QUESTION 1

Let

A = the complement of the smaller angle of angles $4x + 31$ and $6x + 49$, if both are supplementary angles

B = the measure of the acute angle between the minute and hour hand at 6:30

C = the largest angle of a quadrilateral whose interior angles are in a ratio of 2:4:4:5

D = the hypotenuse of a right triangle with legs of length 8 and 15

What is $\dfrac{A+B}{D} + C$?

QUESTION 2

Let

$$\begin{aligned} A &= \text{the length of the diagonal of a square with side length of } 4 \\ B &= \text{the area of a hexagon with an apothem length of } 3\sqrt{3} \\ C &= \text{the area of an equilateral triangle with side length of } 6\sqrt{3} \\ D &= \text{the number of positive factors of } 2016 \end{aligned}$$

What is $A\sqrt{2} + (B + C)\sqrt{3} + D$?

QUESTION 3

Starting with 5, add 2 if the statement is correct, and subtract 3 if the statement is incorrect. What is your final value?

1. In a parallelogram the diagonals bisect each other.
2. The perpendicular bisectors of the sides of a triangle are concurrent at a point called the incenter.
3. A regular icosahedron is formed by connecting the centers of the faces of a regular dodecahedron.
4. The sum of the exterior angles of a triangle is 360 degrees.
5. The centroid of a triangle cuts its medians into a 3:1 ratio.

QUESTION 4

Find the area of the triangle using the following points as its vertices by solving each statement below:

1. The center of a circle with the equation: $x^2 + y^2 + 6y - 18x + 9 + 81 - 16 = 0$
2. The point of intersection of the two lines: $y = \frac{3}{5}x + 9$ and $y = \frac{3}{10}x + \frac{21}{2}$
3. The centroid of the points: (6, 8), (11, 6), and (1, 4).

QUESTION 5

While hiking up the mountains in Salt Lake City, RJ finds a boulder in the shape of an icosahedron. He notices that it has 12 vertices. Let:

$$\begin{aligned} A &= \text{the number of faces the boulder has} \\ B &= \text{the number of edges the boulder has} \\ C &= \text{the number of space diagonals the boulder has} \end{aligned}$$

Find $A + B + C$.

QUESTION 6

Let

A = the volume of a tetrahedron with side length $\sqrt{2}$

B = the volume of a cone with slant height of $\sqrt{261}$ and a diameter of 30

C = the length of the longest diagonal that can fit inside a rectangular prism with side lengths 10, $\sqrt{61}$, and 8

D = the surface area of a hemisphere with radius 6

What is $AC + B + D$?

QUESTION 7

Let

A = the number of possible integer side lengths for the third side of the triangle with side lengths 16 and 40

B = the radius of a circle inscribed in a triangle with area $9\sqrt{3}$

C = the radius of a circle circumscribed around a triangle with perimeter $18\sqrt{3}$

D = the length of BD, where in triangle ABC, an angle bisector is drawn from point A to line segment BC at point D and the length of AB is 10, DC is 8, and AC is 16

What is $A + C + D + B\sqrt{3}$?

QUESTION 8

Cherry and Anvitha are surrounding a garden with cement. The garden is in the shape of a rectangle with side lengths of 168 inches and 5 feet. A rectangular sidewalk is being built around the garden with a width of 6 inches. What is the geometric mean of the perimeter of the original garden and the average of the perimeter and area of the new rectangle that is formed after the cement has been poured around the garden (in feet)?

QUESTION 9

Multiply all the numbers next to the true statements for your final answer:

(-2)	An inscribed angle equals the measure of the arc it intercepts.
(-1)	The incenter lies on Eulers line.
(3)	A line that touches a circle at a single point is called a tangent.
(10)	One form of the law of cosines is: $c^2 = a^2 + b^2 - 3ab\cos C$.
(-6)	The volume of a square pyramid is $\frac{1}{4} \times$ (the area of the base) $\times$ (the height).

QUESTION 10

Let

A = the volume of a frustum with an upper radius of 3 cm, lower radius of 4 cm, and a height of 6 cm

B = the area of a circle who's longest chord has a length of 20 cm

C = the area of the intersection of a sphere and a plane if the plane cuts through the 34 cm diameter sphere 8 cm from the center

D = the volume of a sphere that is circumscribes around a cube with a surface area of 864 cm^2

In terms of π, what is $\dfrac{A+B+C+D\sqrt{3}}{3}$?

QUESTION 11

Let

A = the supplement of the smallest angle in a pentagon if the angles are in the ratio 3:10:13:28

B = the volume of a rectangular prism with surface areas of 24, 36, and 150

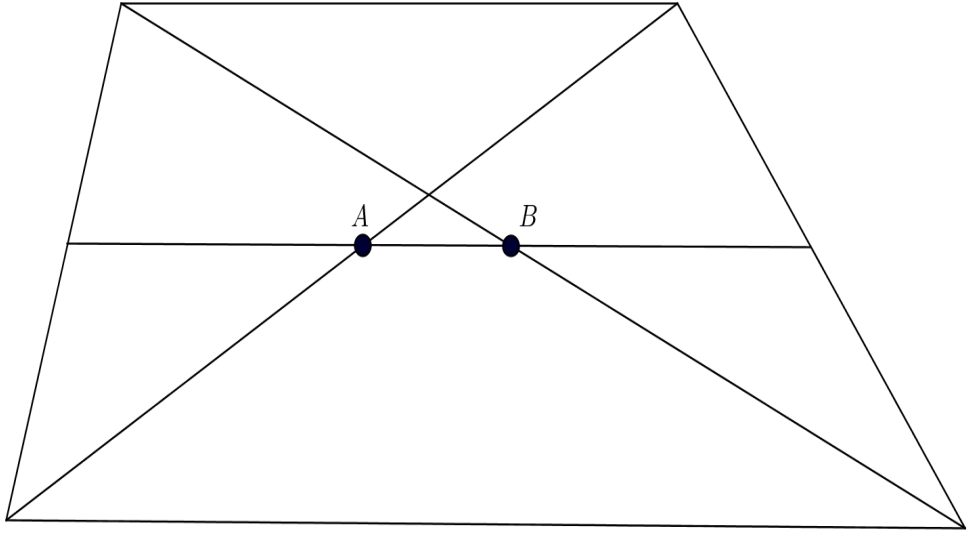
C = the height of a triangle with perimeter 60 that has a similar triangle with perimeter 120 and height 40

D = the sum of the abscissas of the following points, (5,6), (-3,2), (-7,1), (10,9), and (1,2) after they are reflected over the line $x = -5$

What is $A - D + \dfrac{B}{C}$?

QUESTION 12

The diagonals intersect the midsegment at points A and B. If the length of the bases are 14 and 24, what is the length of line segment AB?



QUESTION 13

$$\begin{aligned} A &= \sin 30^\circ \\ B &= \sin 45^\circ \\ C &= \tan 0^\circ \\ D &= \cos 60^\circ \end{aligned}$$

What is $A \times B \times C \times D$?

QUESTION 14

If angle 2 is 87 degrees, what is the sum of the angles 3, 5, and 8?