ECML

2013

Geometry

DIRECTIONS: You **may** write on this test. Be sure that your name, subject, and school (including town name) are on the answer sheet. Mark the answer sheet with dark, careful marks using a #2 pencil. Your score will be determined by the number of correct answers. Incorrect or blank answers will **NOT** lower your score. You **MAY** use only a SAT I approved calculator on this test. The answer to the tie-breaker should be placed on the answer sheet in the place indicated by the proctors. The tie-breaker will be scored, only in the case of a tie between the top scorers, and will not count as part of the team score.

The answer to part e) will always be **NG** for "Not Given". This is a viable answer and means that the correct answer is **not** one of the first four listed.

1) Find the area of parallelogram ABCD is, AB=8, BC=13, and $\angle D = 120°$.

A) $52\sqrt{3}$ B) $32\sqrt{3}$ C)   52   D)   32   E)   NG

2) The supplement of an angle exceeds twice its complement by 43 degrees. Find the degree measure of the angle.

A) 37   B)   43   C)   47   D)   53   E)   NG

3) Parallelogram ABCD has coordinates: A(0, 0), B(-2, -9) and C(4, -4) Find the coordinates of point D, if point D must lie in quadrant I.

A) (5, 5) B)   (5, 6)   C)   (6, 5)   D)   (6,6)   E)   NG

4) An isosceles trapezoid has bases of 10 and 20, and a leg of $\sqrt{89}$. Find the length of the diagonal.

A) 17   B)   15   C) $\sqrt{189}$ D) $\sqrt{161}$ E)   NG

5) Given $\triangle ABC$, with $\angle A < 35° < \angle B$ and $\angle C = 35°$, which of the following could NOT be the value of $\angle B - \angle A$?

A) 73   B)   79   C)   84   D)   101   E)   NG

6) The altitude to the hypotenuse of a right triangle is 6 cm and the hypotenuse is 15 cm. Find the length of the shorter leg of the right triangle.

A) 9 cm   B) $3\sqrt{3}$ cm   C) $5\sqrt{3}$ cm   D) $3\sqrt{5}$ cm   E)   NG

7) Given $\triangle ABC$, with A(-2, 0) and B(6, 0). If point D (3, 0) is such that CD is an altitude and the area of $\triangle ABC$ is 20, find the coordinates of point C.

A) (3, 10)   B)   (3, 5) C)   (10, 3)   D)   (5, 3)   E)   NG

8) Three angles have measures of 2x-7, 4x+5, and 19-x. If their average is 24, what is the measure of the smallest angle?

A) 5   B)   8   C)   15   D)   27   E)   NG

9) Find the point on the line 3x+5y=11 which is equidistant from both the points (-1, 6) and (5, 6).

A) (7, -2)   B)   (2, 6)   C)   (-3, 4)   D)   (2, 1)   E)   NG

10)   In quadrilateral ABCD, $\angle A = 73$ and $\angle B=81$.. What is the degree measure of the acute angle P, the point of intersection of the bisectors of $\angle C$ and $\angle D$?

A) 26   B)   54   C)   77   D)   82   E)   NG

11)   In rectangle ABCD, quadrilateral PQRS is drawn so that point P and R are the midpoints if $\overline{AD}$ and $\overline{BC}$ respectively. Points S and Q lie on $\overline{DC}$ and $\overline{AB}$ respectively such that CS = BQ. What is the ratio of the area of PQRS to the area of ABCD?

        A) ¼ B)   1/3   C)   ½   D)   cannot be determined   E)   NG

12)   In $\triangle ABC$, point D and E lie on side $\overline{AC}$ and $\overline{BC}$ respectively, such that $\overline{DE} \parallel \overline{AB}$ and $DE = \frac{2}{3} AB$. If AD=11, then AC=

A) 33   B) 27 1/3   C)   22   D)   7 1/3   E)   NG

13)   A square and an equilateral triangle have equal perimeters. If the area of the triangle is $12\sqrt{3}$, what is the area of the square?

A) 16/3   B)   9   C)   16   D)   27   E)   NG

14)   A carpenter needs to put a brace into a wooden frame which is in the shape of a right triangle with legs of 18 ft and 24 ft. The brace is to connect the midpoint of the longer leg to the hypotenuse so that it is perpendicular to the hypotenuse. How long must the brace be?

A) 7.2 ft   B)   9.6 ft   C)   14.4 ft   D)   15 ft   E)   NG

15)   Two sides of a triangle are 12 and 18 and the area is $54\sqrt{3}$. Find the length of the third side.
A) $3\sqrt{6}$ B) $6\sqrt{3}$ C) $6\sqrt{7}$ D) $7\sqrt{6}$ E)   NG

16)   Given trapezoid ABCD with bases $\overline{AB}$ and $\overline{CD}$ and $\overline{CD}$ the shorter leg. If legs $\overline{AD}$ and $\overline{BC}$ are extended to meet at point P, find the area of $\triangle ABP$ if AB=20, CD=8, and the area of ABCD is 84 square units.
A) 56   B)   100   C)   124   D) 140   E)   NG

17)   What is the area of the circle that circumscribes right $\triangle ABC$ if AC=15 and BC=20 are the legs of the triangle and $\angle C = 90°$.

A) 10π B) 25π C) 50π D) 625π E)   NG

18)   In $\triangle ABC$, medians $\overline{BD}$ and $\overline{AE}$ intersect at point F. what is the ratio of ED:BA?

A) 1:2   B)   1:4   C)   2:3   D)   3:4   E)   NG

19)   In circle X, with diameter 26, chords $\overline{AB}$ and $\overline{BC}$ have lengths of 10 and 24 respectively. Find the sum of the distances from point X to chords $\overline{AB}$ and $\overline{BC}$.

A) 5   B)   12   C)   13   D)   25   E)   NG

20) Circles A, B, and C are all externally tangent to each other. If AB=12, AC=10, and BC=8, find the radius of the largest circle.

A) 3   B)   5   C)   7   D)   9   E)   NG

Tie Breaker. This question will only be scored to break a tie amongst the high scorers on this contest. It will not count as part of the team score.

Find the exact ratio of the area of the inscribed circle to the area of the circumscribed circle to the equilateral triangle having perimeter 36.