Question #0 – Alpha Seat – 2025 MAO Nationals Convention Relay

---

Get ready for a Musical Adventure! The number of songs Mauithedog10 listens to over time can be modeled by $f(x) = Ax$. If θ is the angle $f(x)$ makes with the positive x-axis, let B be the value of $\cos\theta$.

Question #0 – Alpha Seat – 2025 MAO Nationals Convention Relay

---

Get ready for a Musical Adventure! The number of songs Mauithedog10 listens to over time can be modeled by $f(x) = Ax$. If θ is the angle $f(x)$ makes with the positive x-axis, let B be the value of $\cos\theta$.

Question #0 – Alpha Seat – 2025 MAO Nationals Convention Relay

---

Get ready for a Musical Adventure! The number of songs Mauithedog10 listens to over time can be modeled by $f(x) = Ax$. If θ is the angle $f(x)$ makes with the positive x-axis, let B be the value of $\cos\theta$.

Question #1 – Alpha Seat – 2025 MAO Nationals Convention Relay

---

A vinyl record spins θ radians. If $\tan\theta = \frac{A}{60}$, let

$$B = \frac{1+\cos^2\theta}{1-\sin^2\theta}$$

Question #1 – Alpha Seat – 2025 MAO Nationals Convention Relay

---

A vinyl record spins θ radians. If $\tan\theta = \frac{A}{60}$, let

$$B = \frac{1+\cos^2\theta}{1-\sin^2\theta}$$

Question #1 – Alpha Seat – 2025 MAO Nationals Convention Relay

---

A vinyl record spins θ radians. If $\tan\theta = \frac{A}{60}$, let

$$B = \frac{1+\cos^2\theta}{1-\sin^2\theta}$$

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

---

The Beatles are pointing on their album cover according to two vectors, given by $\vec{v}(t) = \hat{i} + \hat{j}$ and $\hat{u}(t) = (A+1)\hat{i} - A\hat{j}$. Let B be the tangent of the smaller angle between $\vec{v}(t)$ and $\vec{u}(t)$.

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

---

The Beatles are pointing on their album cover according to two vectors, given by $\vec{v}(t) = \hat{i} + \hat{j}$ and $\hat{u}(t) = (A+1)\hat{i} - A\hat{j}$. Let B be the tangent of the smaller angle between $\vec{v}(t)$ and $\vec{u}(t)$.

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

---

The Beatles are pointing on their album cover according to two vectors, given by $\vec{v}(t) = \hat{i} + \hat{j}$ and $\hat{u}(t) = (A+1)\hat{i} - A\hat{j}$. Let B be the tangent of the smaller angle between $\vec{v}(t)$ and $\vec{u}(t)$.

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

---

Harry Styles draws a Fine Line that can be written as $\vec{r}(t) = \vec{r_0} + \vec{v}t$. This line is parallel to both $(A^2)x + (\sqrt{3})y + (A\sqrt{3})z = 10$ and $(A^2\sqrt{3})x + 2y - Az = 15$. If the z-coordinate of $\vec{v}$ is 1, let B be the x-coordinate of $\vec{v}$.

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

---

Harry Styles draws a Fine Line that can be written as $\vec{r}(t) = \vec{r_0} + \vec{v}t$. This line is parallel to both $(A^2)x + (\sqrt{3})y + (A\sqrt{3})z = 10$ and $(A^2\sqrt{3})x + 2y - Az = 15$. If the z-coordinate of $\vec{v}$ is 1, let B be the x-coordinate of $\vec{v}$.

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

---

Harry Styles draws a Fine Line that can be written as $\vec{r}(t) = \vec{r_0} + \vec{v}t$. This line is parallel to both $(A^2)x + (\sqrt{3})y + (A\sqrt{3})z = 10$ and $(A^2\sqrt{3})x + 2y - Az = 15$. If the z-coordinate of $\vec{v}$ is 1, let B be the x-coordinate of $\vec{v}$.

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

---

After wrapping up on set, Dylan is Calling After Me to solve the following determinant:

$$B = \begin{vmatrix} A & -3 & -A \\ -5 & -A & -3 \\ -2 & 3A & 2 \end{vmatrix}$$

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

---

After wrapping up on set, Dylan is Calling After Me to solve the following determinant:

$$B = \begin{vmatrix} A & -3 & -A \\ -5 & -A & -3 \\ -2 & 3A & 2 \end{vmatrix}$$

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

---

After wrapping up on set, Dylan is Calling After Me to solve the following determinant:

$$B = \begin{vmatrix} A & -3 & -A \\ -5 & -A & -3 \\ -2 & 3A & 2 \end{vmatrix}$$

Question #5 – Theta Seat – 2025 MAO Nationals Convention Relay

---

In her study of Supernovas and orbits, Chappell Roan considers the following conic:

$$9x^2 + 4y^2 - 18x + 8y + 13 - 36A^2 = 0$$

A quadrilateral is formed so that the diagonals of the quadrilateral are the axes of the conic. Let B be the area of this quadrilateral.

