FAMAT REGIONAL – JANUARY 2001 – GEOMETRY TEAM

Question #1

Find A + B + C given the following:

A = the length of the arc subtended by a $40°$ inscribed angle in a circle with radius 6.

B = the x-coordinate of the center of the circle given by the equation
$$x^2 + y^2 - 6x + 4y + 13 = 36.$$

C = the length of the apothem of a regular polygon with a perimeter of 50 and area of 20.

Question #2

Find the length of the diagonal of a cube that has a volume of 64.

Question #3

Find A + B + C given the following:

A = the measure of one interior angle of a regular hexagon.

B = the sum of the measures of exterior angles of a dodecagon, measured one at each vertex.
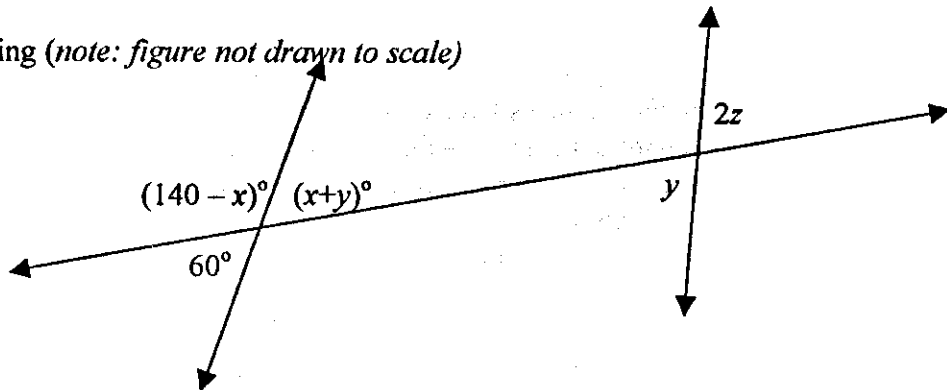
C = the number of diagonals in a triangle.

Question #4

Find A + B given the following:

A = the y-intercept of a line segment with endpoints at (-2, -7) and (5, 2).

B = the x-intercept of the line which is perpendicular to 2x + 5y = 7 and passes through the point (4, 5).

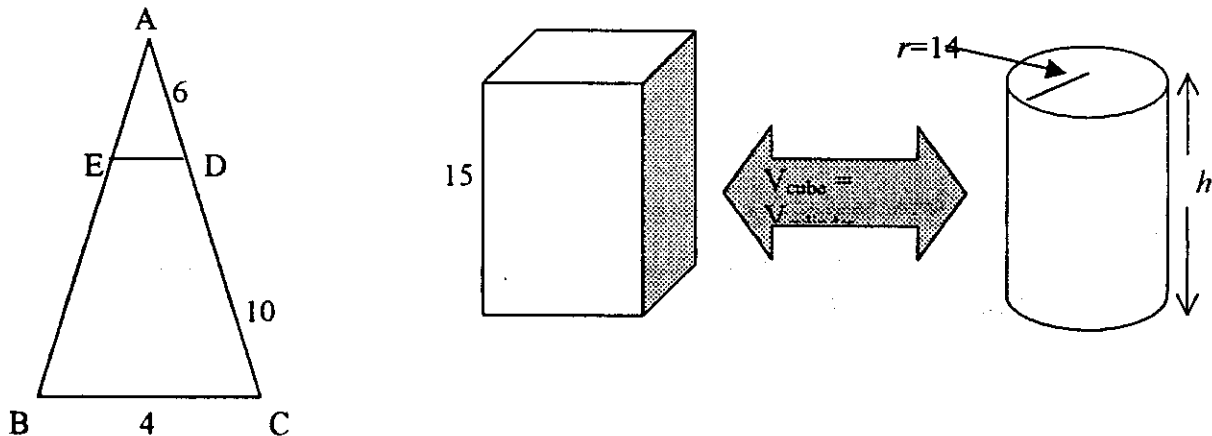## Question #5

Find $x + y + z$ given the following (*note: figure not drawn to scale*)

Question #6

The volume of a cube with side length 15 is equal to the volume of a cylinder with radius 14. Find the height of the cylinder to the nearest tenth.

Question #7

Given the above figure with $\overline{ED} \parallel \overline{BC}$, AD = 6, DC = 10, and BC = 4, find DE.

Question #8

Adam has just bought a 24-inch by 18-inch rectangular painting and wants to frame it, but the only frame he has is 28 inches by 22 inches (rectangular). If the region left remaining uncovered within the frame by the painting is to be of uniform width, what will that width be?

Question #9

Find the area of a regular hexagon if two side lengths are $2x^2 - 5$ and $3x^2 - 9$

Question #10

Find A + B TO THE NEAREST TENTH.

A circle of area 64π is rotated about its diameter. Let A = the volume of the resulting figure.
Let B = the area of an equilateral triangle with sides of length $z + 3$ and $2z - 2$.

Question #11

Find A + B given the following:

A = the number of faces in a Euler's Law compliant polyhedron that has 19 edges and 13 vertices.
B = the surface area of the figure mentioned above given that 50% of the faces have an area of 2 square units and the other 50% have an area of 3 square units.

Question #12

Find A + B + C *to the nearest tenth* given the following:

Two similar triangles have perimeters of 12 and 20, respectively. If the second triangle has an area of 15 square units, let A = the area of the first triangle.
B = The maximum number of points that 4 skew lines can have in common (Each of the lines is skew to the other three).
C = The area of a regular octagon with a side length of 7.

Question #13

Given the figure below as marked (with two parallel lines), find the measure of angle ICQ.
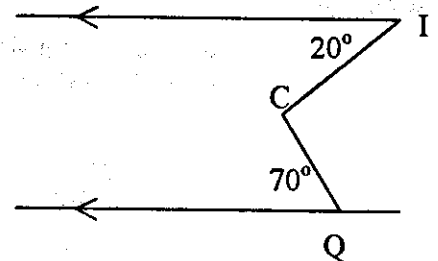
Question #14

What is the volume of the largest cylinder that can fit in a cube with a volume of 4096?

Question #15

How many pairs of collinear points does a circle have?