

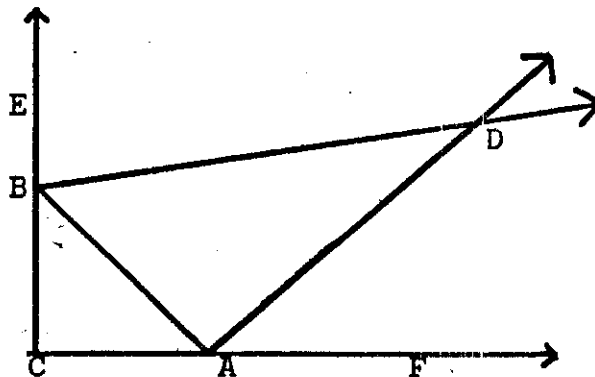
GEOMETRY TEAM QUESTIONS

JANUARY 11, 1992

1. Rearrange the letters from the following statements to form a mathematical word.
 1. The fourth letter of the word for the line segment which joins the midpoints of the nonparallel sides of a trapezoid.
 2. The initial letter of the word which is a statement proved by deduction.
 3. The sixth letter of the word for a convex polygon which is the union of eight sides.
 4. The initial letter of the word for a parallelogram with equal sides whose angles may not be 90° .
 5. The initial letter of the word for the measure of a plane region in

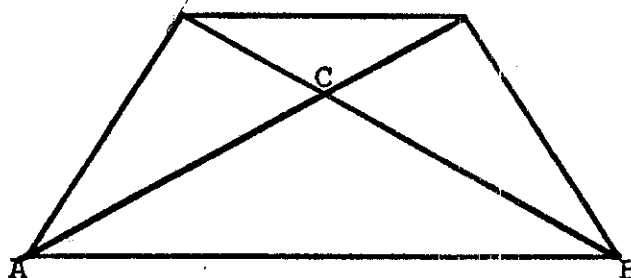
2. Point P is the midpoint of \overline{NA} , point L is the midpoint of \overline{NP} , point E is the midpoint of \overline{NL} , and point S is the midpoint of \overline{NE} . If $NS = 5\frac{2}{5}$, what is the number of units in the length of \overline{NA} ?

3. $\triangle ABC$ is a right triangle with right angle at C. Lines DA and DB bisect $\angle BAF$ and $\angle ABE$, respectively. What is the measure of $\angle ADB$?



4. $\triangle ABC$ is an equilateral triangle with sides of 2 units each. The midpoints of the sides of triangle ABC are joined to form triangle DEF. The midpoints of the sides of triangle DEF are joined to form triangle GHI. This process is continued three more times. What is the sum of the perimeters of all the triangles?

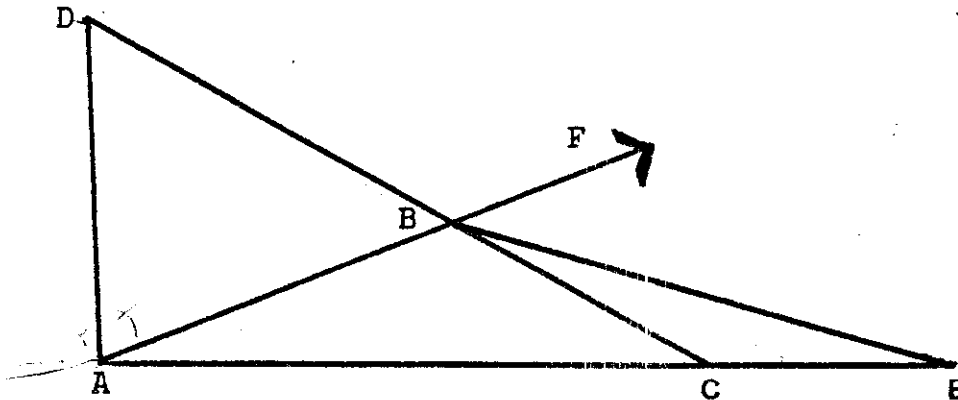
5. The given trapezoid was formed by truncating an isosceles triangle. The area of the original triangle was 72 square units. The area of the trapezoid is 54 square units. Find the area of triangle ABC.



6. A = The area of a triangle with side lengths of 8, 10 and 12.
 B = The area of a regular hexagon with side length of 4.
 C = The area of rhombus with side length of 12 and diagonal length of 16.
 D = The area of a circle with diameter length of 10.

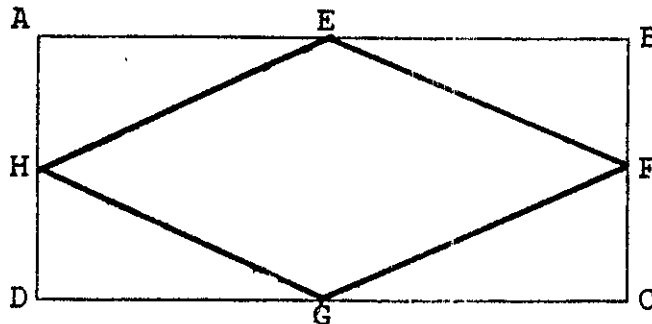
Find $A + B + C + D$

7. Through the point on a radius of a circle which is $\frac{1}{5}$ of the way from the circle to the center, a chord is drawn perpendicular to the radius. If the length of this chord is 36, find the length of a radius of this circle.
8. In triangle ABC, $\angle B$ is obtuse and $AB > BC$. An angle bisector of an exterior angle at A meets \overrightarrow{BC} at D. An angle bisector of an exterior angle at B meets \overrightarrow{AC} at E. If $AD = AB = BE$, find $m\angle BAC$.

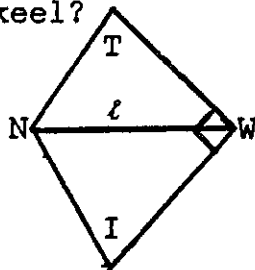


9. If the rectangle were 2 meters wider and 3 meters longer it would be 66 square meters larger, but if it were 3 meters wider and 2 meters longer it would be 71 square meters larger. What are the dimensions of the rectangle?
10. If a statement is true, assign a value of -1. If a statement is false, assign a value of 0. Find the total value of all the statements.
- Every two squares are similar.
 - The geometric mean of two positive numbers is always less than their arithmetic mean.
 - If two lines are perpendicular to the same plane, the lines are parallel.
 - If a median of a triangle is half as long as the side it bisects, the triangle is a right triangle.
 - If two parallel lines are cut by a transversal, the interior angles on the same side of the transversal are supplementary.
 - Every square is a rhombus.
 - The acute angles of a right triangle are complementary.
 - If two angles are congruent, their supplements are congruent.

11. The sum of the measures of an acute angle and an obtuse angle is 150. The sum of twice the supplement of the obtuse angle and three times the complement of the acute angle is 310. What is the measure of the acute angle?
12. Given rectangle ABCD with length twice the width; midpoints E, F, G, and H; and perimeter equal to 60 units. Find the area of EFGH.



13. The sail of a certain type of hang glider consists of two isosceles triangles (i.e., $TW = WN = WI$) joined along the keel so that a 90° angle is formed at the nose. What is the area of such a sail in terms of the length ℓ of the keel?



14. In $\triangle RST$, $\overline{RS} \cong \overline{TS}$, $m\angle T = 2X - 10$ and $m\angle S = X + 20$. Find the exact measure of angle R.
15. Find the shortest distance from point A to point B that touches some point on segment \overline{CD} .