Question #5 – Theta Seat – 2025 MAO Nationals Convention Relay

---

In her study of Supernovas and orbits, Chappell Roan considers the following conic:

$$9x^2 + 4y^2 - 18x + 8y + 13 - 36A^2 = 0$$

A quadrilateral is formed so that the diagonals of the quadrilateral are the axes of the conic. Let B be the area of this quadrilateral.

Question #5 – Theta Seat – 2025 MAO Nationals Convention Relay

---

In her study of Supernovas and orbits, Chappell Roan considers the following conic:

$$9x^2 + 4y^2 - 18x + 8y + 13 - 36A^2 = 0$$

A quadrilateral is formed so that the diagonals of the quadrilateral are the axes of the conic. Let B be the area of this quadrilateral.

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

---

Rather than undefined, Natasha Bedingfield prefers the term *Unwritten*. If

$$f(x) = \frac{3Ax + 1}{2x - 5}$$

Let B be the value of x **not** in the domain of $f^{-1}(x)$.

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

---

Rather than undefined, Natasha Bedingfield prefers the term *Unwritten*. If

$$f(x) = \frac{3Ax + 1}{2x - 5}$$

Let B be the value of x **not** in the domain of $f^{-1}(x)$.

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

---

Rather than undefined, Natasha Bedingfield prefers the term *Unwritten*. If

$$f(x) = \frac{3Ax + 1}{2x - 5}$$

Let B be the value of x **not** in the domain of $f^{-1}(x)$.

Question #7 – Calculus Seat – 2025 MAO Nationals Convention Relay

---

In an argument to settle who was the ultimate Pop Girl of the 2024 Summer, Dr. Santos gives Mr. Snampal the following differential equation: Let $y(x)$ be a function defined on the positive real numbers such that for all $x > 0$,

$$\left(\frac{y'}{x^2} - \frac{2y}{x^3}\right) = \frac{1}{x^2+1}$$

Given that $y(1) = A + \pi/4$, let $B = y(\sqrt{3})$.

Question #7 – Calculus Seat – 2025 MAO Nationals Convention Relay

---

In an argument to settle who was the ultimate Pop Girl of the 2024 Summer, Dr. Santos gives Mr. Snampal the following differential equation: Let $y(x)$ be a function defined on the positive real numbers such that for all $x > 0$,

$$\left(\frac{y'}{x^2} - \frac{2y}{x^3}\right) = \frac{1}{x^2+1}$$

Given that $y(1) = A + \pi/4$, let $B = y(\sqrt{3})$.

Question #7 – Calculus Seat – 2025 MAO Nationals Convention Relay

---

In an argument to settle who was the ultimate Pop Girl of the 2024 Summer, Dr. Santos gives Mr. Snampal the following differential equation: Let $y(x)$ be a function defined on the positive real numbers such that for all $x > 0$,

$$\left(\frac{y'}{x^2} - \frac{2y}{x^3}\right) = \frac{1}{x^2+1}$$

Given that $y(1) = A + \pi/4$, let $B = y(\sqrt{3})$.

Question #8 – Calculus Seat – 2025 MAO Nationals Convention Relay

---

Taylor Swift can do anything with a Broken Heart. After thinking she was the problem (it's me), she solves the following calculus problem: Let

$$B = \lim_{x \to 0} \left(e^{Ax^2} \right)^{\left(\left(\int_0^x e^{-t^2} \sin(t)\, dt \right)^{-1} \right)}$$

Question #8 – Calculus Seat – 2025 MAO Nationals Convention Relay

---

Taylor Swift can do anything with a Broken Heart. After thinking she was the problem (it's me), she solves the following calculus problem: Let

$$B = \lim_{x \to 0} \left(e^{Ax^2} \right)^{\left(\left(\int_0^x e^{-t^2} \sin(t)\, dt \right)^{-1} \right)}$$

Question #8 – Calculus Seat – 2025 MAO Nationals Convention Relay

---

Taylor Swift can do anything with a Broken Heart. After thinking she was the problem (it's me), she solves the following calculus problem: Let

$$B = \lim_{x \to 0} \left(e^{Ax^2} \right)^{\left(\left(\int_0^x e^{-t^2} \sin(t)\, dt \right)^{-1} \right)}$$

Question #9 – Calculus Seat – 2025 MAO Nationals Convention Relay

---

The 1975 would Love It If We Made It optimal. If they wanted a cone with surface area $2A$, let $B = \pi V^2$, where V is the maximum volume that such a cone could have.

Question #9 – Calculus Seat – 2025 MAO Nationals Convention Relay

---

The 1975 would Love It If We Made It optimal. If they wanted a cone with surface area $2A$, let $B = \pi V^2$, where V is the maximum volume that such a cone could have.

Question #9 – Calculus Seat – 2025 MAO Nationals Convention Relay

---

The 1975 would Love It If We Made It optimal. If they wanted a cone with surface area $2A$, let $B = \pi V^2$, where V is the maximum volume that such a cone could have.