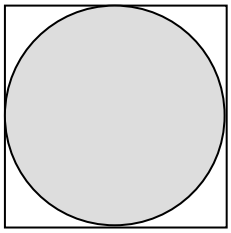
MATH 139 FINAL EXAM REVIEW PROBLEMS

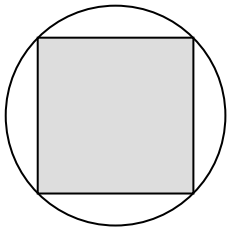
Bring a protractor, compass and ruler.

Note: This is NOT a practice exam. It is a collection of problems to help you review some of the material for the exam and to practice some kinds of problems. This collection is not necessarily exhaustive. We have covered material in this class that is not represented in this collection. You should expect some problems on the exam to look different from these problems. *Be sure to also review your class notes, quizzes, homework assignments, and reading assignments.* This set of problems is *not necessarily* representative of the distribution of material on the final exam!

1. Which fits better: a square peg in a round hole, or a round peg in a square hole? Use the figure and show which one has less wasted space. (Assume the circle in each case has a radius of one unit.)



(a)



(b)

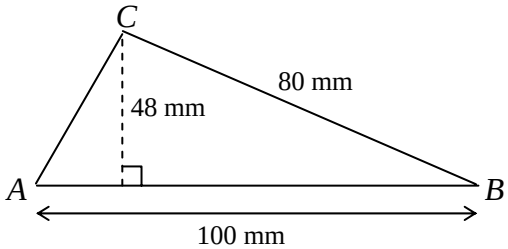
2. A right pyramid is formed whose base is an equilateral triangle. The base has sides of length 8 meters. The height of the pyramid is 10 meters. The distance from the apex to the mid-point of an edge of the base is 10.26 meters. Give the answers to the following problems to the nearest tenth of a meter or square meter, and use correct units. Show the equations you use.

   a. Sketch the base of this pyramid, and find the area of the base.

   b. Find the perimeter of the base.

   c. Find the area of one of the triangular lateral faces.

3. Find the perimeter to the nearest millimeter and the area to the nearest square millimeter of the triangle *ABC* below. Show and explain your work. Caution: You do not know whether angle *C* is a right angle. It might be, but you are not told that it is.



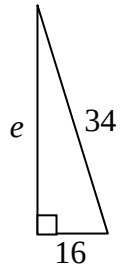
4. Determine for each of the following the smallest number of **faces** possible:
   a. Prism

b. Pyramid
c. Polyhedron

5. Can a prism have exactly 33 edges? Explain how you know. Can a pyramid have exactly 33 edges? Explain how you know.

6. Find the missing side length for each triangle. Do <u>not</u> round your answers.

a.



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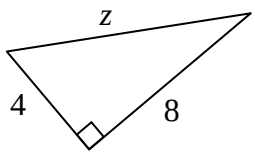

e = _____ z = _____

7. (10 points) Find the exact perimeter if this figure, if one unit is the distance between dots, as illustrated. Your work should show enough detail that it is very clear how you found the answer. (Hint: Use the Pythagorean theorem when necessary.)

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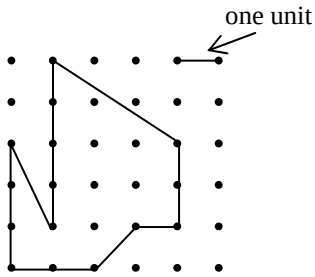


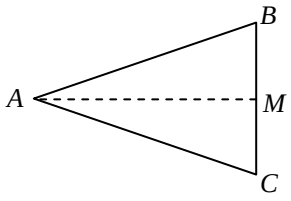
8. Find the exact area of the figure above. Show and explain carefully how you found the area.

9. Fill in the blank with "All," "Some," or "No."
   a. _____ rectangles are squares.
   b. _____ parallelograms are trapezoids.
   c. _____ rhombuses are quadrilaterals.

10. When Joe was asked to draw a shape that has an area of 3 square centimeters, he drew a 3 cm by 3 cm square. Is Joe right or not? Explain.

11. The area of land is often measured in acres. One acre is 43,560 square feet. What is a square mile in acres? Explain.

12. Triangle *ABC* is an isosceles triangle, with $\overline{AB} \cong \overline{AC}$. *M* is the midpoint of $\overline{BC}$. Use this situation to prove the theorem that the angles opposite the congruent sides of an isosceles triangle are congruent. In other words, prove that angle *B* is congruent to angle *C*.

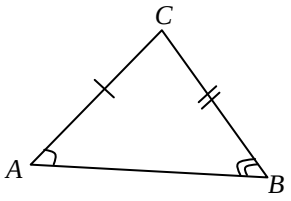


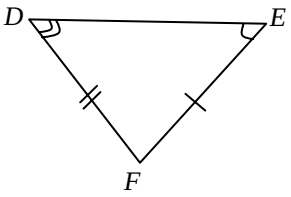
13. If possible, construct a triangle *STU* with side *ST* of 2 inches, *TU* of 1.25 inches, and angle *T* of 35º. Make sure is clear the steps you used.

