# 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 tha 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.
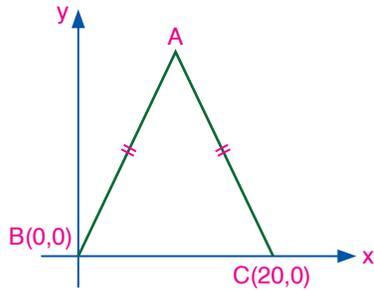
For example: Answer: 201 – either position is correct.
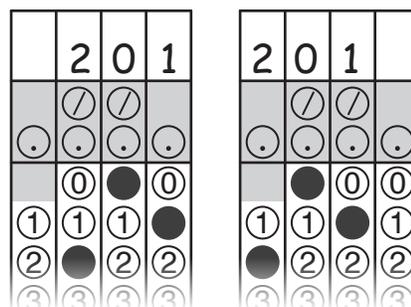
4. No problem has a negative answer.

▶ 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

∠ABC : Angle with the vertex point at B

m∠ABC : Measure of angle ABC

⊥ : Perpendicular

// : Parallel

2. [Geometry, 3 Points]

In the given figure,

ABC is an isosceles triangle,
with area 120 square units.
If B(0, 0) and C(20, 0) are the vertices of the base,
then what is the y-coordinate of point A?

A) 10   B) 12   C) 16   D) 18   E) 24

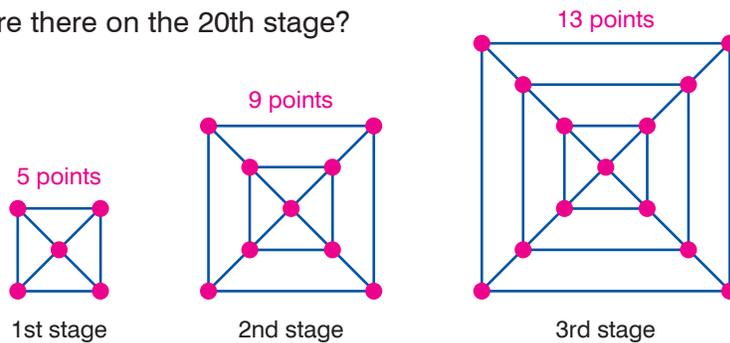**16.** [Combinatorics, 5 Points]

The first six prime numbers are written on the sides of a die. Which of the following sums would **not** be possible if the die was rolled three times and the numbers were added?

A) 10   B) 17   C) 26   D) 30   E) 31

21. [Algebra, 5 Points]

How many points are there on the 20th stage?

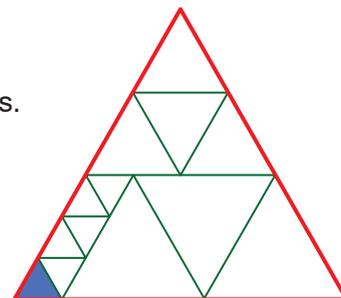A) 73   B) 77   C) 80   D) 81   E) 85

23. [Number Theory, 5 Points]

Which of the following numbers is **not** divisible by 5 for any integer n?

A) $n^2 - 1$ B) $2n + 1$ C) $n \cdot (n + 1)$ D) $10n + 1$ E) $n^3 - 1$

26. [Geometry, 7 Points]

A large red triangle is divided into equilateral triangles as shown in the figure to the right. The side length of the blue shaded triangle is 2 inches. What is the perimeter of the large red triangle?

A) 54 inches   B) 51 inches   C) 48 inches   D) 45 inches   E) 42 inches

27. [Number Theory, 7 Points]

The number 987654321 is written on a strip of paper. Patel cuts the strip three times and gets four numbers. Then he adds these four numbers.

$$9\ 8\ 7\ 6\ 5\ 4\ 3\ 2\ 1$$

What is the **least** possible sum he can get?

A) 551   B) 549   C) 547   D) 545   E) 543

3