INSTRUCTIONS

1. You will have 55 minutes to complete the exam. A 5-minute warning will be given after 50 minutes.

2. On the answer sheet provided, PRINT your name and school name where indicated, and optionally print your email address and high school graduation year. Mark the proper box to indicate whether you are an alternate for this meet. All answers are to be transferred to the answer sheet, which will be the only page collected. The exam itself is yours to keep and may be marked in any way you wish.

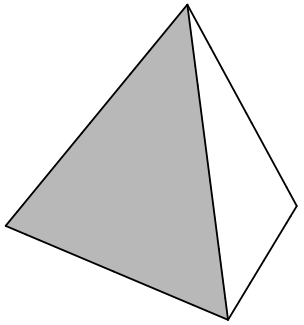
3. Answers will be graded all right or all wrong, except that partial credit may be given for those problems, if any, marked (P). Unless otherwise specified, all answers should be exact and written in simplest form.

4. No calculators may be used. Cell phones and music players are to be turned off and stowed away out of sight.

CENTRAL WISCONSIN

Mathematics League

Unplugged



Geometry, No Calculators

Category I

Meet I November 20, 2019

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CENTRAL WISCONSIN MATHEMATICS LEAGUE

Meet I November 20, 2019

Category I (Geometry, No Calculators)

Unless otherwise noted, each question below refers to Euclidean geometry.
Unless otherwise specified, all answers should be exact and written in simplest form.

1–11: Miscellaneous Problems (point values as indicated). On your answer sheet, circle the letter of the one best choice or write your answer in the blank(s) provided. (P) means that partial credit may be given. Unless otherwise specified, all answers should be exact and written in simplest form.

1. [15 points](P) *True/False: On your answer sheet, circle* **T** *for each of the following statements that is always true; circle* **F** *for each statement that is not always true.*

   (a) Some right triangles are equilateral.

   (b) Every square has exactly four lines of symmetry.

   (c) No obtuse triangles are isosceles.

   (d) Every quadrilateral is convex.

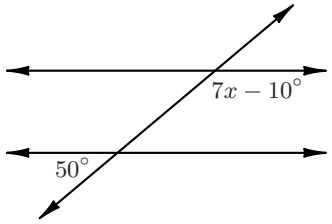
   (e) Three altitudes can be drawn for every obtuse triangle.

2. [5 points] The measure of a central angle of a circle is 20° and the length of the intercepted arc is 10 cm. What is the circumference of the circle in cm?

3. [5 points] Point M lies on segment AB and point N is chosen so that angle AMN measures 115°. If point O is chosen so that segment OM bisects angle AMN and point P is chosen so that segment PM bisects angle NMB, what is the measure of angle OMP?

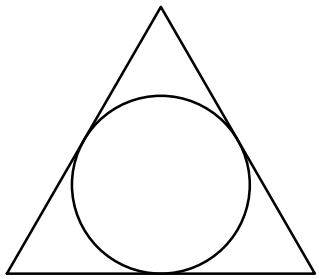
4. [5 points] A rectangle has a perimeter of 42 meters and an area of 108 square meters. Find the length of a diagonal of the rectangle in meters.

5. [5 points] The given figure shows parallel lines cut by a transversal. Given the indicated angle measures, what is the value of x?



(over)

6. [10 points] Determine the exact area of the equilateral triangle that circumscribes the circle of radius 1 unit.



7. [15 points](P) What is the degree measure of an interior angle for each of the following regular polygons?

   (a) Dodecagon

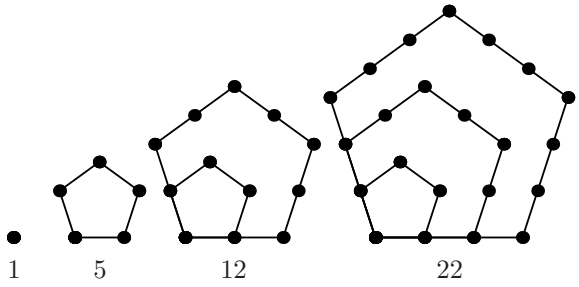
   (b) Nonagon

   (c) Octagon

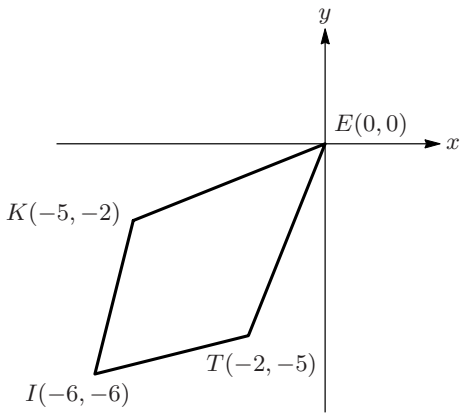
8. [10 points](P) Regular hexagon $ABCDEF$ lies in the coordinate plane with its center at the point $(1, 0)$, and vertex A is located at the point $(2, 0)$. Give the exact coordinates of the remaining five vertices.

9. [10 points] If a clock reads exactly 9:30 a.m., what is the degree measure of the minor angle formed by the hour and minute hands?

10. [10 points] The first four pentagonal numbers are 1, 5, 12, and 22. What is the value of the 10^{th} pentagonal number?



11. [10 points] Quadrilateral $KITE$ (shown below) is translated 7 units horizontally to the right, and 8 units vertically up. This is followed by a reflection in the x-axis. To what coordinates will the point T be relocated?



Student's Answer Sheet **Category I (Geometry, No Calculators)**

Name: _____ Email: _____
PRINT: Last First OPTIONAL

School: _____ High School Graduation Year: _____

I am an alternate for this meet: Yes ☐ No ☐

Miscellaneous Problems (point values as indicated). Circle the letter of the one best choice or write your answer in the blank(s) provided; the boxes at the right are for grading use only. (P) means that partial credit may be given. Additional instructions can be found in the box at the top of the exam.

1. (a) **T** **F** — 15P
   (b) **T** **F**
   (c) **T** **F**
   (d) **T** **F**
   (e) **T** **F**

2. _____ cm — 5

3. _____ degrees — 5

4. _____ meters — 5

5. $x =$ _____ degrees — 5

6. _____ square units — 10

7. (a) _____ degrees (b) _____ degrees (c) _____ degrees — 15P

8. _____ _____ _____ _____ _____ — 10P

9. _____ degrees — 10

10. _____ — 10

11. Coordinates: _____ — 10

TOTAL SCORE _____