

LEE COUNTY INVITATIONAL

Geometry Individual Test

January 26, 2008

“NOTA” means None Of These Answers.

Figures are NOT drawn to scale.

For the purpose of this test, a kite is a quadrilateral with two pairs of disjoint consecutive congruent sides.

1) In $\triangle ABC$, $AB = 3$, $BC = 4$, and $\angle B = 90^\circ$. Find the length of \overline{AC} .

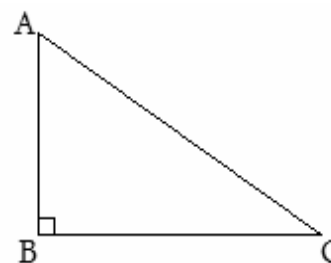
a) $2\sqrt{3}$

d) 5

b) $\frac{5}{2}$

e) NOTA

c) 25



2) At 4:30 PM, a statue of an Ohio State Buckeye, which is 6 feet tall, casts a shadow that is $13\frac{1}{2}$ feet long. If it is instantaneously torn down and replaced by a statue of a Florida Gator that is 10 feet tall, how long will its shadow be?

a) $4\frac{4}{9}$ ft.

b) $22\frac{1}{2}$ ft.

c) $10\frac{3}{4}$ ft.

d) 25 ft.

e) NOTA

3) EFG is a straight line, and $\angle GFH \neq 90^\circ$. If $\angle EFH$ is the vertex angle of an isosceles triangle, then what is the measure of each base angle?

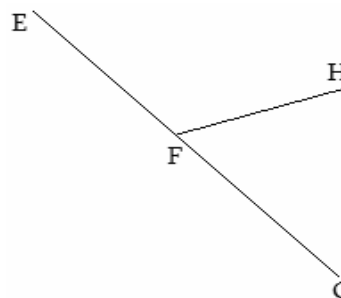
a) $\frac{1}{2}\angle HFG$

d) $\frac{1}{2}\angle EFH$

b) $180^\circ - \angle EFH$

e) NOTA

c) $90^\circ - \angle EFH$



4) On the Cartesian plane, the set of points that are equidistant from two fixed, distinct points form a _____.

- a) line b) segment c) ray
d) midpoint e) NOTA

5) How many of the following are NOT a way to prove right triangle congruency in Euclidean Geometry, where H is the hypotenuse, L is a leg, and A is an angle?

HL HA LA
HH AA LL

- a) 0 b) 1 c) 2
d) 3 e) NOTA

6) The measures of six consecutive exterior angles of a heptagon are in the ratio 1:2:3:4:5:6. The remaining exterior angle is 66° . Find the measure of the smallest interior angle.

- a) $77\frac{1}{7}^\circ$ b) 96° c) 114°
d) 152° e) NOTA

7) Find the number of sides of a regular n-gon whose number of diagonals is equal to $n^2 - 4n - 7$.

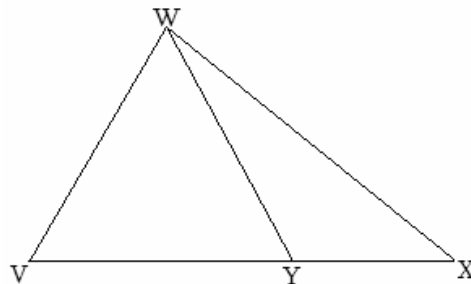
- a) 2 b) 5 c) 7
d) 12 e) NOTA

8) When proving triangle congruency, which of the following is the expanded form of CPCTC?

- a) Congruent Parts of Corresponding Triangles are Congruent
b) Congruent Parts of Composite Triangles are Congruent
c) Corresponding Parts of Congruent Triangles are Congruent
d) Corresponding Parts of Corresponding Triangles are Congruent
e) NOTA

9) Given $\triangle VWX$, with Y on \overline{VX} , find the length of \overline{WY} if $VY = 3$, $VW = 3$, $VX = 4$, and $WX = 5$.

- a) 3
 b) $3\sqrt{2}$
 c) 2
 d) $2\sqrt{2}$
 e) NOTA



10) What is the inverse of the contrapositive of the inverse of the converse of the contrapositive of the inverse of $\sim p \rightarrow q$?

