

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 |
| _____ | 2. Number of minutes in 120". | B. 1.618 |
| _____ | 3. Angle measure for a vertex of a regular pentagon. | C. 2 |
| _____ | 4. The ratios of consecutive terms of a Fibonacci sequence approach what number? | D. 3 |
| _____ | 5. The 55 th term of a sequence whose nth term is $2n - 3$ | E. 5 |
| _____ | 6. Number of basic (undefined) terms in Euclidean Geometry. | F. 10 |
| _____ | 7. Number of Platonic solids formed from triangles. | G. 12 |
| | | H. 20 |
| | | I. 97 |
| | | K. 107 |
| | | L. 108 |
| | | M. π |
| | | 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, $\frac{2}{3}$ of the rest for eye shadows, and $\frac{1}{2}$ 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. $1 \times (1) = 1^2$
 $121 \times (1 + 2 + 1) = 22^2$
 $12321 \times (1+2+3+2+1) = 333^2$

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.
- _____ a) If the hurricane is category 5, then the wind speeds are *not* 150 mph.
- _____ b) If the wind speeds are 150 mph, then the hurricane is category 5.
- _____ 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, _____

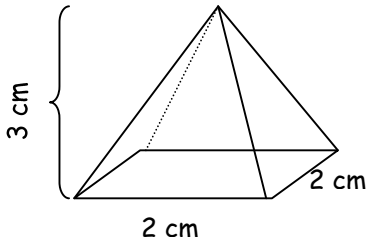
20. Complete the argument using the chain rule. (1 point)

If you can vote, then you're 18. If you're 18, then you are an adult. Joe can vote, _____

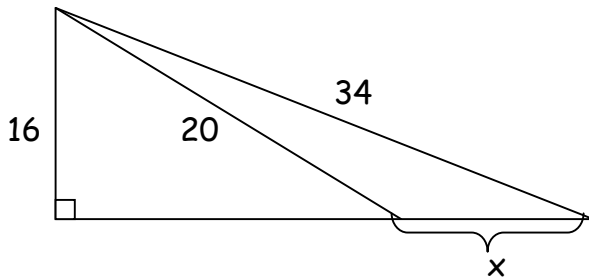
21. Complete the truth table for the compound statements given. (worth 6 points)

p	q	$\sim p$	$\sim q$	$q \rightarrow p$	$p \wedge \sim q$	$\sim p \vee \sim q$	$p \rightarrow \sim q$
T	T						
T	F						
F	T						
F	F						

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



23. Find x. Show work. (2 points)



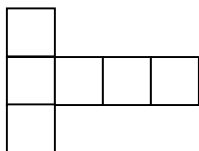
24. Name a property or theorem that you used to solve problem 23. (1 point) _____

True or False. Circle your response. (worth 1 point each)

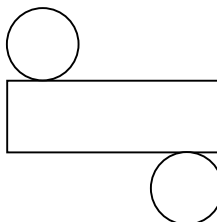
- T F 25. One characteristic of Platonic solids is the same number of edges meet at each vertex for all vertices.
- T F 26. Plato proved there are only 5 regular polyhedra.
- T F 27. The ratio of the volume of a cube with side n, to the volume of a square pyramid with height n and base area of n^2 , 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)

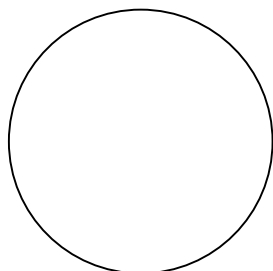
a. _____



b. _____



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



Short Answer. (each blank worth 1 point)

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 _____ $^\circ$ _____' _____"

38. If a circle has area 25π , 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 \dots , 18, 23, the 1st number greater than zero is _____

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

44. If numbers in a Fibonacci sequence are \dots , 18, 29, \dots the previous two numbers are _____ & _____

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

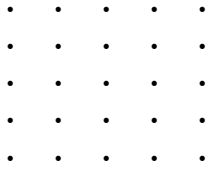
46. The set of all points equidistant from a fixed point is called a _____

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

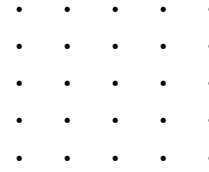
48. Given three points in a plane, A , B , and C , if $AB + BC > AC$, then what can be said about the three points? _____

Use the geoboard grids to do the following problems. (worth 2 points each)

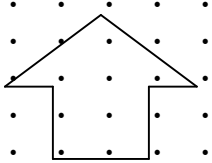
49. Draw a square with area 8.



