Name ____

Teacher (circle): Richardson Simon Williams

Class Block (circle): A B D E F G H

Honors Geometry

Final Exam 2008

Lexington High School
Mathematics Department

You will be allowed to work on this exam for a minimum of 90 minutes and up to 120 minutes. Graphing calculators are permitted. You may not share your calculator.

The exam has two parts. Directions for each part appear below. In total, there are **107** points that you can earn. A letter grade scale will be set by the course faculty after all the tests have been graded.

Part A. Short Answer Calculations

13 problems, points indicated with each problem

Write the value of the indicated measurement in the space provided below the problem.
If your answer is incorrect, you may receive partial credit if you have shown enough correct work.

All work may be done either exactly, in terms of π and radicals, or with decimal approximations accurate to two decimal places.

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Part B. Open Response Problems

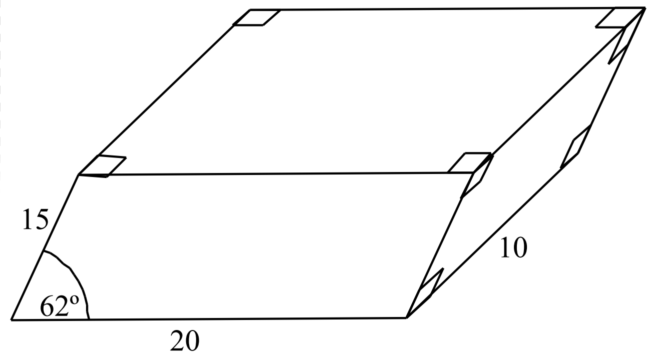
2 constructions (3 points each), 2 proofs (5 points each)

Partial credit will be given, provided sufficient understanding is shown.

Part A: Short Answer Calculations

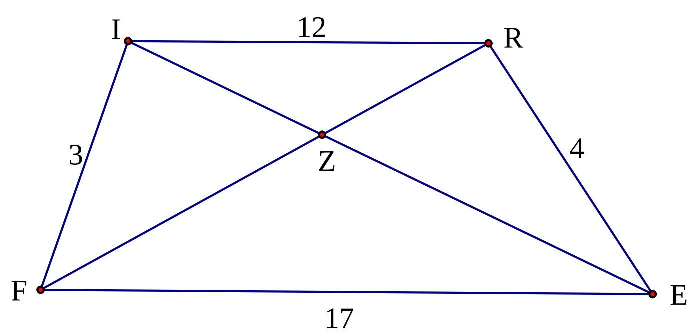
Write the value of the indicated measurement in the space provided below the problem.
If your answer is incorrect, you may receive partial credit if you have shown enough correct work.
Diagrams may not be to scale. Point totals for each problem are given in the answer box.

1. Find the volume of the oblique (not right) prism:



Volume: (3)

2. Given the trapezoid FIRE with bases IR and EF and dimensions shown:



a. Name a pair of ***similar*** triangles (2 points).

______________ and ______________

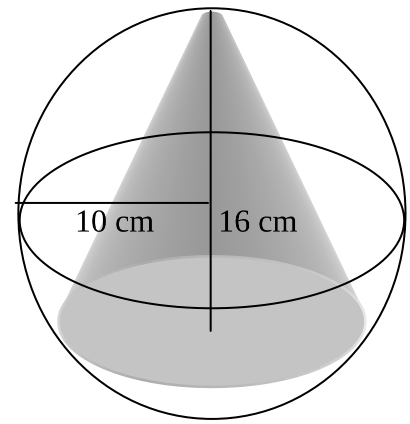
b. Name two pairs of triangles with ***equal area*** (1 point each).

Pair 1: ____________ and ______________ ; *Pair 2*: ____________ and ______________

c. Find the ratio $\frac{\text{Area}_{\Delta RIZ}}{\text{Area}_{\Delta FEZ}}$.

Ratio: (3)

3. Given a cone with height 16 cm inscribed in a sphere of radius 10 cm, find the radius of the base, the volume and surface area of the cone.

