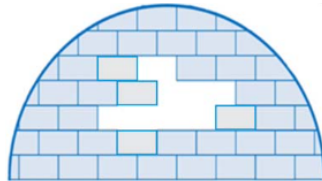# MO✲MATH

Level 1

1. How many bricks like this ☐ are missing from the igloo?

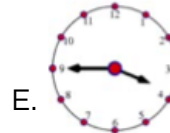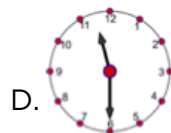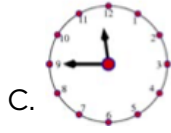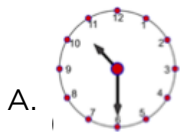   **A.** 6 B. 7 C. 8 D. 9 E. 10

2. In the picture, there are 5-pointed, 6-pointed, and 7-pointed stars. How many 5-pointed stars are there?

   A. 2 B. 3 **C.** 4 D. 5 E. 9

3. Now it has half past one o'clock ⏰. What time was it two and a half hours ago?
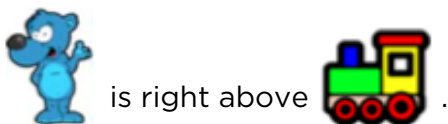
   A. **B.** C. D. E.

4. Brian and William stand in line. Brian knows that there are 7 people in front of him. William knows that there are in total 11 people in the line. If Brian is just in front of William, how many people in the line are behind William?

   A. 2 B. 3 C. 4 D. 5 E. 6

Problems selected from Kangaroo Math

5. Ann put six toys in a shelf with six boxes as shown.

?

When you look at the shelf, you see that:

 is between and .

 is right above .

 is to the left of and to the right of .

Which toy is in the upper right box?

A.   B   C.   D.   E.

6. In a stack of three cards with holes, the top of each card is white and the bottom is grey. Basil threaded these cards on a rope.

After some arrangement of the cards, which situation is possible to obtain without untying the rope?

A.   B.   C.   D.   E.

Level 2

1. A picture of footprints shown on the left was rotated as shown on the right.
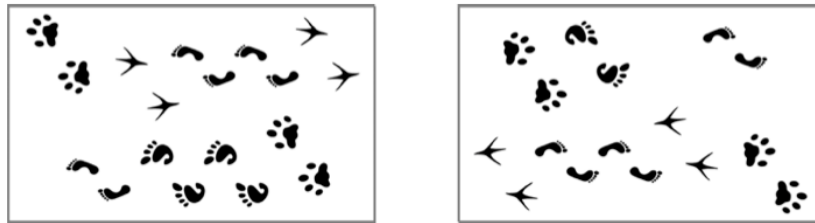
    Which footprints are missing in the picture on the right?

    A.   B.   C.   D.   E.

2. In the figure, we see a necklace of six beads.
    Which one is the same necklace?

    A.
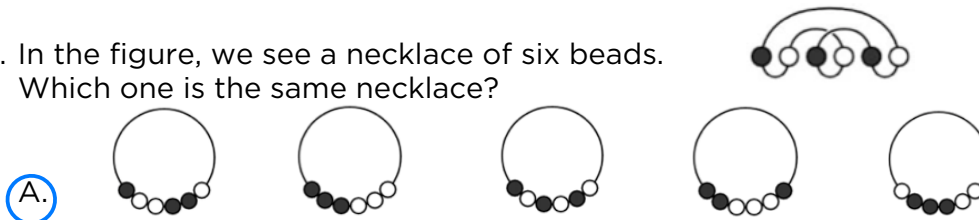
3. ● + ● + ● + ● + ■ = ■ + ■ + ■

    Imagine that the circles represent the same number and the same is true for the squares. Which one is true?

    A. ● = ■   B. ● + ● + ● = ■ .   C ■ + ■ + ■ = ●

    D. ■ + ■ = ●   E ● + ● = ■

4. There is a tournament at the pool. First 13 children signed up and then another 19 signed up. Six teams with an equal number of players are needed for the tournament. At least how many more children need to sign up so that the six teams can be formed?

