

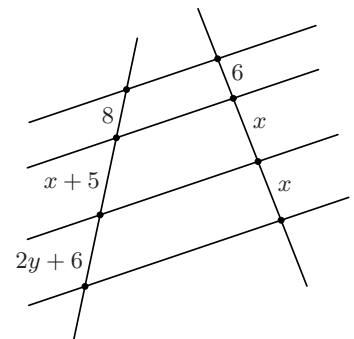
CENTRAL WISCONSIN MATHEMATICS LEAGUE

Meet III
March 29, 2001

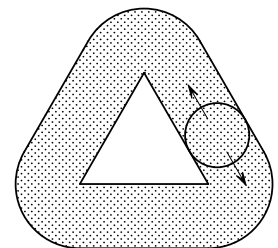
Category I (Geometry)

Miscellaneous Problems (point values as indicated). On your answer sheet, circle the correct response or write your answer in the blank(s) provided. (P) means that partial credit may be given. Figures are not necessarily drawn to scale. Unless otherwise specified, all questions refer to Euclidean plane geometry.

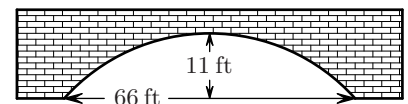
- [2 points each](P) *True/False: On your answer sheet, circle "T" for each of the following statements which is always true; circle "F" for each statement which is not always true.*
 - Any two triangles which are isosceles and have at least one common angle are similar.
 - In a circle, if a diameter is perpendicular to a chord, then it bisects the chord.
 - If a quadrilateral is inscribed in a circle, then its opposite angles are supplementary.
 - A triangle with sides measuring 5, 12, and 13 units is a right triangle.
 - In any two similar triangles, the ratio of the areas is equal to the ratio of the lengths of two corresponding sides.
- [10 points](P) Four parallel lines are cut by two transversals to form six segments with the indicated lengths. Find the *exact* values of x and y .



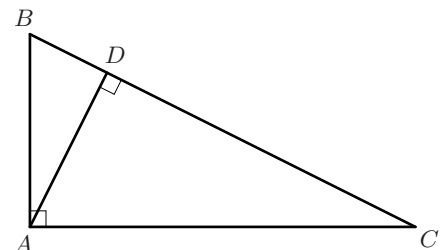
- [10 points] A circular disk with diameter 1 rolls along the outside of an equilateral triangle with side length 2. What is the *exact* area of the shaded region covered by the disk?



- [10 points] A circular arch forms the bottom of a bridge. If the arch is 66 feet wide and 11 feet high, what is the radius of the circle of which the arch is a part?

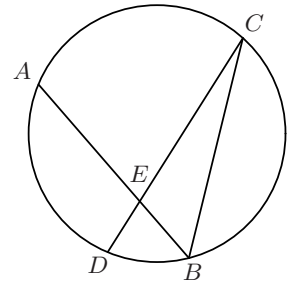


- [10 points] Triangle ABC is a right triangle, $BC = 15$, and altitude \overline{AD} has length 6. The area of the smaller right triangle $\triangle ABD$ is what percent of the area of $\triangle ABC$?

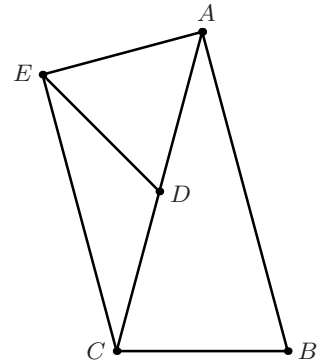


6. [10 points] Find the *exact* area of a regular hexagon which is circumscribed about a circle with radius 9 cm.

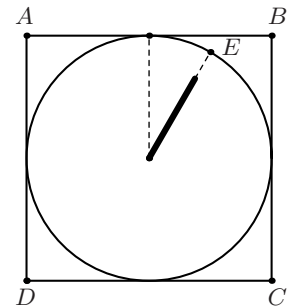
7. [10 points](P) Chords \overline{AB} and \overline{CD} of a circle intersect at E such that $m(\angle AEC) = 55^\circ$. If the measure of arc AC is 80° , find the *exact* measures of angle ABC and arc BD .



