1) The degree measures of the three angles of a triangle have the ratio \(19 : 20 : 21\). Find the degree measure of the largest angle of the triangle.

2) The three circles with centers at A, B, and C are tangent to one another. Find the area of circle A if the length of AC is 17, of BC is 11, and of AB is 14.

3) The Illinois River bridge at Peoria is 1.2 km long, and the Wildlife Park in Peoria covers 3 km². On a map the Illinois River bridge is 1 cm long. Find the number of square centimeters in the area of the Wildlife park as depicted on the same map. Express your answer as a mixed number reduced to lowest terms.

4) Given: \(\angle BAD = (2x + 40)^\circ\), \(\angle BAC = (2y + 40)^\circ\) and \(\angle CAE = (x + 2y)^\circ\), find the degree measure of \(\angle CAE\).
5) Write the equation of the line which is tangent to the circle
\[ x^2 + 8x + y^2 + 2y = 152 \] at \( (1, 11) \). Write the equation in the form \( ax + by = c \)
where \( a, b, \) and \( c \) are relatively prime integers and \( a > 0 \).

6) A circle of diameter 10 is inscribed in a trapezoid ABCD where angles A and B
are right angles and AD = 8. Find the length of the longest side of this trapezoid.
Express your answer as an improper fraction reduced to lowest terms.

7) The lateral surface area of a right circular cone is \( 260 \pi \) in\(^2\), and its total surface
area is \( 360 \pi \) in\(^2\). Find the number of cubic inches in the volume of the cone.

8) Find the perimeter of the trapezoid ABCD. Angle measures are in degrees.

9) Find the distance between the points \((-6, -2)\) and \((-7, -5)\).
10) Segment CD is tangent to the circle. Segment AB has length 6, BC has length 10, HD has length 20, and AI has length 4. What is the length of segment CD?

11) Given AC a diameter of circle O, AB of length 10, BC of length 8 and CD of length 7. Find the exact length of AD.

12) A dart board consists of a circle inscribed in an equilateral triangle. If a dart lands at a random point in the triangle, then the probability that it also lands in the inscribed circle can be expressed, in simplest radical form, as \( \frac{\pi \sqrt{k}}{p} \). Find the value of \( k + p \)
13) In the diagram, $r = 35$ and $t = 12$. Segment AC is congruent to segment AB. Find the exact value of x. Angle measures are given in degrees.

14) In the figure, AP of length 12 is tangent to a circle of radius 5. What is the shortest distance from point P to a point on the circle?

15) Two centers of two coplanar circles are 20 units apart. The circles have radii of 6 and 10 units. What is the length of the common internal tangent?

16) Find the center, $(a, b)$, and radius, $r$, of the circle $x^2 - 4x + y^2 + 6y - 131 = 0$. Write your answer in the form $(a, b, r)$.

17) The complement of an angle added to the supplement of the angle is $70^\circ$ more than 3 times the angle. Find the degree measure of the angle.

18) A right rectangular prism has dimensions 1" by 2" by 3". For a given vertex, find the absolute value of the difference between the maximal distance from that vertex to another vertex and the minimal distance from that vertex to another vertex.

19) Find a so that the line $ax - 6y = -20$ is perpendicular to $3x + 5y = 4$. 
20) In the figure below, points D, F, H divide segment AB into four equal segments. Points E, G, and I do the same for segment AC. If segment DE has length nine, find the sum of the lengths of segments DE, FG, HI, and BC.
A

Geometry

Correct x 2 pts. ea. =  

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Note: All answers must be written legibly in simplest form, according to the specifications stated in the Contest Manual. Exact answers are to be given unless otherwise specified in the question. No units of measurement are required.

1. _________ 63 (degrees optional) _________

2. _________ 100π _________

3. _________ $\frac{2}{12}$ ("cm$^2$" optional) _________

4. _________ 80 (degrees optional) _________

5. _________ 5x + 12y = 137 _________

6. _________ $\frac{40}{3}$ (must be this improper fraction) _________

7. _________ 800π ("in$^3$" optional) _________

8. _________ $22 + 9\sqrt{2} + 3\sqrt{6}$ OR simplified equivalent _________

9. _________ $\sqrt{10}$ _________

10. _________ $20\sqrt{2}$ _________

11. _________ $\sqrt{115}$ _________

12. _________ 12 _________

13. _________ $37\sqrt{2}$ _________

14. _________ 8 _________

15. _________ 12 _________

16. _________ (2, -3, 12) (must be this ordered triple) _________

17. _________ 40 (degrees optional) _________

18. _________ $\sqrt{14} - 1$ OR $-1 + \sqrt{14}$ _________

19. _________ 10 _________

20. _________ 90 _________