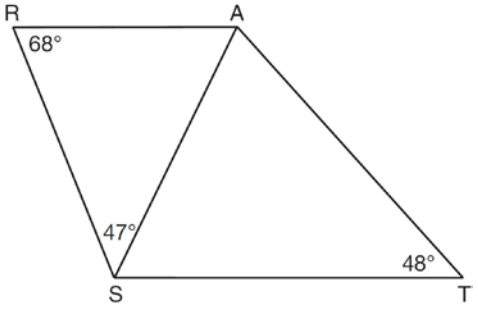
14 In $\triangle CAT$, $m\angle C = 65$, $m\angle A = 40$, and $B$ is a point on side $\overline{CA}$, such that $\overline{TB} \perp \overline{CA}$. Which line segment is shortest?
1) $\overline{CT}$
2) $\overline{BC}$
3) $\overline{TB}$
4) $\overline{AT}$

15 In the diagram below of $\triangle ABC$ with side $\overline{AC}$ extended through $D$, $m\angle A = 37$ and $m\angle BCD = 117$. Which side of $\triangle ABC$ is the longest side? Justify your answer.




(Not drawn to scale)

16 As shown in the diagram below, $\overline{AS}$ is a diagonal of trapezoid $STAR$, $\overline{RA} \parallel \overline{ST}$, $m\angle ATS = 48$, $m\angle RSA = 47$, and $m\angle ARS = 68$.




Determine and state the longest side of $\triangle SAT$.

17 In $\triangle ABC$, $m\angle A = x^2 + 12$, $m\angle B = 11x + 5$, and $m\angle C = 13x - 17$. Determine the longest side of $\triangle ABC$.

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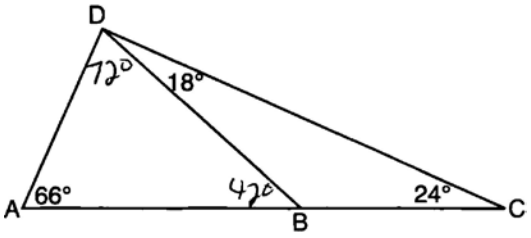
**Answer Section**

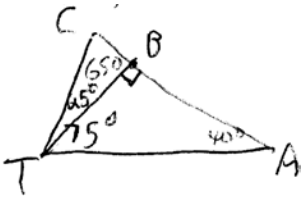
1 ANS: 3 REF: 060629a
2 ANS: 2 REF: 061321ge
3 ANS: 1 REF: 081524ge
4 ANS: 2 REF: 060911ge
5 ANS: 4 REF: 011222ge
6 ANS: 4
$m\angle A = 80$

REF: 011115ge
7 ANS: 1 REF: 061523ge
8 ANS: 2 REF: 081306ge
9 ANS: 4
Longest side of a triangle is opposite the largest angle. Shortest side is opposite the smallest angle.

REF: 081011ge
10 ANS: 1 REF: 061010ge
11 ANS: 2 REF: 011510ge
12 ANS: 1 REF: 011416ge
13 ANS: 1



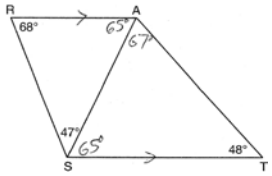

REF: 081219ge
14 ANS: 2




REF: 081422ge
15 ANS:
$\overline{AC}$

REF: 080934ge

16 ANS:




$\overline{ST}$

REF: 061430ge

17 ANS:

$x^2 + 12 + 11x + 5 + 13x - 17 = 180$. $\text{m}\angle A = 6^2 + 12 = 48$ . $\angle B$ is the largest angle, so $\overline{AC}$ in the longest side.

$x^2 + 24x - 180 = 0$ $\quad \text{m}\angle B = 11(6) + 5 = 71$

$(x + 30)(x - 6) = 0$ $\quad \text{m}\angle C = 13(6) - 7 = 61$

$x = 6$

REF: 011337ge