Math 70 Final Review

Find the value of the $n$th term in each sequence.

1.

<table>
<thead>
<tr>
<th>Term</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>$\ldots$</th>
<th>$n$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
<td>11</td>
<td>12</td>
<td>$\ldots$</td>
<td>–?–</td>
</tr>
</tbody>
</table>

2.

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<th>7</th>
<th>$\ldots$</th>
<th>$n$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value</td>
<td>0</td>
<td>3</td>
<td>8</td>
<td>15</td>
<td>24</td>
<td>35</td>
<td>48</td>
<td>$\ldots$</td>
<td>–?–</td>
</tr>
</tbody>
</table>

3. How many diagonals can be drawn from one vertex of an $n$-sided polygon? Just model it and fill in the table.

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<tr>
<td>value</td>
<td></td>
<td></td>
<td>0</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

T/F. Identify each statement as true or false. If false give a reason or counter example.

_____ 4. A polygon with ten sides is called a dodecagon.

_____ 5. A kite is a quadrilateral having exactly one pair of parallel sides.

_____ 6. A diagonal is a line segment in a convex polygon connecting any two vertices.

_____ 7. A parallelogram is a quadrilateral with all the angles equal in measure.

_____ 8. The vertex of angle $RST$ is point $S$.

_____ 9. If the sum of the measures of two angles is 90°, then the two angles are complementary.

_____ 10. A line segment from a vertex of a triangle to the opposite side, perpendicular to that side, is called an altitude.

_____ 11. An acute angle is an angle whose measure is less than 90°.

_____ 12. A scalene triangle is a triangle with two sides the same length.

_____ 13. Every point on an angle bisector is equally distant from the sides of the angle.

_____ 14. The circumcenter of a triangle is the center of the circle inscribed in the triangle.

_____ 15. A rhombus is a quadrilateral with all of its sides equal in length.

_____ 16. The shortest distance from a point to a line is the distance measured along the perpendicular from the point to the line.

_____ 17. It is possible to construct an angle of 15° using a compass and a straight edge.

_____ 18. The circumcenter is equally distant from all three sides of a triangle.

_____ 19. The centroid of a triangle divides each median into two parts, so that the shorter part is one half the larger part.
20. Match each term with its lettered figure below.

A) right scalene triangle ______  B) acute isosceles triangle ______

C) heptagon______  D) pyramid______  E) prism______

![Figures of geometric shapes]

21. a. Write the converse of the statement: “If a quadrilateral is a square, then it is equilateral.”
   
b. Determine if the converse is true or false. If it is false, give a counterexample.

22. At one point in a drag race, Charlie was 15 feet behind Sally and 18 feet ahead of Lucy. Lucy was trailing Linus by 30 feet. Sally was ahead of Linus by how many feet?

23-29 Perform the following constructions (show the compass swiped):

23. Construct the incenter for $\Delta ABC$.

![Diagram of triangle ABC with incenter]

24. Construct the median $IM$ in $\Delta GHI$.

![Diagram of triangle GHI with median IM]
25. Construct the altitude $FG$ in $\triangle DEF$.

26. Construct an angle of $30^\circ$ at point $M$.

27. Construct the circumcenter of $\triangle JKL$.

28. Construct a circumscribed circle on the previous triangle $\triangle JKL$.

29. Construct $\triangle NOP$ given the segment and angles below.
Complete each statement.
30. The three midsegments of a triangle divide the triangle into —?—.
31. An equiangular quadrilateral is usually called a —?—.
32. In an isosceles triangle, the base angles are —?—.
33. The diagonals of a parallelogram —?— each other.
34. Each angle of a regular octagon measures —?—.
35. The length of a midsegment of a trapezoid is —?— of the lengths of the bases.
36. The vertex angles of a kite are —?— by the diagonal.
37. The consecutive angles of a parallelogram are —?—.
38. The length of a midsegment between two sides of a triangle is —?— the length of the third side.
39. The sum of the measures of the angles of a 25-gon is —?—.
40. The opposite angles of a parallelogram are —?—.

41. Perimeter = 64
   \[ a = \underline{\hspace{2cm}} x = \underline{\hspace{2cm}} y = \underline{\hspace{2cm}} \]

42. \[ a = \underline{\hspace{2cm}} w = \underline{\hspace{2cm}} x = \underline{\hspace{2cm}} y = \underline{\hspace{2cm}} \]
From the information given, determine which triangles, if any, are congruent. State the congruence conjecture that supports the congruence statement. If the triangles cannot be shown to be congruent from the information given, write “Cannot be determined.”

43. $\triangle SIK \cong \triangle TIK$

Why?

44. $\triangle TIK \cong \triangle TIK$

Why?

45. Provide each missing reason or statement in the proof.

Given: $\angle ODB \cong \angle OEA$

$sCD \cong sCE$

Show: $sAE \cong sBD$

Flow-chart Proof:
T/F. Identify each statement as true or false. If false give a reason or counter example.
46. A secant is a segment connecting two points of the circle.
47. The perpendicular bisector of a chord passes through the center of the circle.
48. The degree measure of an arc is equal to one half the measure of its central angle.
49. Two circles are congruent if they have the same circumference.