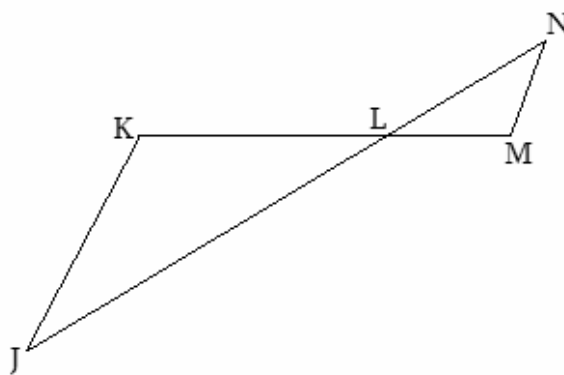
- a) $\sim q \rightarrow p$
 b) $p \rightarrow \sim q$
 c) $\sim p \rightarrow q$
 d) $q \rightarrow \sim p$
 e) NOTA

11) ABCDEFGHIJKLMNOP is a regular 14-gon. Starting at A, diagonal \overline{AF} is drawn, then \overline{FK} , then \overline{KB} , etc. When this cycle is complete, what fraction of the total number of possible diagonals is drawn?

- a) $\frac{1}{11}$
 b) $\frac{2}{11}$
 c) $\frac{3}{11}$
 d) $\frac{4}{11}$
 e) NOTA

12) In the figure to the right, $\angle J \cong \angle N$, $LK = 3$, $LM = 2$, and $MN = 3$. Find the length of \overline{JK} .

- a) 6
 b) 5.5
 c) 5
 d) 4.5
 e) NOTA



13) Given $\triangle HUG$, with $HU = 2\sqrt{3}$, $UG = 6$, and $GH = 4\sqrt{3}$, find the value of $(\sin H)^2 + (\cos H)^2$.

- a) $\frac{1}{2}$
 b) 1
 c) $\frac{3}{2}$
 d) 2
 e) NOTA

14) The lengths of the sides of a non-degenerate triangle are 6, 8, and x , where x is a positive integer. The lengths of the sides of another non-degenerate triangle are 36, 64, and x^2 . How many values of x exist?

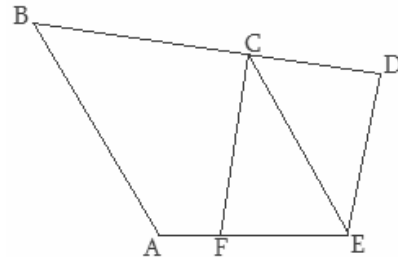
- a) 5 b) 7 c) 9
d) 11 e) NOTA

15) According to the Laws of Quadrilaterals, which of the following *must* be true?

- I. All squares are rectangles.
II. All rhombi are rectangles.
III. Some rhombi are equiangular.
IV. Some parallelograms are squares.

- a) I, III, IV only b) I, II, IV only c) I, II, III only
d) I, IV only e) NOTA

16) In quadrilateral ABDE, C is on \overline{BD} , F is on \overline{AE} , $AE \perp DE$, $CE = CD$, and \overline{CF} bisects $\angle BCE$. If $m\angle ABC = 51^\circ$ and $m\angle CDE = 40^\circ$, find $m\angle FAB$.



- a) 109° d) 179°
b) 129° e) NOTA
c) 171°

17) Given: $\triangle ICY$ and $\triangle HOT$ with $\overline{IC} \cong \overline{HO}$, $\overline{IY} \cong \overline{HT}$, and $\angle I \cong \angle H$. Which method could be used to prove that $\triangle ICY \cong \triangle HOT$?

- a) SAS c) SSS c) HL
d) ASA e) NOTA

18) How many distinct equilateral triangles can be drawn such that the triangle shares at least two vertices with a regular heptagon?

- a) 14 b) 21 c) 28
d) 42 e) NOTA

19) The Greek letter Σ (sigma) is commonly used to indicate a sum in the following fashion: the number on the bottom is the starting number, the number on top is the ending number, and whatever lies after the sigma is what needs to be summed. For example,

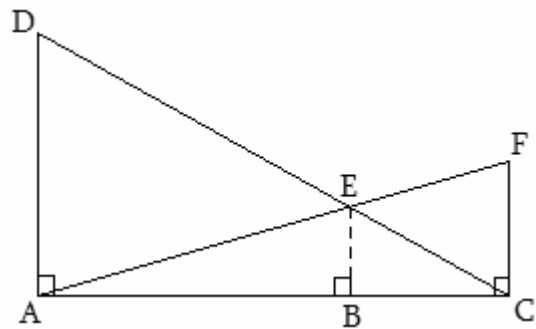
$$\sum_{n=2}^8 (n^2) = 2^2 + 3^2 + 4^2 + 5^2 + 6^2 + 7^2 + 8^2 = 203$$

What is $\sum_{n=3}^6 f(x)$, where $f(x)$ = the measure of one exterior angle in a regular n-gon?

