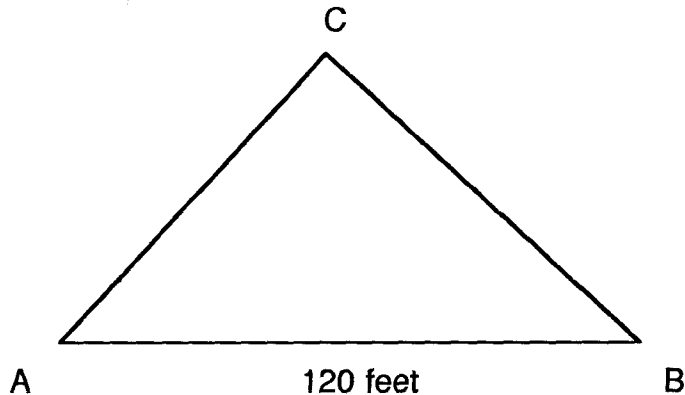


Question 1
Alpha Bowl
Mu Alpha Theta State Convention 2003

Given $f(x - 2) = x^2 - 4x - 5$ and $g\left(\frac{1}{3x}\right) = \frac{1}{x^2}$, express $f[g(x)]$ in factored form.

Question 2
Alpha Bowl
Mu Alpha Theta State Convention 2003

Two markers, A and B, are on the same side of a river (as shown) and are 120 feet apart. A hiker on the other side of the river is located at point C. It is determined that the measure of angle $BAC = 61^\circ$ and that the measure of angle $ABC = 72^\circ$. Determine the shortest width of the river from point C directly across to a point between A and B expressed to the nearest foot.



Question 3
Alpha Bowl
Mu Alpha Theta State Convention 2003

If a and b are the roots of $4x^2 - x + 4 = 0$, compute $a^3b + ab^3$.

Question 4
Alpha Bowl
Mu Alpha Theta State Convention 2003

A line that goes through points $(-5,2)$ and $(4,8)$ goes through another line that goes through $(1,-2)$ and $(10,12)$. Find the measure of the obtuse angle formed by these intersecting lines to the nearest second.

Question 5

Question 5
Alpha Bowl
Mu Alpha Theta State Convention 2003

Given A = the area of $2x^2 - 8x + 2y^2 - 3 = 0$

B = the area of $x^2 + 6x + 3y^2 - 6y + 3 = 0$

C = distance from intersection of asymptotes to one foci of $x^2 - 4y^2 + 8y - 8 = 0$

Find $\frac{B}{A} - C$

Question 6
Alpha Bowl
Mu Alpha Theta State Convention 2003

When the polynomial $f(x)$ is divided by $(x - 2)$, the quotient is $2x^2 + 5x - 8$ and the remainder is -25 . Express $f(x)$ in factored form.

Question 7
Alpha Bowl
Mu Alpha Theta State Convention 2003

Given triangle ABC with $AC = 12$, $BC = 9.1$, and the measure of angle $A = 35^\circ$ find the sum of all possible lengths for side AB to the nearest integer.

Question 8
Alpha Bowl
Mu Alpha Theta State Convention 2003

Given a and b are the real roots of $e^{2x} = 10e^x - 16$. Express $a + b$ as $\ln x$. Find x .

Question 9
Alpha Bowl
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In a trapezoid, the lengths of the bases are 4 and 14 and the lower base angles are

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Solve for all real values of x :
$$\begin{vmatrix} x & 3 & 4 \\ 9 & x & 3 \\ 1 & x & x \end{vmatrix} = 24.$$

Question 12
Alpha Bowl
Mu Alpha Theta State Convention 2003

What is the product of the first 10 terms of a geometric sequence (common ratio > 0) in which the first term is 1 and 10th term is 2?

Question 13
Alpha Bowl
Mu Alpha Theta State Convention 2003

If

- A= the sum of the first 50 cubes greater than zero
- B= the sum of the first 50 squares greater than zero
- C= the sum of the first 50 natural numbers
- D= the sum of the first 50 even numbers greater than zero
- E= the sum of the first 50 odd numbers greater than zero

Find $C-E-D+A-B$

Question 14
Alpha Bowl
Mu Alpha Theta State Convention 2003

If $(1 + i\sqrt{3})^5 = a \text{ cis } b$ ($0 \leq b < 2\pi$) find ab .

Question 15
Alpha Bowl
Mu Alpha Theta State Convention 2003

Given rectangular prism ABCDEFGH with $AB = 6$, $BC = 4$, and $CG = 3$, find $m\angle AGC + m\angle BFH$ to the nearest degree.