50. Draw a triangle with area 7.



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



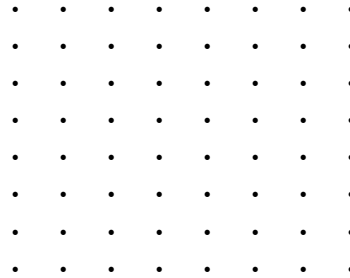
perimeter = _____

area = _____

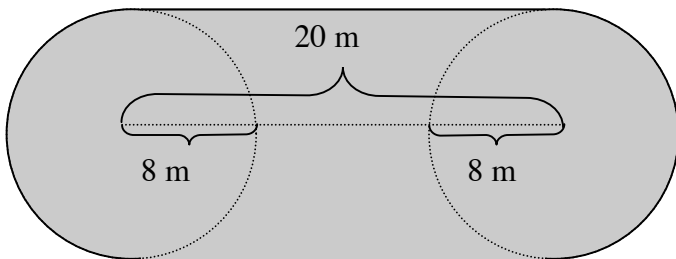
52. In Taxicab Geometry, mark the point(s) between (2,2) and (6,4) which are on the perpendicular bisector. (2 points)



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)

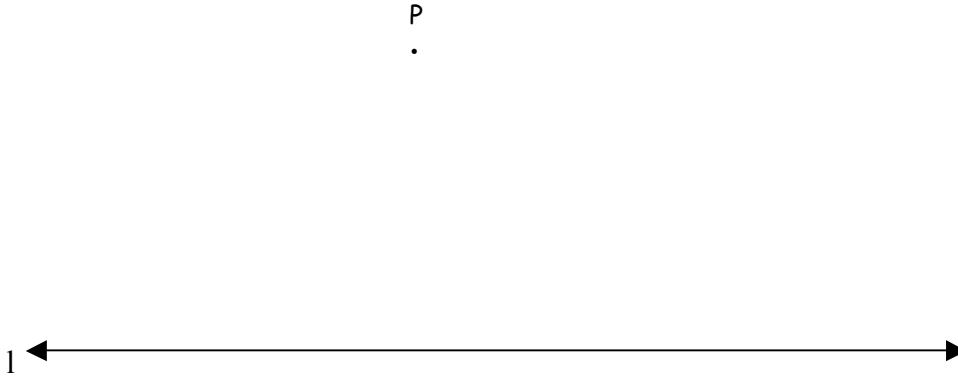


54. Find the shaded area enclosed by two semicircles as shown in the following figure. Show your work. (2 pts)

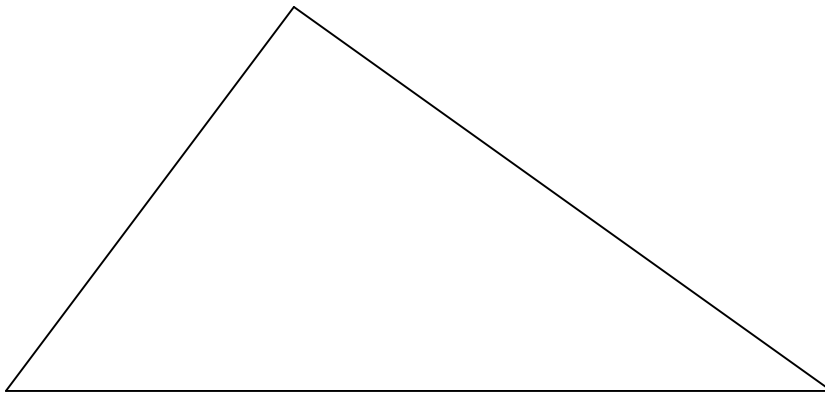


Use compass and straightedge to do the following constructions. (worth 3 points each)

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.