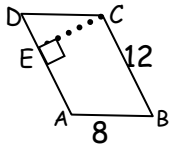
Geometry Individual Test

March Regional Competition

The abbreviation NOTA denotes "None of These Answers." Diagrams may not be drawn to scale.

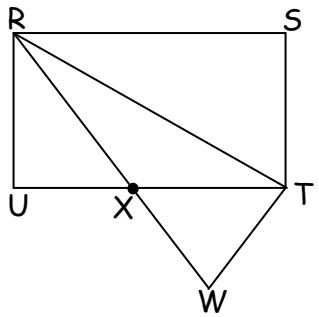
1. 

Parallelogram ABCD has perpendicular $\overline{CE}$ drawn from point C to $\overline{DA}$. If CE=6 then the area of parallelogram ABCD is ___.

A. 96 B. 72
C. 48 D. 36 E. NOTA

2. A right triangle has legs 6 cm and 8 cm. If its area is A sq. cm and its perimeter is B cm then find the value of A-B.

A. 0 B. 2
C. 4 D. $\sqrt{3}-1$ E. NOTA

3. 

Consider rectangle RSTU and right ΔRTW with hypotenuse $\overline{RW}$. If $m\angle STR = 50^\circ$ and $m\angle RXU = 70^\circ$ then $m\angle TRX - m\angle URX =$

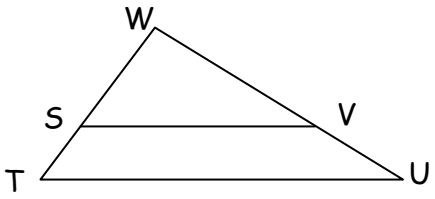
A. 5 B. 10
C. 15 D. 20 E. NOTA

4. $\overrightarrow{AB}$ bisects $\angle RAN$. If $m\angle BAR = 3x^\circ$ and $m\angle RAN = (8x-12)^\circ$ then find the value of $x+20$.

A. 6 B. 12
C. 22 D. 26
E. NOTA

5. Isosceles triangle RST has base $\overline{RS}$. If $m\angle T = x+20$ then which is an expression for $m\angle S$?

A. $160-2x$ B. $100-0.5x$
C. $80-0.5x$ D. $80-x$
E. NOTA

6. 

In ΔWTU, $\overline{SV}$ is drawn parallel to $\overline{TU}$ as shown. SV=10, ST=3, TU=14. Find length SW.

A. 7.5 B. 7.0
C. 6.2 D. 4.2
E. NOTA

7. Chord $\overline{AB}$ is a distance of 14 units from the center of circle R. If the radius of R is 16 units, then tell the length of $\overline{AB}$ to the nearest tenth place.

A. 15.5 B. 21.3
C. 30.0 D. 60.0
E. NOTA

Geometry Individual Test

March Regional Competition

8. In rectangle RSTU, $\overline{RT}$ and $\overline{SU}$ intersect at point E. If $RE = 3x - 10$, $ES = x + 6$ and $TE = 2x - 2$, then find the length RT.

A. 32 B. 28
C. 16 D. 12
E. NOTA

9. In triangle ABC, C is a right angle, and $m\angle A = 30^\circ$. If the perimeter of ABC is $24\sqrt{3} + 72$ then find the area of ABC.

A. 144
B. $144\sqrt{3}$
C. $288\sqrt{3}$
D. $576\sqrt{3}$
E. NOTA

10. The longest length chord of circle C has length 20. Which must be true ?

A. The shortest chord of circle C has length 10.
B. The longest chord is distance 1 from the center C.
C. Circle C has radius 10.
D. The longest chord has length 5 more than the radius of C.
E. NOTA

11. A regular polygon has one interior angle which measures 108° more than one exterior angle. If the polygon has N sides then what is the value of $N^2 - N$?

A. 5 B. 20
C. 70 D. 90
E. NOTA

12. Consider the set S of all parallelograms, and the set T of all rhombuses, and the set U of all rectangles. Which is NOT true?

A. T and U may contain some of the same members.
B. There may be a member of T which is not a member of S.
C. A square is always a member of S and T.
D. A rectangle may be a member of set T.
E. NOTA

13. A non-regulation baseball playing field has the shape of a square with playing bases on the vertices. The sides of field are each 90 feet long. The pitcher's mound is 30 feet from home base, on the diagonal which connects home and 2nd base. Find the distance that the pitcher's mound is from 2nd base. Round to the nearest tenth place.

