
MATH CHALLENGERS[®]

Friday, January 29th, 2016

★ Mock Competition ★

Bull's-eye Round

Problems 1 – 12

Printed Full Name

School/Team Code

Grade

DO NOT BEGIN UNTIL YOU ARE INSTRUCTED TO DO SO.

Number of Problems: 4×3

Time Allotted: 12×3 minutes

No calculators, books, or other aids are permitted

Answer in exact form and round only when asked to do so. No units need to be provided after your answers. Please record only final answers in the blanks in the left-hand column of the competition paper. If you complete the problems before time is called, use the remaining time to check your answers.

FORM CODE

A		F		0		5	
B	■	G		1	■	6	
C		H		2		7	
D		I		3		8	
E		J		4		9	

Total Correct	Scorer's Initials

**HOSTED WITH
PERMISSION FROM:**
Canadian Math Challengers Society

Section I: Problem Solving

1. _____ years 1. 1 Jupiter year is equal to 6 Mars years. 1 Mars year is equal to 1.9 Earth years. A person born on a colony on Jupiter is 15 years old with respect to Jupiter. In Earth years, how old is she? Round your answer to the nearest Earth year.
2. _____ cents 2. I go to a charity drive, and I do the following:
1. Buy 6 candy canes for 15 cents each
 2. Donate a fifth of my remaining money
 3. Buy 3 identical scented erasers. After doing this, I have no money left
- After step 2 above, I've spent half of my money. What's the price of one of the scented erasers? Express your answer in cents.
3. _____ 3. Starting from points A and B, Alex and Albert, respectively, are walking with a speed of 8 km/hr and 10 km/hr towards each other. The distance AB is 54km. They do not stop when they meet for the first time. Upon arriving at B, Alex stops and stays at B. Upon arriving at A, Albert reverses direction and walks towards B. How long does Alex need to wait for Albert to come back to B, in hours and minutes? Express your answer in the form $AB : CD$, with A, B, C, D as digits (not necessarily distinct) and $0 \leq CD < 60$.
4. _____ km 4. A steamboat has enough fuel to travel for 6 hours at a rate of 20 km/hr in still water. Today, the steamboat is on a river which has a current of 8 km/hr. What is the maximum distance, in km, that the boat can travel downstream and still have enough fuel to get back to where it started? Round your answer to 1 decimal place.

Section II: Combinatorics and Numbers

5. _____ 5. There are 3 white marbles, 7 red marbles, and 2 blue marbles in a bag. I continue to take marbles out with replacement until I get a white marble. What's the probability that my first white marble is on my second draw?
6. _____ 6. Determine the number of positive integers n between 1 and 100, inclusive, such that:
- n is divisible by 2 or 3
 - n is not divisible by 7
7. _____ 7. Determine the sum of all 3-digit positive integers n such that n has only even digits (i.e. 468 is a possibility for n , but not 469).
8. _____ 8. How many distinct "words" can be created by swapping exactly 2 of the letters in the sequence of letters "TWENTYSIXTEEN" with each other?

G

Section III: Geometry

9. _____ 9. $\frac{2}{3}$ of a cylinder of radius 12 and height 18 is filled with water. What's the empty volume left in the cylinder, in terms of π ?
10. _____ 10. Two identical equilateral triangles with side length 2 share a common side. The two equilateral triangles combined creates a parallelogram. One of the diagonals of this parallelogram has length 2. What's the length of the other diagonal of this parallelogram? Express your answer in simplest radical form.
11. _____ 11. What's the fewest number of radius 1 circles that you need to completely cover up a circle with radius 2? Assume all of the circles lie in the same plane.
12. _____ 12. The center of a regular hexagon in the first quadrant of the coordinate plane is (5, 17). What is the sum of the numerical values of the perimeter and area of the largest such hexagon? Express your answer in simplest radical form.