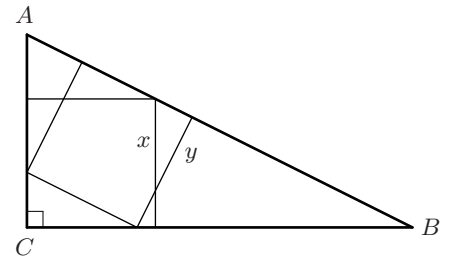
8. [10 points] The measures of $\angle ACB$ and $\angle ABC$ both equal 75° , D is the midpoint of \overline{AC} , $\triangle ADE$ is equilateral, and the length of \overline{AB} equals 10. If base \overline{BC} is horizontal, find the *exact vertical* distance between points E and D .



9. [10 points] The face of a clock consists of a circle with a 4 inch radius which is inscribed in square $ABCD$. Let E be the point on the circle which corresponds to the tip of the hour hand. What is the *exact* area of triangle AED when the clock reads 1 o'clock?



10. [10 points](P) Two squares are inscribed in right triangle ABC . One square, with side length x , is inscribed so that two of its sides lie on \overline{AC} and \overline{BC} . The other square, with side length y , is inscribed so one side lies on \overline{AB} . If $AB = 5$, $BC = 4$, and $CA = 3$, find the *exact* values of x and y .



Student's Answer Sheet

Name: _____
PRINT: First Last

School: _____ Code

I participated in: Meet I Meet II Neither

Miscellaneous Problems (point values as indicated). Circle the correct response 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.

- | | | | |
|--|--|-----|--|
| <p>1. (a) T F
 (b) T F
 (c) T F
 (d) T F
 (e) T F</p> | <table border="1" style="width: 100%; height: 100%; border-collapse: collapse;"> <tr><td style="width: 15px; text-align: center;">10P</td><td style="width: 20px;"></td></tr> </table> | 10P | |
| 10P | | | |
| <p>2. $x =$ _____ $y =$ _____</p> | <table border="1" style="width: 100%; height: 100%; border-collapse: collapse;"> <tr><td style="width: 15px; text-align: center;">10P</td><td style="width: 20px;"></td></tr> </table> | 10P | |
| 10P | | | |
| <p>3. area = _____</p> | <table border="1" style="width: 100%; height: 100%; border-collapse: collapse;"> <tr><td style="width: 15px; text-align: center;">10</td><td style="width: 20px;"></td></tr> </table> | 10 | |
| 10 | | | |
| <p>4. radius = _____ feet</p> | <table border="1" style="width: 100%; height: 100%; border-collapse: collapse;"> <tr><td style="width: 15px; text-align: center;">10</td><td style="width: 20px;"></td></tr> </table> | 10 | |
| 10 | | | |
| <p>5. percent = _____ %</p> | <table border="1" style="width: 100%; height: 100%; border-collapse: collapse;"> <tr><td style="width: 15px; text-align: center;">10</td><td style="width: 20px;"></td></tr> </table> | 10 | |
| 10 | | | |
| <p>6. area = _____ square centimeters</p> | <table border="1" style="width: 100%; height: 100%; border-collapse: collapse;"> <tr><td style="width: 15px; text-align: center;">10</td><td style="width: 20px;"></td></tr> </table> | 10 | |
| 10 | | | |
| <p>7. $m(\angle ABC) =$ _____ $^\circ$ $m(\widehat{BD}) =$ _____ $^\circ$</p> | <table border="1" style="width: 100%; height: 100%; border-collapse: collapse;"> <tr><td style="width: 15px; text-align: center;">10P</td><td style="width: 20px;"></td></tr> </table> | 10P | |
| 10P | | | |
| <p>8. <u>vertical</u> distance = _____</p> | <table border="1" style="width: 100%; height: 100%; border-collapse: collapse;"> <tr><td style="width: 15px; text-align: center;">10</td><td style="width: 20px;"></td></tr> </table> | 10 | |
| 10 | | | |
| <p>9. area = _____ square inches</p> | <table border="1" style="width: 100%; height: 100%; border-collapse: collapse;"> <tr><td style="width: 15px; text-align: center;">10</td><td style="width: 20px;"></td></tr> </table> | 10 | |
| 10 | | | |
| <p>10. $x =$ _____ $y =$ _____</p> | <table border="1" style="width: 100%; height: 100%; border-collapse: collapse;"> <tr><td style="width: 15px; text-align: center;">10P</td><td style="width: 20px;"></td></tr> </table> | 10P | |
| 10P | | | |

TOTAL SCORE