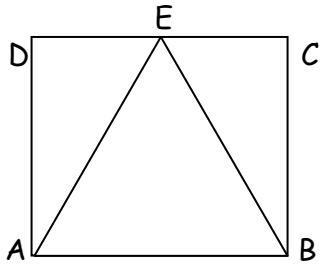
A. 127.3 B. 125.9
C. 97.3 D. 63.6
E. NOTA

14. Quadrilateral ABCD is inscribed in circle P. If $m\angle A = 20^\circ$, $m\angle B = 2x - 12$ and $m\angle C = 4x - 32$ then $x =$

A. 48
B. 32
C. 16
D. 13
E. NOTA

Geometry Individual Test

March Regional Competition

15. 

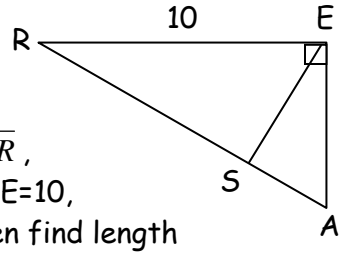
An equilateral triangle ABE shares a side with rectangle ABCD as shown, and E is on side $\overline{CD}$. If AB= 10, then find the perimeter of the rectangle to the nearest tenth place.

A. 44.5 B. 37.3
C. 28.7 D. 27.1 E. NOTA

16. Two externally tangent circles have radii which measure 12 and 14 cm. A line which is tangent to the smaller circle contains the radius of the larger circle. Find the distance between the centers of the two circles.

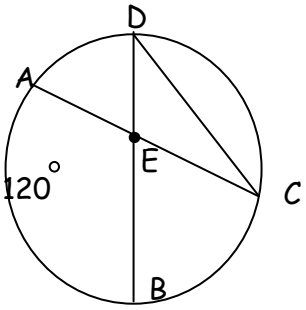
A. $14\sqrt{3}$ B. $12\sqrt{3}$
C. $14\sqrt{2}$ D. $12\sqrt{2}$
E. NOTA

17. In right ΔEAR, $\overline{ES}$ is the altitude to hypotenuse $\overline{AR}$, as shown. If RE=10, and AR=12 then find length SA to the nearest hundredth place.



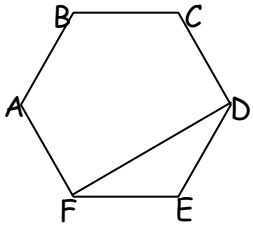
A. 6.63 B. 4.01
C. 3.67 D. 2.40 E. NOTA

18. In circle R, chords $\overline{DC}, \overline{AC}$, and $\overline{BD}$ are drawn, with the latter two intersecting at point E. If $m\overset{\frown}{CB} = 80^\circ$, $m\overset{\frown}{AB} = 120^\circ$ and $m\overset{\frown}{CD} = 100^\circ$ then find $m\angle AED$.



A. 40° B. 60°
C. 70° D. 80° E. NOTA

19. Regular hexagon ABCDEF has sides which are each 10. What is the length of diagonal $\overline{FD}$?



A. $25\sqrt{3}$ B. $15\sqrt{3}$
C. $10\sqrt{3}$ D. 10 E. NOTA

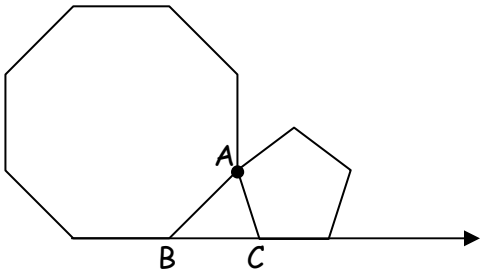
20. An isosceles trapezoid has its shorter base with length 4, legs with lengths 10 (each) and height 8. Find the length of the trapezoid's diagonal, to the nearest tenth place.

A. $2\sqrt{41}$
B. $8\sqrt{5}$
C. $2\sqrt{65}$
D. 14
E. NOTA

Geometry Individual Test

March Regional Competition

21.



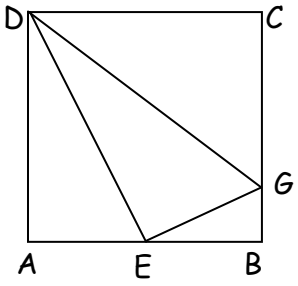
The regular octagon and regular pentagon shown share vertex A and vertices B and C are on the line that contains two of the sides of the polygons as shown. Find $m\angle BAC$.

