TEAM MATH ATTACK CONTEST
PART B

Saturday December 7th, 2019

Time: 30 minutes

Calculators are NOT allowed. Students are not allowed to leave the room during testing time.

Instructions

1. Do not open the contest paper until you are told to do so.
2. You may use rulers, compasses, protractors, and graph paper for rough work, but all problems can be solved without additional aid.
3. Write your team name, member names, and all corresponding schools at the top of the response sheet. Print clearly. When you are finished, submit the exam booklet with your answer sheet attached or tucked inside.
4. A box to place your answer follows each question on the response sheet. To receive full marks, you must simply write your answer in the appropriate blank space. Use exact values (i.e. $\sqrt{3}$, or $\pi + 2$ etc.) or rounded answers to the thousandths decimal place (i.e. 324.237).
5. Each correct answer in Part 1 is worth 1 point. Each correct answer in Part 2 is worth 2 points. Each correct answer in Part 3 is worth 3 points. There is no penalty for an incorrect answer. Partial marks will not be awarded.
6. When your supervisor tells you to begin, you will have 30 minutes of working time.

Good luck and have fun!

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Easy

Problem 1

Find x given the equation:

$$4x + 3 = 3(x + 3)$$

Problem 2

Josh can run down an 100m track in 12 seconds. Jack can run down a 250m track in 32 seconds. Assuming they can both run at constant speed, who is running faster?

Problem 3

Two numbers differ by 5 and their sum is 37. What is the larger number of the two?

Problem 4

Consider an isosceles triangle with vertices $\triangle ROY$, where $RY = RO = 5$. If $OY = 6$, find the area of $\triangle ROY$.

Problem 5

Find the set of positive integers (x, y) such that

$$4x + 7y = 23$$

Medium

Problem 6

Candrew is at a restaurant with his friend Arlson. There are 4 dishes at this restaurant: salad, steak, soup, and cookies. Arlson will to try exactly one of each dish, while Candrew only eats salad. Each dish costs 15$. Without tax or tip, they pay a total of 105$. How many orders of salad does Candrew get?

Problem 7

In a bag full of balls, each ball is a single colour. It is known that $\frac{1}{4}$ of these balls are green, $\frac{1}{8}$ are blue, $\frac{1}{12}$ are yellow and the remaining 13 are white. How many balls are blue?

Problem 8

Find the area of a triangle with the following side lengths: (13,14,15)

Problem 9

Alex, Andrew, Oliver, Alice, and Bob are in a chess tournament. Every win is worth 1 point, every draw is worth 0.5 points, and every loss is worth 0 points. They play a round-robin tournament, where every player plays every other player exactly once. After they have played all their games, Alex has 2 points, Andrew has 0.5 points, Oliver has 3 points, and Alice has 1.5 points. How many points does Bob have?

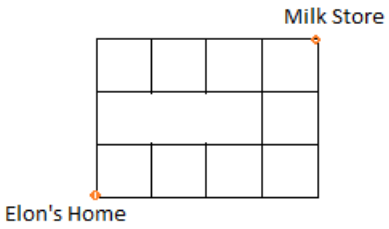
Problem 10

Alice just heard about a deal at a nearby convenience store. The poster tells her that if she buys a Slushy for $2.40 using a gift card, the store will then double the money left on the card! Alice thinks this is a fantastic deal. She buys a Slushy, and the money on her card doubles! She buys another... and another... and then realizes that she has no more money left on the gift card. How much money did Alice start with on her gift card?

Hard

Problem 11

Elon is at home and wants to buy milk from the store. How many ways can he do so by following the gridlines if he can only move up and to the right?



Problem 12

How many five-digit numbers have at least one odd digit?

Problem 13

How many trailing 0's are in 30!?

Note: $n!$ is 'factorial notation'. $n!$ is defined as the product of every positive integer from 1 to n. For example,

$$4! = 4 \cdot 3 \cdot 2 \cdot 1 = 24$$

Problem 14

Let N be a positive integer such that $N = \sqrt{4x^2 + 12x + 9}$. Let $x = (3+3^2+3^3+\ldots+3^{2018}+3^{2019})$. What is the value of N?

Problem 15

Alice is playing a game. She has 10 cards, each with a blue face on the top and a red face on the bottom, laid out in a line from left to right. The blue face is facing upwards for every card. On any given turn, exactly one of two moves can be made:

i. She may flip over a card that currently has its blue face up. Example: $R\underline{B}BB \rightarrow R\underline{R}BB$

ii. Given a blue card and then a sequence of entirely red cards to its right, she may flip over all such consecutive/adjacent red cards in exchange for flipping over the single blue card. Example: $B\underline{BRRR}B \rightarrow B\underline{RBBB}B$

Alice would like to play this game for as long as possible. What is the maximum number of turns Alice can make before she can no longer make any moves?

Team Name:

_____

Team Members:

1. _____ 2. _____ 3. _____

School:

_____

Part: | B |

Please do not write anything in the columns labeled "Mark" or under "GRADER'S USE ONLY".

	Part 1	Mark
1.		
2.		
3.		
4.		
5.		

	Part 2	Mark
6.		
7.		
8.		
9.		
10.		

	Part 3	Mark
11.		
12.		
13.		
14.		
15.		

GRADER'S USE ONLY

Grader #1

1 × _____ = _____
2 × _____ = _____
3 × _____ = _____

Grader #2

1 × _____ = _____
2 × _____ = _____
3 × _____ = _____

Final Score: _____ / 30