Complete each conjecture. (2pts each)
50. The arc length equals the __________ divided by 360°, times the circumference of the circle.
51. The __________ angles of a quadrilateral inscribed in a circle are supplementary.
52. If two secants of a circle are __________, then they cut off congruent arcs.
53. Every angle inscribed in a(n) _____________ is a right angle.
54. The measure of a(n) _____________ angle is equal to the measure of its intercepted arc.
55. Tangent segments to a circle from a point outside the circle are —?—.

Use your new conjectures to solve each problem.
56. \( b = \frac{?}{108°} \)  

57. \( f = \frac{?}{88°} \)

58. \( r = 36 \text{ cm} \). The arc length of \( AB \) is —?—.

59. How far will a wheel of radius 14 inches travel in 11 revolutions?
60. A Roach is orbiting a cheeto 6 inches from the center of the cheeto. It makes 1 revolution in 5 seconds. Find the speed of the roach in inches per secondplanet.

61. **Construct the center of the circle using cords.**
Find the shaded area. All measurements are in centimeters.

62. 63. 64. Find the area of the shaded region

65. Determine the surface area of each figure

66. Show that the Area of a regular Pentagon is

67. The __________________________ is the side opposite the right angle in a right triangle.

68. In an isosceles right triangle, if the legs have length \( y \), then the hypotenuse has length ________________.

69. In a 30-60 right triangle, if the hypotenuse has length \( 2y \), then the shorter leg has length ________________ and the longer leg has length ________________.

70. In a right triangle, if \( r \) and \( s \) are the lengths of the legs and \( t \) is the length of the hypotenuse, then _______________________

Solve each problem below. In Problems 1–3, measurements are given in centimeters

71. Is \( \triangle ABC \) a right triangle? 72. \( AB = ? \)
73. a) Use the grid lines as a guide to turn $sAB$ into the hypotenuse of a right triangle. Then find the length of $sAB$ using the Pythagorean theorem.

\[
\begin{array}{c}
\text{K} \\
\text{L} \\
\text{A} \\
\text{B} \\
\text{C}
\end{array}
\]

b) Find the shaded area. $KL = 6\sqrt{2}$ cm

74. $AB = 6$. Find the area of the equilateral triangle. Find the area of the circumscribed circle. (4 ; 4 pts)

75. A __________________________ is the set of all points in space at a given distance from a given point.

76. An object’s density is calculated by dividing the_________________ of the object by its__________________.

77. A _________________ prism has lateral faces that are perpendicular to the two bases.

78. You can determine the _________________ of an irregularly shaped object by measuring its displacement.

Find the volume of each solid. In Problem 2, the base is a trapezoid. All given measurements are in centimeters.

79. 80. 81. $h = 8$

82. $h = 7$. Find the density of the solid if its mass is 1144 grams.

83. Find the volume and the surface area of the solid below. Include the area of the base of the hemisphere in your calculations.
84. Is $\triangle BAK \sim \triangle JOL$? (yes/no), why = 

85. Is $\triangle ACE \sim \triangle SPR$? (yes/no), why = 

86. Igor, who is 4’ 8” tall, wishes to find the height of an oak tree out in front of his castle. He walks along the shadow of the tree until his head is in a position where the end of his shadow exactly overlaps the end of the treetop’s shadow. He is now 22’ from the foot of the tree and 11’ from the end of the shadows. How tall is the oak tree? Express your answer in feet.

87. Name the three conjectures that show similarity.

88. $v = -?-$

89. $k \parallel l \parallel m \parallel n \ w - z = -?-$

90. The dimensions of the small cylinder are three fifths of the larger. The volume of the small cylinder is $2160\pi$ cm$^3$. Find the volume of the large cylinder.
Answers:

1) n+5
2) (n - 1)(n + 1)
3) n - 3
4) F, decagon
5) F, Trapezoid
6) F, non-consecutive vertices
7) F, rectangle
8-11) T
12) F, Isosceles
13) T
14) F, circumscribed
15-17) T
18) F, incenter
19) T
20a) b, a, c, f, d, e
21) a) If a quadrilateral is equilateral, then it is a square  
   b) False
22) 3 ft
23-29) ask
30) 4 congruent triangles
31) rectangle  
32) congruent  
33) bisect  
34) 135 deg  
35) half the sum  
36) bisected
37) supplementary  
38) half  
39) 4140 deg  
40) congruent
41) a=22, x=96 deg, y=144 deg  
42) a=16, w=125 deg, x=120 deg, y=55 deg
43. ASA  
44. CBD
45) ask
46) F, that would be a cord
47) T
48) F, they’re the same
49) T
50) arc measure
51) opposite
52) parallel
53) semi-circle
54) central
55) congruent  
56) 126 deg  
57) 66 deg  
58) 22π cm  
59) 308π in  
60) 7.54 in/sec
61) ask
62) 85.84 cm²  
63) 11πm²  
64) 13.98 cm²  
65) 150π cm²  
66) ask  
67) hypotenuse  
68) y√2
69) y√3  
70) r² + s² = l²  
71) no  
72) 39 cm
73) a) 5 b) (9π - 18) cm  
74) 9√3 cm², 144π cm²
75) sphere  
76) mass, volume  
77) right  
78) volume
79) 252 cm³  
80) 160π ft³  
81) 1024 cm³
82) 1.084 ³/π cm³  
83) V = \frac{2000}{3} π cm³  
84) No, sides not proportional
85) no, angles not congruent
86) 14 ft
87) AA, SAS, SSS
88) 23.1  
89) -141
90) 10000πm³