

Competition A – Geometry – Individual Contest

Team Make-up: maximum 6 students; sophomores or freshmen, or students enrolled in Geometry

Questions: 20

Time: 50 minutes

Format: Individual competition

All battery operated calculators permitted, including CAS-type

Answers must be legible

Answers must be **exact** unless otherwise indicated in the question

Scoring: Correct answers worth 2 points each; 40 points possible per team member

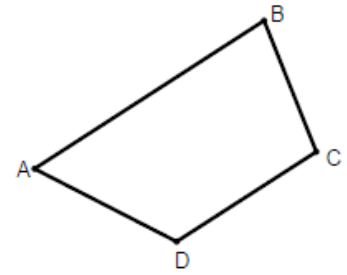
Team Score: The top 4 scores count toward the team score; 5th and 6th scores are used for tie-breaking
Maximum 160 points per team

Sample Regional Questions

1. $\triangle ABC$ is isosceles with base \overline{AC} having length $12\sqrt{3}$. The numeric area of $\triangle ABC$ is $36\sqrt{3}$. Determine the degree measure of $\angle ABC$.

Answer: 120

2. $ABCD$ is a trapezoid. Leg $AD = 9$, base $CD = 6$ and $m\angle D = 2m\angle B$. Determine the length of base \overline{AB} .

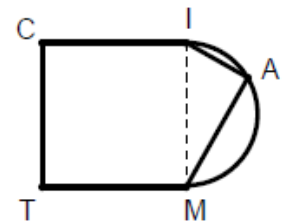


Answer: 15

3. An equation of the line that passes through the point $(-3, -4)$ with a slope of 2 can be written as $y = kx + w$. Determine the sum $(k + w)$.

Answer: 4

4. $ICTM$ is a square with numeric perimeter of 40 and semi-circle \widehat{IAM} constructed with \overline{IM} as a diameter. $AI = \frac{1}{2}(IM)$. The exact numeric area of pentagon $ICTMA$ can be written in reduced and simplified radical form as $\frac{k + w\sqrt{p}}{q}$ where k , w , p , and $q > 0$ are integers. Determine the sum $(k + w + p + q)$.

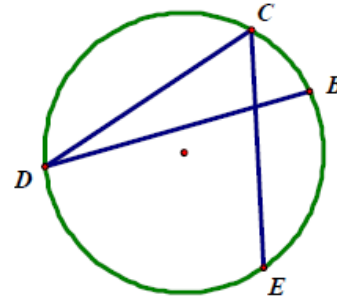


Answer: 230

5. A right triangle has acute angles such that the degree measure of one is half of the degree measure of the other. The area of this triangle is $18\sqrt{3}$. Find the length of the hypotenuse of this triangle.

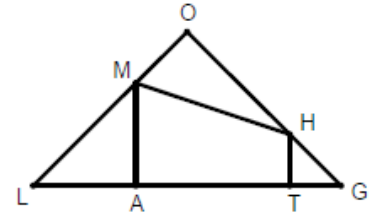
Answer: 12

6. In the given circle, $\widehat{BC} = 42^\circ$ and $\angle DCE = 60^\circ$. The measure of \widehat{BE} is 46° less the measure of \widehat{CD} . Find the degree measure of \widehat{BE} .



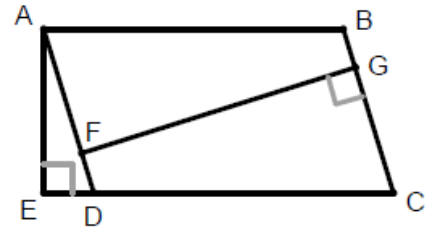
Answer: 76

7. $\triangle LOG$ is a right triangle with right $\angle O$. $\overline{MA} \perp \overline{LG}$, $\overline{HT} \perp \overline{LG}$, $AL = AM$, and $HT = TG$. $LM = 4$, $OM = 2$, $GH = 2$, and $OH = 4$. Determine the numeric area of quadrilateral $MATH$.



Answer: 9

8. $ABCD$ is a parallelogram with points E , D , and C collinear. $\overline{AE} \perp \overline{EC}$ and $\overline{FG} \perp \overline{BC}$. $FG = 60$, $AE = 24$, and the perimeter of $ABCD$ is 182. Determine the numeric area of $ABCD$.



Answer: 1560

9. The measures of two angles of a triangle are in the ratio $2 : 3$. The third angle measures 4° more than the larger of the other two angles. Determine the degree measure of the exterior angle adjacent to the third angle of this triangle.

Answer: 110

10. In $\triangle ABC$, the altitude from A to \overline{BC} intersects \overline{BC} between B and C and the foot of the altitude has coordinates $(-2, 3)$. An equation of the perpendicular bisector of \overline{BC} is $2x + y = 4$ and an equation of the median from A is $3x + 4y = 16$. Determine the coordinates of A . Express your answer as an ordered pair (x, y) .

Answer: $(-4, 7)$