# MO✳MATH

Level 1

1. A birthday candle stays lit for 15 minutes. For how long will 10 birthday candles stay lit if they are lit at the same time and no one blows them out?

    A. 1.5 minutes   B. 15 minutes   C. 150 minutes
    D. 1.5 hours   E. 15 hours

2. It is 120 km from Zakopane to the Krakow airport. Buses take off from Zakopane for the airport at 30 minutes past every hour. The buses drive with an average speed of 60 km/hr. A group of Spanish "Kangaroos," members of a mathematical camp in Zakopane, was supposed to arrive at the airport at 11:30. What is the latest time their bus had to leave Zakopane to get them to the airport on time?

    A. 7:30   B. 8:30   C. 9:30   D. 10:30   E. 11:30

3. During the time that Kasia eats two bowls of ice cream, Basia eats three bowls of ice cream. The two girls ate 10 bowls of ice cream in one hour. How many bowls of ice cream did Kasia eat?

    A. 3   B. 4   C. 5   D. 6   E. 7

4. For his birthday, Patrick got a box with some identical cube blocks. He used all of them to make two projects (see the picture). All the blocks together weigh 900 grams. The project on the left weighs 300 grams and the picture shows all of the blocks it is made of. How many blocks in the figure on the right are not shown?

    A. 4   B. 5   C. 6   D. 7   E. 8
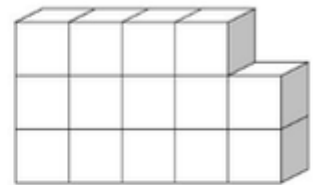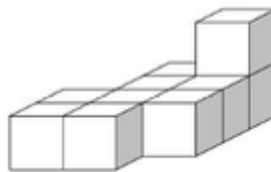
5. Altogether, six hens eat eight cups of grain in three days. How many cups of grain will three hens eat in nine days?

    A. 10　　　　　B. 12　　　　　C. 14　　　　　D. 16　　　　　E. 9

6. A magical ball falling to the ground bounces twice as high as the height from which it was dropped. From what height was the ball dropped if it reached the height of 320 cm after the second bounce?

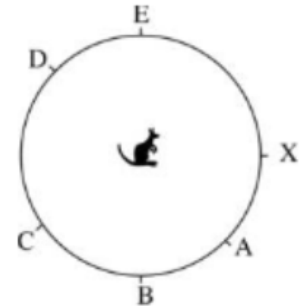   A. 80 cm　　　B. 160 cm　　C. 320 cm　　D. 640 cm　　E. 1280 cm

Level 2

1. There are 29 students in a class, and the number of girls is three greater than the number of boys. How many girls are there in this class?

    A. 6   B. 13   C. 16   D. 19   E. 15

2. The kangaroo's nose is pointing toward X (see the picture). Toward which letter will its nose be pointing if it turns in place 270° clockwise?

    A. A   B. B   C. C   D. D   E. E

3. How many two-digit numbers are divisible by 2 and by 7?

    A. 8   B. 7   C. 6   D. 5   E. 4

4. How many four-digit numbers with a sum of their digits equal to 3 are there?

    A. 6   B. 8   C. 9   D. 10   E. 12

5. The leaders of the math camp in Zakopane decided to divide 96 participants into groups. Each group would have the same number of people in it, and there would be at least five and at most 20 people in each. How many numbers can represent the number of people in one group?

    A. 10   B. 8   C. 5   D. 4   E. 2

6. We have three boxes: one red, one green, and one blue. We also have three objects: a coin, a shell, and a bead. In each of the boxes there is only one of these objects. We know that:
    - the green box is to the left of the blue box;
    - the coin is to the left of the bead;
    - the red box is to the right of the shell; and
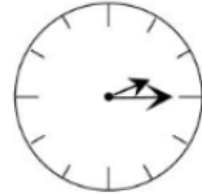   - the bead is to the right of the red box.
   In which box is the coin?

   A. in the red box
   B. in the green box
   C. in the blue box
   D. This cannot be determined.
   E. The conditions given above cannot all be true at the same time.

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Level 3

1. The picture shows the mirror reflection of a wall clock. What time does the actual clock show?

   A. 3:15   B. 10:15   C. 10:45   D. 8:45   E. 9:45
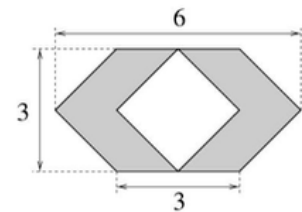
2. A circus trainer needs 40 minutes to wash an elephant. His son needs two hours to do the same job. In how much time will the trainer and his son wash three elephants if they work together?

   A. 30 min   B. 45 min   C. 60 min   D. 90 min   E. 100 min

3. What is the area of the shaded figure?

   A. 9   B. $3\sqrt{2}$ C. 18   D. 12

   E. $6\sqrt{3} - 3\sqrt{2}$

4. In three years Stephen will be three times older than he was three years ago. In four years he will be _____ times older than he was four years ago. What word belongs in the blank?

