
QUESTION 1

A = the complement of $\angle B$ degrees

B = the supplement of $\angle C$ degrees

C = the supplement of the complement of $\angle D$ degrees

D = the central angle of a circle with radius 4 with corresponding arc length of π

Find $A + B + C + D$

QUESTION 2

A = the number of diagonals of an icosagon (20 sided polygon)

B = the area of an isosceles trapezoid with base lengths 4 and 28 and a height of 5

C = the height of a rectangular prism with a length of 20, a width of 9, and a space diagonal of 25

D = the volume of a hemisphere with radius 6

Find $A + B + \frac{D}{C}$

QUESTION 3

Puneet lives in a box with dimensions $20ft \times 15ft \times 10ft$. There is a door with dimensions $7ft \times 4ft$. Each can of paint can cover $100 ft^2$.

A = the number of paint cans needed to paint the door

B = the number of paint cans needed to paint Puneet's house given that he paints the entire surface area of the house

C = the length of the longest sandwich Puneet can fit into his box

D = the ratio of the volume of the box to the surface area of the box

Find $AC + BD$

QUESTION 4

A semicircle is inscribed in an equilateral triangle so that the diameter rests on one side of the triangle and is tangent to the other two sides. Let A be the radius of the semicircle when the side lengths of the triangle equals 24.

Two poles of height 6 ft. and 8 ft. are located 12 ft. away from each other. Jenny attaches two cables that connect the top of one pole to the bottom of the other. Let B be the height of the intersection of the two cables from the ground.

Jenny likes pie and π . She buys herself a two-dimensional pie with radius 14 in. Let C be the area of her pie in in^2 .

Find $A + B + C$.

QUESTION 5

A = the length of the inradius of a triangle with side lengths 7, 8, and 9

B = the length of circumradius of a triangle with side lengths 10, 10, and 14

C = the area of a triangle with side lengths 14, 60, and 66

D = the area of a triangle with side lengths 12 and 15 and included angle of 60°

Hint: Area = $\frac{1}{2}ab \sin C$ where C is the angle between a and b

Find $A\sqrt{5} + B\sqrt{51} - \frac{C}{\sqrt{2}} + \frac{D}{\sqrt{3}}$

QUESTION 6

A = the sum of the coordinates of the centroid of a triangle with vertices $(5, 7)$, $(-1, 5)$, and $(8, 0)$

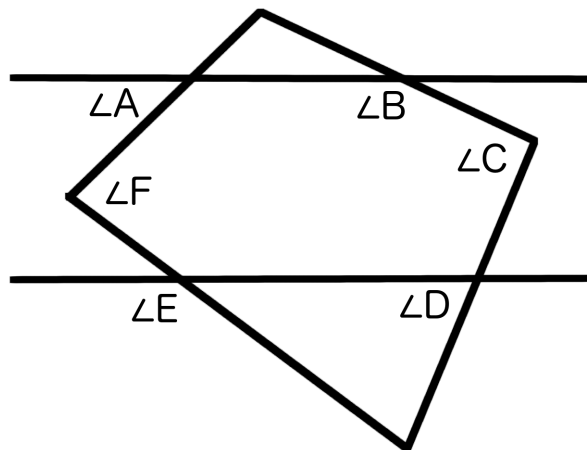
B = the slope of the median from vertex B of a triangle with vertices $A(31, 7)$, $B(19, 21)$, $C(25, 12)$

C = the measure of $\angle D$ in degrees in $\triangle DOG$ if the opposite side length is $4\sqrt{2}$, $\angle G$ equals 45° and DO equals 8

Find $A+B+C$.

QUESTION 7

(Figure not drawn to scale. A quadrilateral is drawn over two parallel lines.)



What is the sum of $\angle B$ and $\angle F$ if $\angle A = 42^\circ$, $\angle C = 79^\circ$, $\angle E = 135^\circ$, and $\angle D = 51^\circ$?

QUESTION 8

Two spheres are inscribed in a rectangular box so that each sphere is tangent to five sides of the box and the other sphere. If the radius of each of the spheres is 4 in, then the volume of the box is $A \text{ in}^3$.

If a frustum of the cone has radii 6 in and 8 in and a height of 4 in, then the lateral surface area is $B\pi \text{ in}^2$.

An ant is sitting on the center of the top face of a right, cylindrical can of soup with radius 4 in and height 6π in. The ant wants to get down to the ground so it takes the shortest path to the edge of the face and climbs down the side of the can. The ant spirals down the can, rotating around once and arriving at the point directly underneath his position on the top edge. The length of the path the ant took from his original position to the ground is C in.

Find $A+B+C$.

QUESTION 9

Add the values in the parentheses to x if they are true. Subtract them from x if they are false. Begin with $x = 0$.

- (5) The incenter of a triangle is the center of its inscribed circle
- (-3) The circumcenter of a triangle is equidistant from the sides of the triangle
- (-2) The orthocenter is the intersection of the altitudes of a triangle
- (7) The centroid is the intersection of the medians of a triangle
- (10) Euler's line is made up of the orthocenter, circumcenter, and the incenter

After performing these operations, what is x ?

QUESTION 10

A cylinder with radius 3 and height $\frac{9}{4}$ is inscribed in a cone with radius 8.

A = the volume of cylinder

B = the height of the cone

C = the volume of the cone

Find $\frac{AC}{B}$.

QUESTION 11

Siddarth is obsessed with the song Bang by Griana Arande. Jeewoo, unfortunately, has bad music taste and likes All the Single Men by Jeyonce. The song Bang by Griana Arande is 3 minutes long. All the Single Men by Jeyonce is also 3 minutes long. If Siddarth starts to listen to the song randomly at a time between 12:00 pm and 12:30 pm and if Jenny listens to All the Single Men by Jeyonce randomly between 12:00 and 12:30 p.m., what is the probability that their songs are both playing at a given time between 12:00 to 12:30 p.m.

QUESTION 12

A = the number of sides of an undecagon

B = the number of faces of a hexahedron

C = the number of vertices of a figure with 12 edges and 8 faces

D = the number of space diagonals in a dodecahedron

Find $(A+D) - (B+C)$

QUESTION 13

$$A = \sin 60^\circ$$

$$B = \sin 30^\circ$$

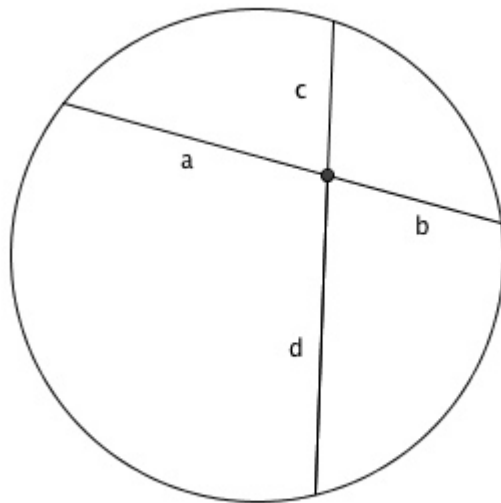
$$C = \cos 45^\circ$$

$$D = \tan 60^\circ$$

Find ABCD.

QUESTION 14

(The figure is not drawn to scale.)



The lengths of a and b are 6 and 4, respectively. How many possible combinations of (c, d) exist if c and d are integer lengths?