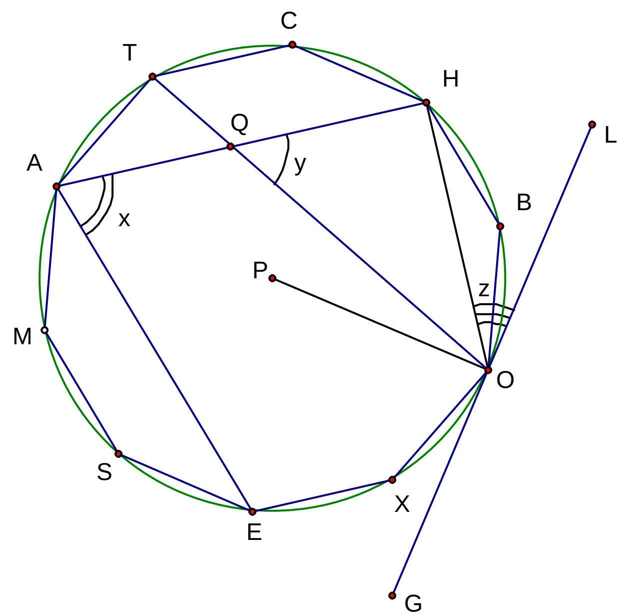


Radius : (2)

Volume: (1)

SA: (1)

4. Regular decagon MATCHBOXES is inscribed in circle P and LOG is tangent to circle P. Find the angles indicated by x, y, and z.

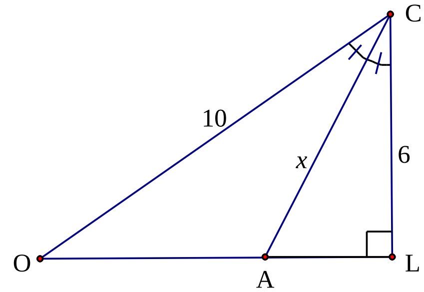


x: (3)

y: (3)

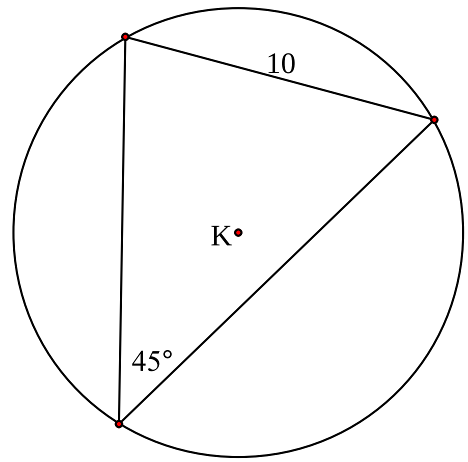
z: (3)

5. Find *x*, the length of the angle bisector in triangle COAL.



x:	(3)

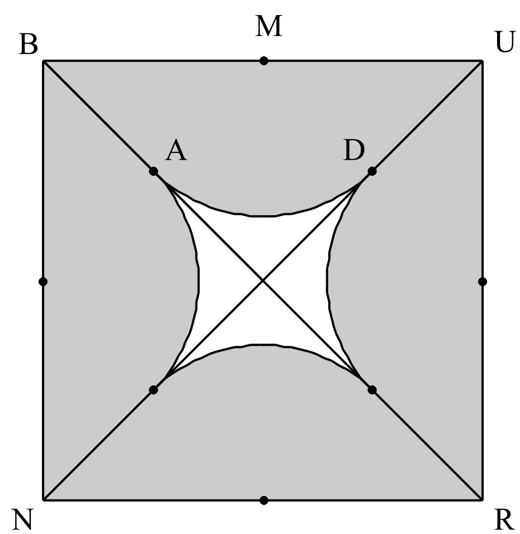
6. Find the radius and area of circle K in the diagram at the right.



area:	(3)

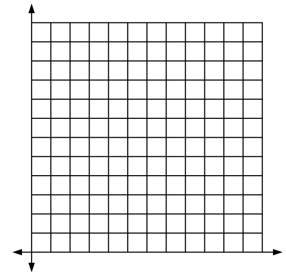
7. BURN is a square with sides of length 12. From the midpoint M of BU a circular arc is drawn tangent to the diagonals of BURN at A and D. Similar constructions are made at the midpoints of the other three sides.

Find the <u>unshaded</u> area.



area:	(3)

8. The vertices of triangle ASH are A = (5, 4), S = (11, 6) and H = (9, 10).



a. Find the length of the median to AS.

length: (2)

b. Find the equation of the median to AS.