   A. "two"   B. "three"   C. "four"   D. "five"   E. "six"

5. The area of rectangle ABCD is equal to S. Points E, F, G, and H divide the sides of the rectangle in there ratio of 1:2 (see the picture). What is the area of parallelogram EFGH?

   A. $\dfrac{2}{5}S$ B. $\dfrac{3}{5}S$ C. $\dfrac{4}{9}S$ D. $\dfrac{5}{9}S$ E. $\dfrac{2}{3}S$
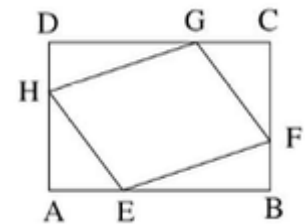
6. What is the last digit of the number $\dfrac{1}{5^{2000}}$ in decimal notation?

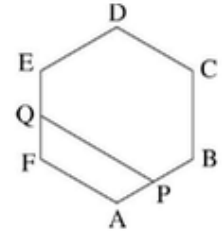   A. 2   B. 4   C. 6   D. 8   E. 5

Level 4

1. The value of $33333^3 - 27 \times 11111^3$ equals

    A. -22222^5 B. 0 C. 22222 D. 22222^2 E. 22222^3

2. In the regular hexagon ABCDEF, points P and Q are the centers of sides AB and EF respectively. The ratio of the area of quadrilateral APQF to the area of hexagon ABCDEF is

    A. 5:36   B. 1:6   C. 5:24   D. 1:4   E. 5:18

3. The number $(\dfrac{\sqrt{5}+1}{2})^{2000} \times (\dfrac{\sqrt{5}-1}{2})^{2000}$ equals

    A. $\dfrac{5^{2000}-1}{4}$ B. $\dfrac{5^{2000}+1}{4}$ C. 4^{1000} D. 1 E. $(\dfrac{\sqrt{5}}{4})^{2000}$

4. Points A (-2, -1), B (2,2), and C (x, 1) lie on a plane. Find x so that the sum $|AC| + |CB|$ is the smallest.

    A. $\dfrac{5}{3}$ B. $\dfrac{3}{4}$ C. $\dfrac{2}{3}$ D. 1 E. $\dfrac{4}{3}$

5. From Monday to Wednesday, Mark always lies. For the rest of the week he tells the truth. One day, Mark said to Mary:
    1. "Yesterday I lied." and
    2. "Starting the day after tomorrow, I will be lying for two consecutive days."
    On what day of the week did Mark talk to Mary?

    A. Monday   B. Tuesday   C. Wednesday   D. Thursday   E. Friday

6. All three figures below represent the same "pyramid" made out of wooden cubes, as seen from different views: from the front, from above, and from the left. Out of how many cubes is this "pyramid" made?

A. 10   B. 11   C. 12   D. 13   E. 14

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Level 5

1. John took a trip from city A to city B. Starting from city A, he drove 10 km north, then 10 km east, then 6 km south, then 2 km west, then 8 km north, then 4 km west, and finally 9 km south. This way, he ended up in city B. What is the distance in a straight line between city A and city B?

   A. 0 km   B. 1 km   C. $\sqrt{5}$ km   D. 5 km   E. $10\sqrt{2}$ km

2. The positive integer a has the property that the sum
   $a + 2a + 3a + 4a + 5a + 6a + 7a + 8a + 9a$ when written in the decimal system consists of the same digit. What is that digit?

   A. 1   B. 3   C. 5   D. 9   E. There is no solution.

3. The figure to the right shows triangle ABC with an inscribed circle k which has its center at S. Points D, E, and F are the points of tangency of the circle with the sides of triangle ABC. What is the measure of angle DFE if the measure of angle DAE is 32°?
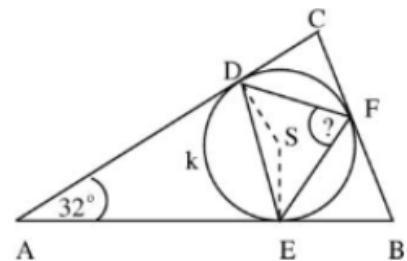
   A. 46°   B. 58°   C. 64°   D. 74°
   E. More information is needed to solve this problem.

4. Consider a cube K with an edge length of 2, and a sphere G with its center at the center of the cube. The set $K \cap G$ contains six circles only when radius r of the sphere fulfills the inequality

   A. $1 < r \le \sqrt{2}$ B. $1 \le r < \sqrt{2}$ C. $r \le \sqrt{2}$
   D. $1 < r < \sqrt{2}$ E. $\sqrt{2} \le r < \sqrt{3}$

5. If $x, y \in \mathbb{R}$ are the solutions of the equation $x^2 + y^2 = 1$, then the greatest possible value of the product xy is equal to

    A. 2   B. $\sqrt{2}$ C. 1   D. $\dfrac{\sqrt{2}}{2}$ E. $\dfrac{1}{2}$

6. Given a tetrahedron ABCD, what is the number of planes located the same distance from all four of its vertices?

    A. 4   B. 5   C. 6   D. 7   E. 8