Unit 1 TEST MATH 117

NAME: ____________________________________________

100 points 10/5/04

LAB T.A. (Circle one) Warren Youngsoo

Matching (choices may be used more than once or not at all): (each correct answer worth 1 point)

_____ 1. Number of faces on a dodecahedron.  A. 0
                B. 1.618
_____ 2. Number of minutes in 120".  C. 2
                D. 3
_____ 3. Angle measure for a vertex of a regular pentagon.  E. 5
                F. 10
_____ 4. The ratios of consecutive terms of a Fibonacci sequence approach what number?  G. 12
                H. 20
_____ 5. The 55th term of a sequence whose nth term is 2n - 3  I. 97
                K. 107
_____ 6. Number of basic (undefined) terms in Euclidean Geometry.  L. 108
                M. π
_____ 7. Number of Platonic solids formed from triangles.  P. ∞

Problem-solving tasks:

The following problem can be solved in more than one way. Find a way to solve it without using algebra. Show your work. State the strategy you used to solve the problem. (1 pt = strategy, 1 pt = math knowledge, 1 pt = answer)

8. Mary Kay wanted to buy some makeup. She spent $28 of her paycheck on foundations, 2/3 of the rest for eye shadows, and 1/2 of what was left after that for a lipstick. She had $12 left over. How much was her paycheck? (ignore sales tax)

Explain why the following problem is unsolvable. Then change it in such a way that it would be solvable. (1 pt = explanation, 1 pt = revision)

9. The perimeter of a rectangular garden is 58 feet. The sum of the length and width is 29 feet. Find the length and width.

Consider the following products. Use your calculator to verify that the statements are true. Then predict the next line in the sequence of products. Using your calculator, state whether your prediction is correct. (1 pt = prediction, 1 pt = check)

10. 1 × (1) = 1²
    121 × (1 + 2 + 1) = 22²
    12321 × (1+2+3+2+1) = 333²
For each of the following sequences, write the next two terms of the sequence, then identify as: arithmetic, geometric, Fibonacci, triangular, square, or "other." You need not show work on these problems. (each blank worth 1 point, 1 point, and 1 point respectively.)

11. ..., 8, 13, 18, 23, ________, ________, . . .

12. ..., 8, 13, 21, 34, ________, ________, . . .

13. ..., 8, 12, 18, 27, ________, ________, . . .

14. ..., 8, 27, 64, 125, ________, ________, . . .

15. ..., 8, 4, 2, 1, ________, ________, . . .

16. Consider the following sequences. 300, 500, 700, 900, 1100, 1300, ...

   2, 4, 8, 16, 32, 64, ...

   Find the number of the term in which the geometric sequence becomes greater than the arithmetic sequence. Show work. (worth 2 points)

17. Explain and clearly show how to find the number of terms in the sequence: 3, 6, 12, 24, ..., 768. (2 points)

18. Given the statement, "If the hurricane is category 5, the wind speeds are 150 mph," identify which of the following is the inverse, which is the converse, which is the contrapositive, and which are none of these. (1 pt each)

   a) If the hurricane is not category 5, then the wind speeds are not 150 mph.
   b) If the hurricane is category 5, then the wind speeds are not 150 mph.
   c) If the wind speeds are not 150 mph, then the hurricane is category 5.
   d) If the wind speeds are not 150 mph, then the hurricane is not category 5.

19. Complete the argument using the law of modus ponens. (1 point)

   If you can vote, then you are at least 18 years old. You can vote, ______________________

20. Complete the argument using the chain rule. (1 point)

   If you can vote, then you're 18. If you're 18, then you are an adult. Joe can vote, ______________________
21. Complete the truth table for the compound statements given. \(\text{worth 6 points}\)

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22. Calculate the volume of the right square pyramid with side 2 cm. Show work. \(\text{2 points}\)

![Pyramid Diagram]

23. Find \(x\). Show work. \(\text{2 points}\)

![Triangle Diagram]

24. Name a property or theorem that you used to solve problem 23. \(\text{1 point}\)

True or False. Circle your response. \(\text{worth 1 point each}\)

| T | F | 25. One characteristic of Platonic solids is the same number of edges meet at each vertex for all vertices. |
| T | F | 26. Plato proved there are only 5 regular polyhedra. |
| T | F | 27. The ratio of the volume of a cube with side \(n\), to the volume of a square pyramid with height \(n\) and base area of \(n^2\), is the golden ratio. |
| T | F | 28. The lateral faces of right pyramids are always right triangles. |
| T | F | 29. The relationship between the number of vertices, faces and edges of a polyhedron is \(V + F - E = 2\). |
| T | F | 30. If you know the lengths of the sides of any triangle, you can find the area using the Pythagorean Theorem. |
| T | F | 31. Attribute/logic blocks (used in lab 2) have 4 attributes. |
| T | F | 32. Doubling any Pythagorean triple creates another Pythagorean triple. |
33. Name each polyhedron (as completely as possible) that can be constructed using the following nets. If it is not possible to construct a polyhedron with the net, say “not possible”. (1 point each)

   a. 

   b. 

34. Find the length of a 125° arc of a circle with diameter 10 cm. Show work. (worth 2 points)

35. The dimensions of a rectangle are “golden” if the ratio of the shorter side to the longer side is _______.

36. State the ratio of the circumference to the diameter of a unit circle to 2 decimal places. ____________

37. The angle 36.875° is equivalent to ______° ______’ ______".

38. If a circle has area $25\pi$, what is its diameter? _________________

39. If the ratio of the perimeters of two similar triangles is 1 to 4, what is the ratio of their areas? ______

40. If the ratio of the surface areas two hexahedrons is 1 to 4, what is the ratio of their volumes? ______

41. The formula for the surface area of a cube with side $s$ is ________________.

42. If two numbers of an arithmetic sequence are . . . , 18, 23, the 1st number greater than zero is ______

43. If two numbers of a geometric sequence are . . . , 18, 24, the common ratio is ______

44. If numbers in a Fibonacci sequence are . . . , 18, 29, . . . the previous two numbers are ________ & ______

45. Regular __________, __________, and __________ make up the faces of the Platonic solids.

46. The set of all points equidistant from a fixed point is called a ________________.

47. Explain with a brief geometry statement why a 3-legged stool is more stable than a 4-legged chair.

48. Given three points in a plane, A, B, and C, if $AB + BC > AC$, then what can be said about the three points? ________________
Use the geoboard grids to do the following problems. (worth 2 points each)

49. Draw a square with area 8.

50. Draw a triangle with area 7.

51. Determine the perimeter and area of the figure. (worth 1 point each)

52. In Taxicab Geometry, mark the point(s) between (2,2) and (6,4) which are on the perpendicular bisector. (2 points)

53. In Taxicab Geometry, mark the point(s) which make a taxicab circle of radius 3 and center (4,4). Find the circumference of the circle. (2 points)

54. Find the shaded area enclosed by two semicircles as shown in the following figure. Show your work. (2 pts)
Use compass and straightedge to do the following constructions. (worth 3 points each)

55. Construct a parallel to line $l$ through point $P$.

56. Construct the circumcenter for the given triangle.
Tear off and use this page for scratch paper.