

DO NOT TURN TO THE NEXT PAGE until your proctor tells you.

Please read the directions carefully.

- ▶ You have 100 minutes for 32 Problems.
- ▶ Mark your answers on your Answer Form with a pencil.
- ▶ Extra scratch paper is neither given nor allowed. You may use blank pages/spaces in the booklet as scratch paper.
- ▶ There are no penalties for incorrect answers. Answer as many problems as you can; go back and check your work and also go to questions you skip, before the time is over.
- ▶ Calculators are not permitted. Cell phones must be turned off completely and placed out of sight. MathCON problems are ALL done without a calculator.
- ▶ The problems are divided into three categories by difficulty levels:
3 Points (Questions 1-8)
5 Points (Questions 9-24)
7 Points (Questions 25-32)
- ▶ Problems 29-32, the last four problems are constructed-response problems. Enter your numerical answer in the grid on your answer sheet as shown on the right.

1. Although not required, it is suggested that you write your answer from left to right in the boxes at the top of the columns to help you fill in the circles accurately. You will receive credit only if the circles are filled in correctly.

2. Mark no more than one circle in any column.
3. You may start your answers in any column, space permitting. Columns you don't use should be left blanks, and there should be no blank columns between columns that are not blank. For example, if your answer is 201, then either arrangement of filled-in circles shown below is acceptable.

For example: Answer: 201 – either position is correct.

	2	0	1
Ⓐ	Ⓐ	●	Ⓐ
Ⓑ	Ⓑ	Ⓑ	●
Ⓒ	●	Ⓒ	Ⓒ
Ⓓ	Ⓓ	Ⓓ	Ⓓ

2	0	1	
Ⓐ	●	Ⓐ	Ⓐ
Ⓑ	Ⓑ	●	Ⓑ
●	Ⓒ	Ⓒ	Ⓒ
Ⓓ	Ⓓ	Ⓓ	Ⓓ

4. No problem has a negative answer.
- ▶ Notations in Geometry Problems:
- A : Point A
- $\overleftrightarrow{AB}$: Line through points A and B
- $\overline{AB}$: Line segment joining A and B
- AB : Length of the line segment AB
- $\angle ABC$: Angle with the vertex point at B
- $m\angle ABC$: Measure of angle ABC
- $\perp$: Perpendicular
- // : Parallel

1. [Algebra, 3 Points]

Peter swims six miles north, then three miles east, then three miles north, then fifteen miles west. What is the distance between where he started and where he is now?

- A) 10 miles B) 12 miles C) 14 miles D) 15 miles E) 17 miles

2. [Geometry, 3 Points]

A cube has a side length of 6 cm. An equilateral triangle is formed using three of the vertices of the cube. The area of this triangle is $m\sqrt{n}$ cm², where m and n are integers and n is not divisible by the square of a prime number. What is the value of $m + n$?

- A) 24 B) 21 C) 18 D) 15 E) 12

8. [Combinatorics, 3 Points]

The length of a meter stick is 100 centimeters (numbered from 0 to 100). Starting at a random point on the meter stick, an ant walks towards 0 at a speed of 2 centimeters per second. What is the probability that it will take more than 20 seconds for the ant to reach 0?

- A) $\frac{1}{5}$ B) $\frac{3}{10}$ C) $\frac{2}{5}$ D) $\frac{3}{5}$ E) $\frac{7}{10}$

9. [Algebra, 5 Points]

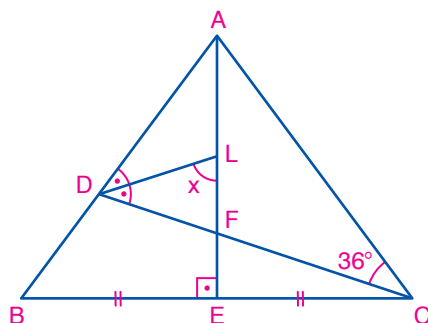
The area of the triangle formed by the x -axis, y -axis, and $3y = mx + 12$ is 48 square units. What is $|m|$?

- A) $\frac{1}{2}$ B) $\frac{1}{3}$ C) $\frac{1}{4}$ D) $\frac{1}{6}$ E) $\frac{3}{4}$

10. [Geometry, 5 Points]

For the given figure, ABC is a triangle,

$\overline{AE} \perp \overline{BC}$,
 $BE = EC$,
 $\overline{DL}$ bisects $\angle ADC$,
 $m\angle ACD = 36^\circ$.



What is $m\angle DLE = x$?

- A) 54° B) 68° C) 72° D) 76° E) 82°

11. [Number Theory, 5 Points]

In the equation

$$A + BC + DEF + ABCDEF = 343165,$$

where $A, B, \dots, F$ represent different digits, what is the three-digit number DEF ?

- A) 560 B) 482 C) 480 D) 343 E) 342