

ALGEBRA ONE TEAM ROUND

2000

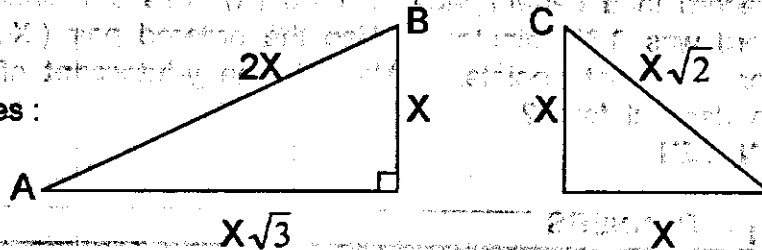
MARCH REGIONAL COMPETITION

TEAM QUESTION ONE

Multiply / Divide / Simplify
$$\frac{A^4 - 81B^4}{A^2C - 6ABC + 9B^2C} \cdot \frac{A+3B}{A^2+9B^2} \cdot \frac{A^2+6AB+9B^2}{(A-3B)^2}$$

TEAM QUESTION TWO

Given the two triangles:



$M = \sin \angle A + \cos \angle B + \tan \angle C$
What is the exact value of M ?

TEAM QUESTION THREE

Five Cars in a race all finish within 8 seconds of each other. Car 1 finished 1 second ahead of Car 4, and Car 4 was not last. Car 2 finished 6 seconds before Car 5. Car 5 finished 3 seconds behind Car 1. Car 1 finished 5 seconds behind Car 3. In what order did the Cars finish?

TEAM QUESTION FOUR

Given the equation $4X - 5Y = 10$. State the **PRODUCT** of the slope of the line perpendicular to this equation and the slope of the given equation and the y-intercept of the given equation.

TEAM QUESTION FIVE

Solve the systems:
$$\begin{cases} 3X - 5Y = 1 \\ 2X + 7Y = -1 \end{cases} \quad \text{AND} \quad \begin{cases} 4M - 3N = -7 \\ 5M - N = 2 \end{cases}$$

What is the **SUM** of the denominators of the X -coordinate and M -coordinate solutions?

TEAM QUESTION SIX

Start with the equation $AX^2 + BX + C = 0$ and perform the following steps:

- Step 1. Subtract C from both sides of the equation.
- Step 2. Multiply both sides of the equation by $4A$.
- Step 3. Add B^2 to both sides of the equation.
- Step 4. Factor the perfect square trinomial on the left side of the equation.
- Step 5. Solve for X by using the square root property.

The result has a special name. What is it?

TEAM QUESTION SEVEN

Find the determinants in order to solve the following for X:

$$\begin{vmatrix} -4 & 7 \\ 5 & -2 \end{vmatrix} + \begin{vmatrix} 5 & -2 \\ -4 & 7 \end{vmatrix} + \begin{vmatrix} 3 & X \\ -2 & 2 \end{vmatrix} = \begin{vmatrix} -X & 6 \\ -3 & 2 \end{vmatrix}$$

TEAM QUESTION EIGHT

State the product of the first three prime numbers times the first two perfect numbers times the first three whole numbers.

TEAM QUESTION NINE

A school record in a certain race in 1960 (X) was 3.8 minutes (Y). In 1980 the school record was 3.65 minutes. Use the ordered pair (X, Y) to find a linear equation for these data points. What is the y-intercept of the graph of this equation in decimal form?

TEAM QUESTION TEN

		RUNNERS					
		A	B	C	D	E	F
TIMES	↓						
Slowest		5:01	4:50	4:43	4:40	4:47	4:50
Fastest		4:48	4:42	4:34	4:33	4:39	4:41

Assume that each runner's time is within his time interval.

1. Is it possible for A to beat B?
2. Is it possible for F to beat D?
3. Is it possible for B, A, and E to finish 1st, 2nd, 3rd respectively?
4. Is it possible for C to win?

Write your four YES and/or NO answers in the order the questions were asked?

TEAM QUESTION ELEVEN

Choose the correct reason (Letter) to complete this proof. Arrange the letters in the order 1, 3, 5, 6, 8 when you write them on your answer sheet to be turned in.

Prove: For any number N, $-1 \cdot N = -N$

Statement	Reason
1 $-1 \cdot N = -1 \cdot N + 0$	1 ?
2 $= -1 \cdot N + [N + (-N)]$	2 Additive Inverse Property
3 $= (-1 \cdot N + N) + (-N)$	3 ?
4 $= -1 \cdot N + 1 \cdot N + (-N)$	4 Multiplicative Identity property
5 $= (-1 + 1)N + (-N)$	5 ?
6 $= 0 \cdot N + (-1N)$	6 ?
7 $= 0 + (-N)$	7 Multiplication Property of Zero
8 $= -N$	8 ?
9 $-1 \cdot N = -N$	9 Transitive Property of Equality

A) Additive Identity Property
 B) Additive Inverse Property
 C) Commutative Property of Addition
 D) Associative Property of Addition
 E) Distributive Property of Multiplication over Addition

TEAM QUESTION TWELVE

State the value of the **Discriminant** of the equation $7X^2 - 15X + 5 = 0$.

TEAM QUESTION THIRTEEN

Multiply $(2X^2 - 3X + 6)(3X^2 - 2X - 3)(X^2 + 4X - 3)$

What is the **SUM** of the coefficients of the third (3rd) and fourth (4th) degree terms?

TEAM QUESTION FOURTEEN

Simplify:

$$1 + \frac{X}{Y - X}$$

$$\frac{X}{X + Y} - 1$$

TEAM QUESTION FIFTEEN

A total of 190 boxes are stacked following the pattern shown below.



1 on the bottom row



2 on the bottom row



3 on the bottom row

How many boxes are on the bottom row of a stack of 190 boxes?