

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.
- ▶ Use of calculators is prohibited. 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 the 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. Leave unused columns blank, 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]

If $\frac{1}{3}$ of P is equal to 5, then what is $\frac{1}{12}$ of P?

- A) 1.2 B) 1.25 C) 1.5 D) 12 E) 20

3. [Number Theory, 3 Points]

What will the time be 2024 minutes after 10:30 am?

- A) 8:14 pm B) 7:44 pm C) 7:14 pm D) 6:44 pm E) 6:14 pm

4. [Combinatorics, 3 Points]

During a meeting with five people, Amelia shook hands with exactly one person, Bobby and Camilla shook hands with exactly two people, Daniela shook hands with exactly three people, and Elijah didn't shake hands with anybody. What is the number of handshakes that took place?

- A) 4 B) 5 C) 6 D) 7 E) 8

5. [Algebra, 3 Points]

The daily high temperature was noted for 30 days in a city.
For the first fifteen days, the temperature was 44°F every day.
For the next ten days, the temperature was measured at 54°F each day.
The recorded temperature for each of the next five days was 42°F .
What was the recorded 30-day mean (average) temperature?

- A) 48°F B) 47°F C) 46°F D) 45°F E) 44°F

12. [Combinatorics, 5 Points]

Each number from 11 to 16 replaces one of the letters U, V, W, X, Y, and Z.
If the sum of U and V is 25 and the difference between X and Y is 5, then what is $W \cdot Z$?

- A) 156 B) 176 C) 210 D) 224 E) 240

16. [Combinatorics, 5 Points]

At a building's entrance, there are six doors, all of which are randomly open or closed.
What is the probability that exactly two of the six doors are open?

- A) $\frac{3}{8}$ B) $\frac{5}{16}$ C) $\frac{9}{32}$ D) $\frac{1}{4}$ E) $\frac{15}{64}$