A. 65 B. 64
C. 63 D. 62 E. NOTA

22. A rectangle with dimensions 10 cm by 8 cm is formed into a cylinder (with no bases). If bases are then added, the volume of the cylinder to the nearest tenth of a cubic cm could be __.

A. 63.7 B. 48.6
C. 16.2 D. 12.7 E. NOTA

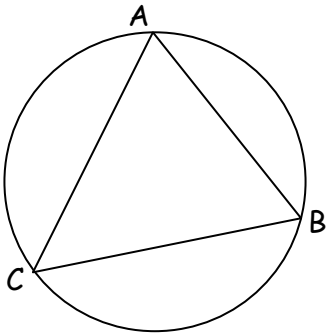
23.



ABCD is a square with . CB=10. The ratio BG:BC is 1:4. E is the midpoint of $\overline{AB}$. Give the ratio of the area of quadrilateral BGDE to the area of square ABCD.

A. 5:8 B. 3:8
C. 3:5 D. 3:7 E. NOTA

24.



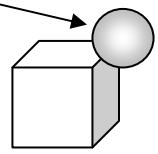
Inscribed triangle ABC has $m\angle A + m\angle B = 140^\circ$ and $m\angle B = 2 \bullet m\overset{\frown}{BC}$. If the circle has radius 2, give the length of arc $\overset{\frown}{BC}$.

A. $\frac{28}{45}\pi$ B. $\frac{14}{5}\pi$
C. $\frac{28}{5}\pi$ D. $\frac{7}{5}\pi$ E. NOTA

25. A regular triangle has area $3\sqrt{3}$. What is its height ?

A. 6 B. $3\sqrt{3}$
C. 3 D. 2 E. NOTA

26. A light is at the corner (vertex) of a building which is a cube with edge 15 ft. A moth will stay within 9 feet of the light and will stay outside the building. That is, he will not travel through the walls. What is the amount of cubic feet of the moth's "domain?" Round to the nearest cubic foot.



not drawn to scale

A. 5665
B. 3054
C. 2672
D. 2290
E. NOTA

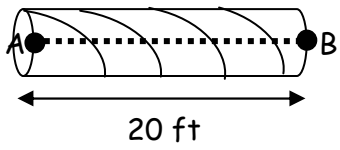
Geometry Individual Test

March Regional Competition

27. A rhombus has diagonals with lengths $2x$ and $2x+2$. If its perimeter is $4x+36$ then $x=$.

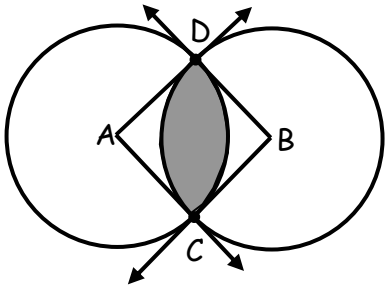
A. 13 B. 14
C. 20 D. 21
E. NOTA

28. A pole in the shape of a right circular cylinder has ribbon wrapped about it so that the ribbon goes around four times. The ribbon has no slack, and the ends of the ribbon are directly opposite each other on the bases of the cylinder (example: points A and B are "opposite" above.) If the ribbon has length 52 feet and the pole has length 20 feet, then find the circumference of the pole.



A. 6π B. 12
C. $\frac{12}{\pi}$ D. $\frac{6}{\pi}$ E. NOTA

29.



Congruent circles A and B intersect so that the tangent lines at the points of intersection (C and D) contain the radius of one of the circles. If AD=6 then find the area of the shaded region, the intersection of the interiors of the circles.

A. $9\pi+4$ B. $36\pi-18$
C. $18\pi-36$ D. $18-4.5\pi$
E. NOTA

30. A triangle ABC has lengths AB = 12 and AC = 20. If the triangle is obtuse, then the third side has length x, such that all the possible values of x are given by the conjunction $A<x<B \text{ or } C<x<D$, and $A<B<C<D$. Give the value of $ABCD$.

A. $10880\sqrt{2}$
B. $1280\sqrt{514}$
C. $2560\sqrt{594}$
D. $16384\sqrt{34}$
E. NOTA