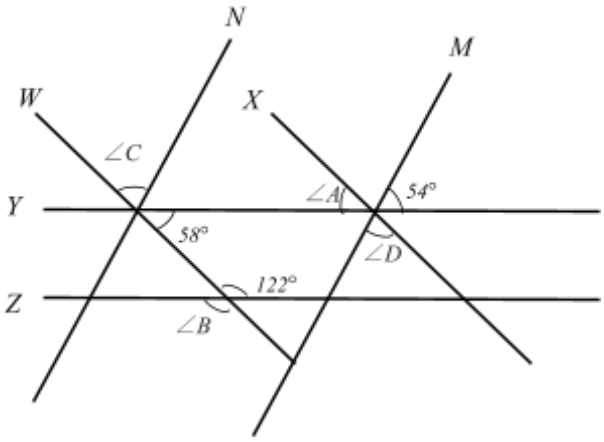
Fourteenth Annual PI Competition

Geometry Team Test

Geometry Team Problem 1

Assume lines Y and Z are parallel, lines N and M are parallel, and lines W and X are parallel.



Let Y = $\angle A$
Let U = $\angle B$
Let C = $\angle C$
Let K = $\angle D$

What is $Y + U \times C \div K$?

Geometry Team Problem 2

A triangle ABC has the coordinates of A at (4, 6), B at (1, 9), and C at (7, 13).

Let L = the y value of A if the triangle is reflected across $y = -x$ and reflected across the *x-axis*.
Let A = the y value of B if the triangle is rotated 90° counterclockwise about the origin and reflected across the *y-axis*.
Let N = the x value of C if the triangle is reflected across $y = x$, rotated 90° clockwise about the origin, and dilated by 3.
Let D = the x value of A if the triangle is rotated 90° counterclockwise about the origin, dilated by 2, reflected across $y = -x$, and reflected across the *y-axis*.

What is $L \times A \div N + D$?

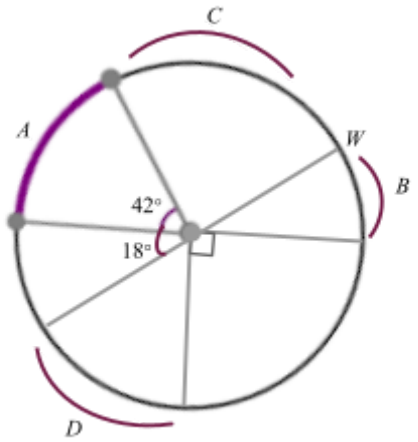
Geometry Team Problem 3

Let M = the sum of the interior angles of a regular decagon
Let A = the sum of the interior angles of a regular dodecagon
Let T = the sum of the interior angles of a regular octagon
Let H = the sum of the interior angles of a regular heptagon

What is the mean of M, A, T, and H?

Geometry Team Problem 4

W is a segment with a length of 4 cm that bisects the circle below.



Let N = arc length A
Let E = arc length B
Let S = arc length C
Let T = arc length D

What is $\frac{\sqrt{E}}{S} + (\frac{N+T}{2})$?

Geometry Team Problem 5

Shiv loves coffee conspiracy theories who believes that his local coffee chain is reducing the amount of coffee in their large-sized cups. As such, he measures the amount of coffee in his next order where the cylindrical cup has a height of 6 inches and a radius of 2 inches. He measures that this latte is filled up to the 5 inch mark with foam being 1 inch of the 5 inches rather than liquid completely to the 6 inches.

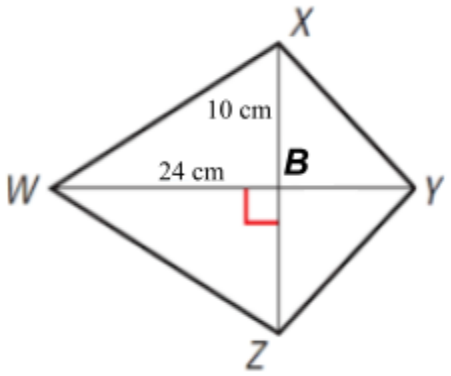
Let C = Volume of the latte in the cup.
Let U = Volume of the latte without foam.
Let T = Difference between the volume of the total latte and the latte without foam.
Let E = Volume of the latte in the cup if the cup was twice as large.

Round to the nearest hundredth at every step.

What is $C - U - T + E$?

Geometry Team Problem 6

The shape WXYZ is a regular kite whose triangle XYB is an isosceles triangle.



Let P = BY
Let A = $WZ + XY$
Let C = Perimeter of the shape.
Let E = Area of the shape.

What is $(C - E) - (\frac{P+\sqrt{A}}{4})$?

Geometry Team Problem 7

During a boring math class, Aly has decided to play paper football with his friends Alice and Reena. Aly makes a paper football in the shape of a right triangle with legs whose lengths are 14 cm and 20 cm. Alice makes a paper football in the shape of a right triangle whose lengths are 8 cm and 16 cm. Reena makes a paper football in the shape of a right triangle whose lengths are 18 cm and 22 cm. Instead of playing paper football, they all decide to balance the triangle on the tips of their fingers. The right angle is considered the origin on a Cartesian plane and the hypotenuse of the triangle is in quadrant 1.

Let M = The average of the two x values of possible coordinates at which Alice must place her finger so that the triangle balances.
Let U = The average of the two y values of possible coordinates at which Alice must place her finger so that the triangle balances.
Let C = The perimeter of all triangles.
Let H = The total area of all triangles.

What is $M \times U + C - H$?

Geometry Team Problem 8

A sphere fits perfectly into a cylinder that has a radius of 5 cm with its top reaching the halfway mark of the cylinder.

Let F = Volume of the cylinder.
Let O = Volume of the sphere.
Let X = Surface area of the cylinder.
Let Y = Surface area of the sphere.

Round to the nearest whole number at every step.

What is $F - O + X - Y$?

Geometry Team Problem 9

Let R = Number of pythagorean triples: (10, 12, 15) (28, 45, 53) (12, 15, 35) (1, 3, 5) (7, 11, 14)
Let O = Number of non-pythagorean triples: (8, 16, 18) (20, 21, 29) (9, 12, 16) (4, 15, 22) (16, 19, 45)
Let C = Number of double amount of pythagorean triples: (1, 2, 6) (39, 80, 89) (13, 17, 21) (11, 60, 61) (20, 99, 101) (4, 24, 82)
Let K = Number of triple amount of pythagorean triples: (32, 64, 82) (33, 56, 65) (18, 21, 42)

What is $R + O + C + K$?

Geometry Team Problem 10

A tree is standing upright on even ground with Sammy the squirrel perched on top. The angle of elevation from the ground to the top of the pole is 60° and the distance from the base of the pole to where Lila stands to watch Sammy is 10 meters.

Let T = Number under the root of the height of the flagpole. - 3
Let I = Distance between Sammy and Lila. 20 meters
Let R = Measurement of the angle opposite to the eyeline of Lila to Sammy. 90
Let E = Measurement of the angle opposite to the ground. 30

$\frac{R+E}{2} + (TI)$