- a) 720 b) 360 c) 378
 d) 342 e) NOTA

20) In the figure to the right, \overline{FC} and \overline{DA} are perpendicular to \overline{AC} , $AD = 10$, and $FC = 5$. Find the length of \overline{EB} .

- a) $\frac{5}{2}$ d) 4
 b) $\frac{10}{3}$ e) NOTA
 c) $\frac{7}{2}$

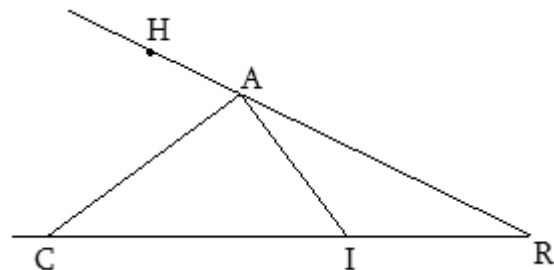


21) Who was the man born around 640 BC in Miletus who brought geometry to Greece from Egypt and is considered by some to be *The Father of Modern Geometry*?

- a) Euclid b) Pythagoras c) Thales
 d) Archimedes e) NOTA

22) In the figure to the right, $\angle RAI \cong \angle IAC$, $AR = 8$, $IR = 5$, and $AC = 4$. Find the length of \overline{IC} .

- a) 5 b) $\frac{5}{2}$
 b) 10 e) NOTA
 e) $\frac{15}{2}$



23) From a point in the interior of a regular hexagon, perpendiculars drawn to the sides of the hexagon have lengths, in size order, of 14, 18, 19, 23, 24, and 28. What is the length of a side of this hexagon?

- a) 21 b) $7\sqrt{3}$ c) $10\sqrt{3}$
d) $14\sqrt{3}$ e) NOTA

24) Given scalene, acute $\triangle GAP$, where $m\angle GAP = 56^\circ$ and $m\angle APG = x^\circ$, for how many *integral* values does x exist?

- a) 53 b) 52 c) 37
d) 38 e) NOTA

25) What is the ratio between the sum of the squares of the side lengths to the sum of the squares of the median lengths of any triangle?

- a) Cannot be determined b) 3:2 c) 4:3
d) 4:1 e) NOTA

26) Given the supplement of the complement of the supplement of $\angle GUM$, which of the following are true about $\angle GUM$?

- I. $90^\circ < m\angle GUM < 180^\circ$
II. If $m\angle GUM = 95^\circ$, then the supplement of the complement of the supplement of $m\angle GUM = 95^\circ$
III. If $\angle GUM$ was the vertex angle of obtuse, isosceles triangle $\triangle MUG$, then the supplement of the complement of the supplement of $\angle GUM = \frac{1}{2}(180 - \angle UGM)$.

- a) II, III only b) I, II only c) I, III only
d) I, II, III e) NOTA

27) Fill in the blank: _____ is the term for the point of intersection of skew lines in Euclidean Geometry.

- a) Equilibrium b) Node c) Vanishing Point
d) No such point exists e) NOTA

28) Which of the following can be the intersection of two planes?

- I. Point
- II. Line
- III. Plane

- a) I, II, and III b) I, II only c) II, III only
d) I, III only e) NOTA

29) How many triples in the box below are Pythagorean Triples?

- 3, 4, 5
- $3n, 4n, 5n$ for all positive values of n
- $3^n, 4^n, 5^n$ for all positive values of n
- $3+n, 4+n, 5+n$ for all positive values of n
- $3-n, 4-n, 5-n$ for all positive values of n
- n^3, n^4, n^5 for all positive values of n

- a) 2 b) 3 c) 4
d) 5 e) NOTA

30) In the figure to the right, $m\angle XZY = 40^\circ$, $m\angle UZV = 115^\circ$, and $\overline{TXY} \parallel \overline{WZU}$, with \overline{YZV} as a transversal. Find $m\angle ZYX + m\angle WZV$.

- a) 130° d) 50°
b) 105° e) NOTA
c) 80°