14. If possible, construct a triangle *ZAP* with side *ZA* of 1.75 inches, angle *Z* of 60°, and side *AP* of 1.25 inches. Make sure is clear the steps you used.

15. Determine whether a pair of congruent triangles is present in each diagram. Explain in detail how you know the triangles are congruent.

a.





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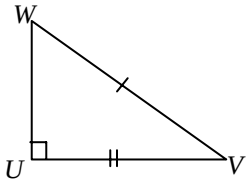
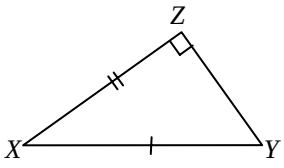
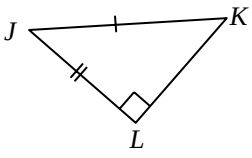
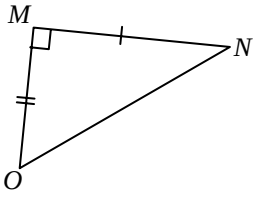




c.

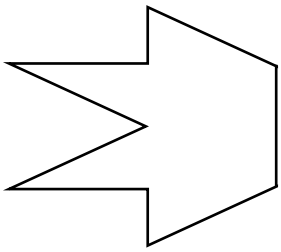




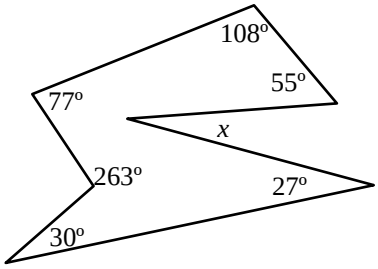
16. Determine the measure of the following angles:
    a. Vertex angle of a regular decagon (ten sides)
    b. Central angle of a regular pentagon

c. Exterior angle of a regular heptagon

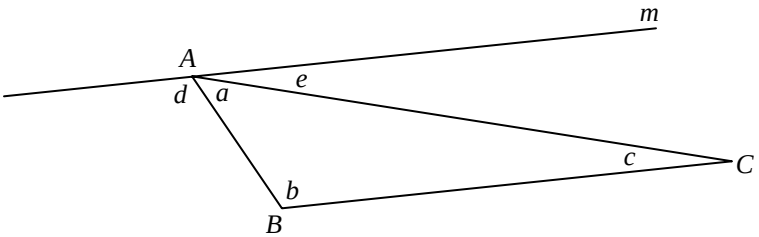
17. Show how to find the sum of the vertex angles of the polygon shown here <u>without</u> using a formula.



18. <u>Without using a protractor</u>, find the measure of the angle marked *x*.



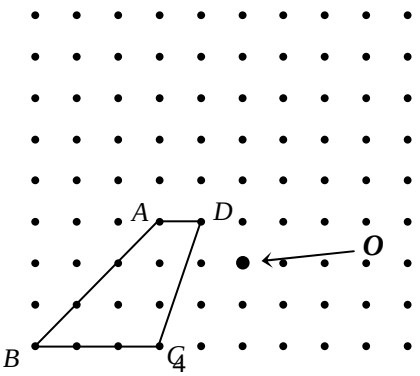
19. Explain how this figure can be used to prove that the sum of the measures of the angles of a triangle is 180°. The line *m* is parallel to segment *BC*.



20. Imagine a pyramid whose base is a 100-gon. Fill in the blanks: the pyramid has _____ faces, ____ vertices, and _____ edges.

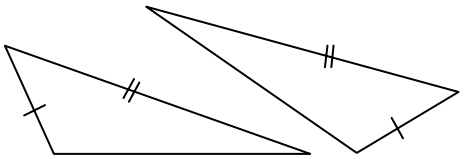
21. Imagine a prism whose base is a 51-gon. Fill in the blanks: the prism has _____ faces, _____ vertices, and _____ edges.

22. Sketch the image of *ABCD* for a clockwise rotation of 90° about the point marked *O*.

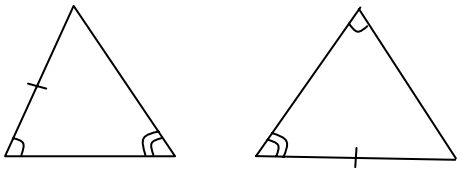


23. There is a difference between the following two statements: (i.) “These triangles are not necessarily congruent.” (ii.) “These triangles are not congruent.”
    a. Explain the difference.
    b. Determine if the following pairs of triangles are congruent. If not, determine which statement—(i) or (ii)—is best for the situation, and explain why it is best.

i.



ii.



iii.