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All answers on this relay are integers.

1. Find the y -coordinate of the vertex of the parabola with equation $y = 2x^2 - 3x - \frac{31}{8}$.
2. Let $T = \text{TAFTPQ}$. Find the absolute value of the complex number $(T + 12i)^2$.
3. Let $T = \text{TAFTPQ}$. Find the least positive integer M such that $(\sqrt{M} + \sqrt{T-1})^2$ is an integer.
4. Let $T = \text{TAFTPQ}$. Let $g(x)$ be the remainder polynomial when $x^3 - 12x^2 + Tx - 64$ is divided by $x^2 + x - 5$. Find the value of $g(3)$.
5. Let $T = \text{TAFTPQ}$. Find the sum of the positive integral factors of T .
6. Let $T = \text{TAFTPQ}$. Find the value of z for the solution to the system
$$\begin{cases} 4x - 3y + z = 5 \\ x + 4y + 2z = 33 \\ 5x + y + z = T \end{cases}$$

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1. Henry and James are throwing a party. They decide to buy 72 sandwiches, each of which costs \$3.79. If they pay with the least whole amount of dollars possible to cover the total amount of purchasing the sandwiches, how many cents make up the change they received in return for payment?
2. Let $T = \text{TAFTPQ}$. An arithmetic sequence consisting solely of integers has first term T and last term 395. If the sequence contains more than two terms, find the 75th term of the sequence.
3. Let $T = \text{TAFTPQ}$. Find the least possible integer n such that $\frac{n \cdot T^2}{1000} > 2026$.
4. Let $T = \text{TAFTPQ}$. Find the sum of the digits of T^2 .
5. Let $T = \text{TAFTPQ}$. Consider a circle with equation $(x + 2)^2 + (y - 3)^2 = T$. Among all the distances from a point on this circle to the point $(-2026, 2026)$, find the positive difference between the maximum and minimum distances.
6. Let $T = \text{TAFTPQ}$. A bag contains T total marbles, some of which are orange while the rest are blue. When drawing two marbles from the bag, the probability that both marbles are orange is $\frac{1}{3}$. How many blue marbles are in the bag?

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1. If the hole in the graph of $y = \frac{x^2 - 8x - 20}{x^2 + 6x + 8}$ is at the point (a, b) , find the value of $a + b$.
2. Let $T = \text{TAFTPQ}$. The least possible positive radian value solution to the equation $\cos(Tx) = -\frac{\sqrt{3}}{2}$ can be written in the form $\frac{M\pi}{N}$, where M and N are relatively prime positive integers. Find the value of $M + N$.
3. Let $T = \text{TAFTPQ}$. The point in Quadrant III with Cartesian coordinates $(C, -45)$ can be written with polar coordinates as (T, θ) . Find the value of C .
4. Let $T = \text{TAFTPQ}$. A hyperbola has eccentricity $\frac{25}{7}$, and its vertices are at the points $\left(2 \pm \frac{T}{20}, 0\right)$. Find the distance from the center of the hyperbola to either of its foci.
5. Let $T = \text{TAFTPQ}$. In the expansion of $(Tx^2 + Tx - 2)^T$, find the coefficient of x^3 .
6. Let $T = \text{TAFTPQ}$. Find the remainder when T is divided by 57.

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1. \$10,000 is deposited in an account earning interest at an annual rate of 4%, compounded semi-annually. Find the amount of money, in dollars, in the account at the end of one year.

2. Let $T = \text{TAFTPQ}$. If S is the sum of the digits of T , find the value of $\frac{T}{S}$.

3. Let $T = \text{TAFTPQ}$. If $\ln T = A \ln B + C \ln D$, where A , B , C , and D are positive integers, and B and D are prime, find the value of $A + B + C + D$.

4. Let $T = \text{TAFTPQ}$. Vector $\vec{v} = \langle P, Q, 3 \rangle$, where P and Q are integers, satisfies the equation $\|\vec{v}\| = T$. Find the greatest possible value of the product PQ .

5. Let $T = \text{TAFTPQ}$. Evaluate: $\lim_{x \rightarrow 12} \left(\frac{x^2 + 9x - T}{x^2 - 21x + 108} \right)$

6. Let $T = \text{TAFTPQ}$. One line has parametric equations $x = 3 - 5r$ and $y = 10 + r$, while a second line has parametric equations $x = 6s$ and $y = -9 - Ts$, where r and s are parameters. If (F, G) are the Cartesian coordinates for the intersection of these two lines, find the value of $F + G$.

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1. Find the determinant of the matrix $\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$.

2. Let $T = \text{TAFTPQ}$. How many positive perfect squares less than 10,000 have units digit equal to T ?

3. Let $T = \text{TAFTPQ}$. If the function $f(x) = -2x^3 + (2T - 1)x^2 + 595x + 1$ has distinct complex

roots a , b , and c , find the value of $\frac{\frac{1}{a} + \frac{1}{b} + \frac{1}{c}}{\frac{1}{ab} + \frac{1}{ac} + \frac{1}{bc}}$.

4. Let $T = \text{TAFTPQ}$. If S is the sum of the real solutions to the equation $-4^x + 2^{x+6} - 1050 = T$, find $\lceil S \rceil$, the least integer greater than or equal to S .

5. Let $T = \text{TAFTPQ}$. Find the greatest value of $\binom{T+2}{n}$, where n is some integer satisfying $0 \leq n \leq T+2$.

6. Let $T = \text{TAFTPQ}$. For the logistic growth function with equation $y = \frac{T}{1 + 20e^{-0.064x}}$, at what value of y is the rate of growth of the function the largest?