    A. 1   B. 2   C. 3   D 4   E. 5

Problems selected from Kangaroo Math

5. Ten bags each contain a different number of candies from one to ten. Five boys each took two bags of candies. Alex got five candies, Bob got seven candies, Charles got nine, and Dennis got fifteen. How many candies did Eric get?

   A. 9   B. 11   C. 13   D. 17   (E.) 19

6. Zosia has hidden smileys ☺ in some of the cells of the table. In some of the other cells she write the number of smileys in the neighboring cells as shown in the picture. Two cells are said to be neighboring if they share a common side or a common corner. How many smileys has she hidden?

	3	3	
2			
		2	
	1		

   A. 4   (B.) 5   C. 7   D. 8   E. 11

Level 3

1. Kalle knows that $1111 \times 1111 = 1234321.$ What is the answer of 1111×2222?

   A. 3456543   B. 2346642   C. 2457642   D. 2468642
   E. 4321234

2. Peter and Nick are both working on "Kangaroo" contest problems. For every two problems that Peter solves, Nick manages to solve three problems. In total, the boys solved 30 problems. How many problems did Nick solve more than Peter?

   A. 5   B. 6   C. 7   D. 8   E. 9

3. Peter went hiking in the mountains for 5 days. He started on Monday and his last trip was on Friday. Each day he walked 2 km more than the day before. The total distance he walked during the five days was 70 km. What distance did Peter walk on Thursday?

   A. 12 km   B. 13 km   C. 14 km   D. 15 km   E. 16 km

4. Boris has an amount of money and three magic wands that he can only use once. Wand A adds $1. Wand S subtracts $1. Wand D doubles the amount. In which order must he use these wands to obtain the largest amount of money?

   A. DAS   B. ASD   C. DSA   D. ADS   E. SAD

5. The structure on the figure is made of unit cubes glued together. Morten wants to put it into a rectangular box. What are the dimensions (length, width, and height) of the smallest box he can use?

   A. 3 x 3 x 4   B. 3 x 5 x 5   C. 3 x 4 x 5   D. 4 x 4 x 5
   E. 4 x 4 x 5

Problems selected from Kangaroo Math
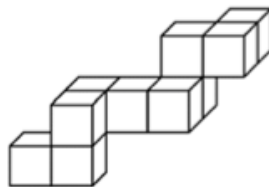
6. John wrote a natural number in each fo the four boxes in the bottom row of the diagram. Then he wrote in each of the other boxes the sum of the two numbers int he boxes immediately underneath. What is the largest number of odd number that could appear in the complete diagram?

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

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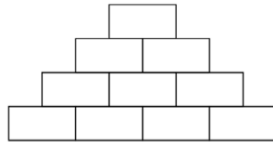
Level 4

1. The sum of 2017 nonnegative integers is 2016. What is the product of the numbers?

   A. 2017   B. 2016   C. 1008   D. 1   E. 0

2. The diagram shows four overlapping hearts. The areas of the hearts are 1 cm², 4 cm², 9 cm², and 16 cm². What is the grey area?

   A. 9 cm²   B. 10 cm²   C. 11 cm²   D. 12 cm²   E. 13 cm²

3. Four cousins Ema, Iva, Rita, and Zina are 3, 8, 12, and 14 years old, although not necessarily in that order. The sum of the ages of Zina and Ema is divisible by 5. The sum of the ages of Zina and Rita is also divisible by 5. How old is Iva?

   A. 14   B. 12   C. 8   D. 5   E. 3

4. If students are late for school, they are punished by detention. The first late arrival means 10-minute detention, the second one 20 minutes after school, the third one 30 minutes, the fourth one 40 minutes etc. In winter term, Simon had to spend 9 hours and 10 minutes at school. How many times was he late?

