

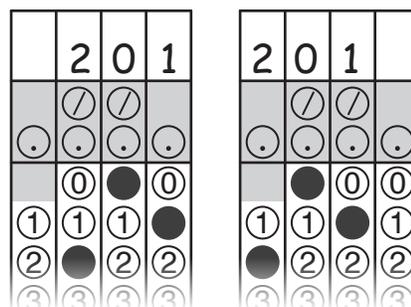
DO NOT TURN TO THE NEXT PAGE until your proctor tells you.

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.

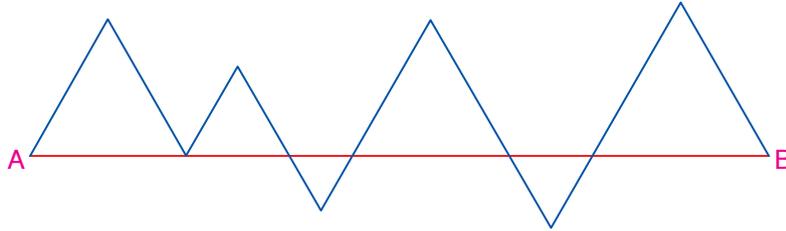
For example: Answer: 201 – either position is correct.



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

2. [Geometry, 3 Points]

The diagram shows six equilateral triangles. The total length of the blue lines is 26 cm. What is the length of the red line (AB)?



- A) 12 cm B) 13 cm C) 15 cm D) 16 cm E) None of the preceding

6. [Geometry, 3 Points]

What is the degree measure of the smaller angle formed by the hands of a clock at 9:30?



- A) 90° B) 100° C) 105° D) 115° E) 120°

9. [Algebra, 5 Points]

Justin can carry a heavy box 15 feet, and Ethan can carry the same box 9 feet farther than Justin. Also, Gabriel can carry the box three-fourths as far as Ethan. How far is the box from the starting position if Justin and Gabriel each carries it twice, and Ethan carries it three times?

- A) 70.5 feet B) 132 feet C) 138 feet D) 140 feet E) 142 feet



20. [Combinatorics, 5 Points]

Each of the 49 students in the eighth grade at Lemelson Elementary School has one dog or one cat or both a dog and a cat. 24 students have a dog, and 29 students have a cat. How many students have both a dog and a cat?



- A) 4 B) 5 C) 6 D) 8 E) 9

21. [Algebra, 5 Points]

A bacterium divides into two bacteria every 40 minutes. Starting with one bacterium, how many bacteria will there be after 4 hours?



- A) 24 B) 32 C) 48 D) 64 E) 128

23. [Number Theory, 5 Points]

A palindrome is a whole number that reads the same forwards or backwards. For example, 121 is a palindrome.

What is the largest palindrome less than 200 that is the sum of three consecutive integers?

- A) 191 B) 181 C) 171 D) 161 E) 151