ME: (2)

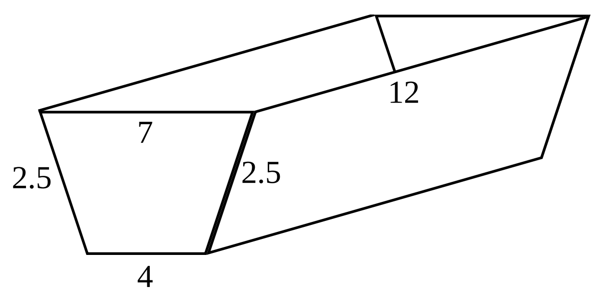
c. Find the equation of the perpendicular bisector of AS.

PB: (2)

d. Find the coordinates of the centroid.

Ce: (2)

9. An open-top trough in the shape of a right prism is drawn with the dimensions as shown. Find the volume and exterior surface area (including the bottom) of the trough.



Volume: (3)

SA: (3)

10. Given a triangle with sides 25, 28, and 17:

a) Find the area of the triangle.

Area:	(3)

b) Find the length of the altitude to the longest side.

Length:	(3)

11. Two similar cones have volumes 25π in^3, 200π in^3. What is the ratio of their lateral areas (larger to smaller)?

Ratio:	(3)

12. Assume that the statement "All cars have wheels," in the domain of vehicles, is always true.

a. Write the statement in if-then form (1 point).

b. Write the converse and explain whether it is necessarily true or false (3 points).

c. Write the contrapositive and explain whether it is true or false (3 points).

13. A boat sails on a bearing (clockwise from North) of 54º a distance of 115 miles. It then sails on a new bearing of 148º for another 75 miles.

How far from its starting point is the boat and at what bearing should it sail to return on a direct path?

Distance:	(3)
Bearing	(3)

Part B. Open Response Problems

1. Constructions. Leave compass markings to demonstrate your method.

a. Construct a 30º-60º-90º triangle (3 points).

b. Construct any triangle and its inscribed circle (3 points).

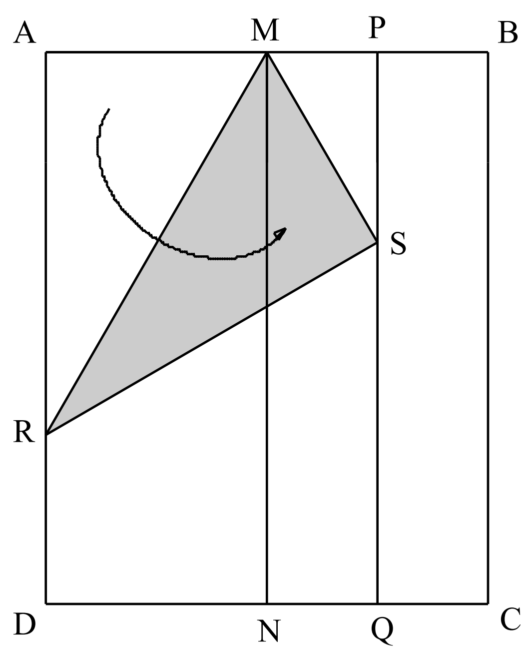
Complete any two of the following four proofs (5 points each):

2. Triangle PYR has PY = YR. E is a point, not in plane PYR, such that PE = ER. If O is any point on YE, prove that PO = OR.

3. How to fold a 60º angle on a piece of paper.

ABCD is any rectangular piece of paper.
MN folds the paper in half and PQ folds the right half in half again.
Then corner A is folded along MR to meet PQ at S.

Prove that $\angle BMS = 60^\circ$.



4. Given ΔABC with point N on BC, show that "N is the midpoint of BC" is **not** sufficient to conclude that $\overline{AN}$ is the angle bisector of $\angle BAC$.

5. Quadrilateral ABCD is a parallelogram. Points E and G are projections of A and C, respectively, on diagonal BD. That is, E and G are the feet of altitudes drawn to BD from A and C, respectively. Likewise, F and H are projections of B and D, respectively, on diagonal AC. Prove that the quadrilateral EFGH is a parallelogram.