

ALGEBRA ONE TEAM ROUND
2000
JANUARY REGIONAL COMPETITION

TEAM QUESTION ONE

Two sides of a right triangle are 6 and 12. Find the product of the two possibilities for the third side to the nearest thousandths.

TEAM QUESTION TWO

Point $A = (2, -5)$ and point $B = (-6, 7)$

Let $D =$ the distance from A to B

Let $X =$ the X coordinate of the midpoint of \overline{AB}

Let $Y =$ the Y coordinate of the point $\frac{3}{4}$ of the way from A to B

Find $D - XY$, rounded to the nearest thousandth.

TEAM QUESTION THREE

Find the slope of the line that contains the vertices of the following two graphs :

$$Y = |X - 4| + 7 \quad \text{and} \quad Y = -|3X - 1| - \frac{3}{2}$$

TEAM QUESTION FOUR

Given $f(X) = (1 + \frac{1}{X})^X$ find $\frac{f(10) + f(100) + f(1000)}{3}$. Give answer to 5

significant digits.

TEAM QUESTION FIVE

Find the absolute value of the difference between the minimum value of $Y = X^2 - 5X + 6$ and the maximum value of $Y = -2X^2 - 6X - 8$.

TEAM QUESTION SIX

Find the point of intersection of the lines $2X + 3Y = 6$ and $3X + 4Y = 12$, and find the point of intersection of the lines $3X - Y = 7$ and $X + Y = 1$. Find the sum of the product of the two X -coordinates and the product of the two Y -coordinates.

TEAM QUESTION SEVEN

Evaluate $X^4 + 4X^3Y + 6X^2Y^2 + 4XY^3 + Y^4$ for $X = 4$ and $Y = -1$

TEAM QUESTION EIGHT

A business man needs to be at a 12:00 appointment which is 6 miles from his office. Not wanting to be late he decides to leave at 10:00; however, his car will not start. He tinkers with his engine for $\frac{2}{5}$ of an hour, and spends the next 0.3 of an hour trying to find a ride. Finally he decides to go on foot. He can walk a mile in 20 minutes and jog a mile in 10 minutes. What is the greatest number of miles he can walk and still get to his meeting at 12:00?

TEAM QUESTION NINE

Find the **SUM** of the range, mean, median, and mode of the following set of data:
{5,6,7,8,9,5,6,7,8,6,7,8,6,7,8,7,8,7,7,7}.

$$\text{Let } \frac{A}{B} = 0.126$$

$$\text{Let } \frac{C}{D} = 0.\overline{126}$$

$$\text{Let } \frac{E}{F} = 0.\overline{126}$$

$$\text{Let } \frac{G}{H} = 0.\overline{126}$$

where $\frac{A}{B}$, $\frac{C}{D}$, $\frac{E}{F}$, and $\frac{G}{H}$ are all simplified fractions.

Find $A + B + C + D + E + F + H + G$

TEAM QUESTION ELEVEN

A car depreciates in value 25% the first year after it is purchased, 20% the second, 15% the third, and 10% every year thereafter. In what year will a 2000 model car be worth less than 20% of its original selling price?

TEAM QUESTION TWELVE

Let P = the 15th digit in the decimal expansion of $\frac{1}{7}$

Q = the 15th digit of the decimal expansion of $\frac{1}{13}$

R = the unit digit of 13^{50}

Find PQR

TEAM QUESTION THIRTEEN

A high school senior needs to save \$1500 for college. She decides to save 1 cent the 1st day, 3 cents the 2nd day, 5 cents the 3rd day and so forth for an entire 365 day year. By how much will she fall short of her goal?

TEAM QUESTION FOURTEEN

Simplify $(10X^3Y^{-2})^3(8XY^{-3})^{-2}$

TEAM QUESTION FIFTEEN

Multiply $(\sqrt{6} + 3)(\sqrt{8} - 5)(\sqrt{6} - 3)(\sqrt{8} + 5)$