

Question #0 - Calculus Seat - 2025 MAO Nationals Convention Relay

Get ready for a Musical Adventure! The number of songs Mauithedog10 \oplus listens to over time can be modeled by $f(x) = \frac{1}{B}x^2 + 1$. Let C be the area in the first quadrant between y = f(x) and x = 1.

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| Charli XCX is going Vroom Vroom in her car | which has a displacement | t given by $x(t) = \cos(t^B e^t)$. Let C | Z |
|--|--------------------------|---|---|
| be the velocity of the car when $t = 1$. | | | |

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Question #2 – Calculus Seat – 2025 MAO Nationals Convention Relay

Take The Eagles to the limit! Let

$$C = \lim_{x \to \infty} \left(\sqrt{x^2 + Bx} - \sqrt{x^2 - x} \right)$$

Question #2 – Calculus Seat – 2025 MAO Nationals Convention Relay

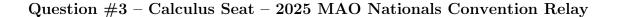
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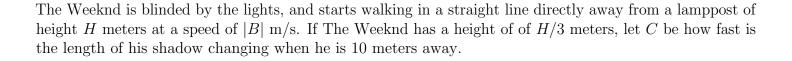
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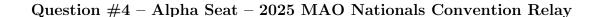


Question #3 – Calculus Seat – 2025 MAO Nationals Convention Relay

The Weeknd is blinded by the lights, and starts walking in a straight line directly away from a lamppost of height H meters at a speed of |B| m/s. If The Weeknd has a height of H/3 meters, let C be how fast is the length of his shadow changing when he is 10 meters away.

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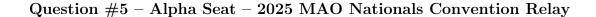
Bruno Mars needs to study angles at the APT if he wants to get good at astronomy. Given triangle ΔPQR with $\overline{PQ} = \overline{QR} = B$ and $\angle Q = \frac{\pi}{4} + \frac{\pi}{3}$, let $C = (\overline{PR})^2$. Note C is the square of the side length.

Question #4 – Alpha Seat – 2025 MAO Nationals Convention Relay

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Not all questions can be music themed, and not all areas can be found without knowing linear algebra. A convex region in the xy-plane with positive area k is redrawn so that every point (x, y) now has the coordinate (3kx - y, Bx + 2y). This new region has area B^2 . Let C = k.

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Question #6 – Alpha Seat – 2025 MAO Nationals Convention Relay

ABBA is trying to train their angle eyes by practicing their trigonometry. They are interested in finding the maximum value of

$$B\sqrt{3}\sin(\theta) + 2\cos(\theta + \pi/3)$$

Let C be the square of this maximum value.

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Question #7 - Theta Seat - 2025 MAO Nationals Convention Relay

Not all questions can be music themed, and not all roots can be found without useful tricks. Let $B = n\pi + m$ for integers n, m. If p, q are the complex roots to the polynomial $nx^2 + mx + 1$, then let

$$C = \frac{1}{p-1} + \frac{1}{q-1}$$

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The members of Magdelena Bay are Killing Time waiting for each other to arrive. Let $T = |\ln(B)|$. Two band members are going to a meeting that begins at 9 AM. One person will arrive anywhere from 9 AM to (T+1/2) hours after 9 AM, while the other person will arrive anywhere from **9:15 AM** to T hours after **9:15 AM**. Assume both people arrive at a random time uniformly on their respective intervals and are independent of each other. Let T be the probability that the two arrive within 15 minutes of each other.

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The 1975 are done learning About You and moving on to Somebody Else. Matty is standing at (24, B) and must get to (x, 20), where x > 24, while stopping along the line y = 1 along the way. They travel a distance D doing so. If $D^2 = 12025$, let C be the maximum value of x.

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