

ALPHA DIVISION SCHOOL TEAM: QUESTION 1

Let a = the degree of the polynomial $2x^5yz - 2^2xy^5z^2 + 2^3x^2y^2z^2$

Let $b = \log_2 (1/64)$

Let c = the radius of the circle given by $2x^2+2y^2+16x-8y-10=0$.

Let d = the number of feet in a mile.

Find the value of $a + b + c + d$.

ALPHA DIVISION SCHOOL TEAM: QUESTION 2

Let a = the length of the major axis of the ellipse whose equation is $49x^2 + 36y^2 = 1764$.

Let $b = |12 - 5i|$

Let $c = (1 + \sqrt{3}i)^6$

Let d = the number of degrees in each exterior angle of a regular decagon.

Find the value of $c - d + a - b$.

ALPHA DIVISION SCHOOL TEAM: QUESTION 3

Consider the sample space of drawing cards from a standard fifty-two card deck without replacement.

Let $a = P(\text{first card drawn is a face card})$.

Let $b = P(\text{first card drawn is an Ace or a spade})$.

Let $c = P(\text{second card is black})$.

Let $d = P(\text{eighteenth card drawn is an ace})$.

Find the value of $\frac{a}{b} + \frac{c}{d}$.

ALPHA DIVISION SCHOOL TEAM: QUESTION 4

Simplify as one integer:

$$32 - 15(16) + 40(2)(9) - 40(3^3) + 5(2)(81) - 3^5$$

ALPHA DIVISION SCHOOL TEAM: QUESTION 5

Given: \vec{AC} , \vec{AF} and \vec{BE} are tangent to circle O. Point D lies on \vec{OA} .

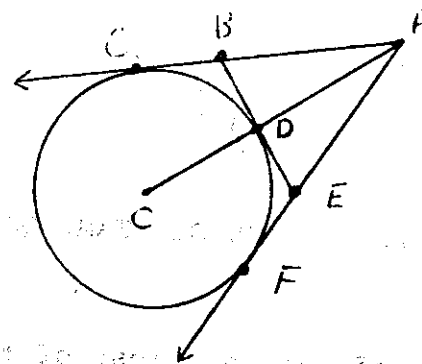
$AC=6$; $AD=4$.

Let $w = \text{length of } AE$.

Let $x = \text{length of } AB$.

Let $y = \text{length of } BE$.

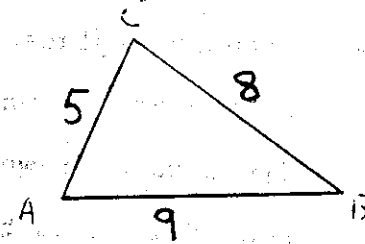
Let $z = \text{length of } OD$.



Find the value of $z(w + x + y)$.

ALPHA DIVISION SCHOOL TEAM: QUESTION 6

Let x = the length of the altitude to AB.
Let y = the length of the altitude to BC.
Let z = the length of the altitude to AC.



Find the value of $x + y + z$.

ALPHA DIVISION SCHOOL TEAM: QUESTION 7

Given the equation $2x^3 - 10x^2 + 15x + 9 = 0$, find the sum of the reciprocals of the roots.

ALPHA DIVISION SCHOOL TEAM: QUESTION 8

Evaluate: $(1 - \sqrt{3}i)^8$

ALPHA DIVISION SCHOOL TEAM: QUESTION 9

The area of the innermost of two concentric circles is one-eighth the area between the circles. What is the ratio of the circumference of the inner circle to the circumference of the outer circle?

ALPHA DIVISION SCHOOL TEAM: QUESTION 10

Let (h,k) be the center of the circle given by

$$x^2 + y^2 - 4x - 2y - 31 = 0.$$

Let (a,b) be the vertex of the parabola given by $y = 2x^2 - 4x + 5$.

Find the value of $h + k + a + b$.

ALPHA DIVISION SCHOOL TEAM: QUESTION 11

In triangle ABC $a = 3\sqrt{3}$, $b = 3\sqrt{3}$, and $c = 2\sqrt{3}$.

Circle O is inscribed in triangle ABC.

Circle P is circumscribed about triangle ABC.

Find the ratio of the area of circle O to the area of circle P.

ALPHA DIVISION SCHOOL TEAM: QUESTION 12

Given regular octagon ABCDEFGH with side 2, find the area of quadrilateral ADEF.