   A. 8   B. 9   C. 10   D. 11   E. 12

5. Olesia's tablecloth has a regular pattern, as shown in the diagram. What percentage of the tablecloth is black?

   A. 16   B. 24   C. 25   D. 32   E. 36

6. Two runners are practicing on a 720-meter circular track. They run in opposite directions, each at a consistent speed. The first runner needs four minutes to complete the full loop and the second runner needs five minutes. How many meters does the second runner travel between two consecutive meetings of the two runners?

   A. 355   B. 350   C. 340   D. 330   E) 320

Level 5

1. Angela mad a decoration by overlaying alternating grey and white star-like shapes. The areas of the shapes are 16 cm², 9 cm², 4 cm², and 1 cm². What is the total area of the visible grey regions?

   A. 9 cm²   B. 10 cm²   C. 11 cm²   D. 12 cm²   E. 13 cm²

2. Martin participates in a chess tournament. He played 15 games, out of which he won nine. He has five more games to play. What will his success rate be if he wins all five remaining games?

   A. 60%   B. 65%   C. 70%   D. 75%   E. 80%

3. Six perpendiculars to the sides are drawn from the midpoints of the sides of a regular triangle (see figure). What fraction of the area of the initial triangle does the resulting hexagon cover?
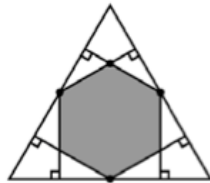
   A. $\dfrac{1}{3}$ B. $\dfrac{2}{5}$ C. $\dfrac{4}{9}$ D. $\dfrac{1}{2}$ E. $\dfrac{2}{3}$

4. Pete would like to determine who earns more money and who earns less among his three colleagues, Francis, Maria, and Joana, from the following two facts. First, he knows that if Francis is not the best paid among the three of them, it must be Joana. Second, he knows that if Joana is not the worst paid, then Maria is the one who earns the most. Who is the one who earns the most, and the one who learns the least, in this order?

   A. Maria, Joana   B. Francis, Joana   C. Joana, Maria   D. Maria, Francis
   E. Francis, Maria

Problems selected from Kangaroo Math

5. An arbitrary two-digit number consists of the digits a and b. By repeating this pair of digits three times, one obtains a six-digit number. By which of the following numbers will this six-digit number be always divisible?

A. 2   B. 5   C. 7   D. 9   E. 11

6. On a balance scale, three different weights are put at random on each pan and the result is show in the picture. The weights are of 101, 102, 103, 104, 105, and 106 grams. What is the probability that the 106-gram wight stands on the heavier (right) pan?
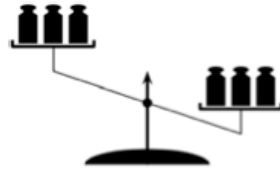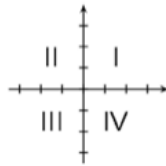

A. 75%   B. 80%   C. 90%   D. 95%   E. 100%

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Level 6

1. In the figure, we see 10 islands that are connected by 15 bridges. What is the smallest number of bridges that can be eliminated to make it impossible to get from island A to island B by bridge?
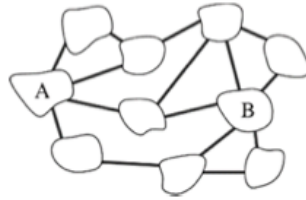
    A. 1   B. 2   C. 3   D. 4   E. 5

2. Which quadrant contains no points of the graph of the linear function $f(x) = -3.5x + 7$?

    A. I   B. II   C. III   D. IV   E. All quadrants contain points

3. Two right cylinders A and B have the same volume. The radius of B is 10% larger than that of A. By what percentage is the altitude of A larger than that of B?

    A. 5%   B. 10%   C. 11%   D. 20%   E. 21%

4. Two consecutive number are such that the sums of the digits of each them are multiples of 7. At least how many digits does the smaller one have?

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

Problems selected from Kangaroo Math

5. Consider the sequence a_n with $a_n = 2017$ and $a_{n+1} = \dfrac{a_n - 1}{a_n}$.

   What is the value of a_{2017}?

   A. -2017 B. $\dfrac{-1}{2016}$ C. $\dfrac{2016}{2017}$ D. 1 E. 2017

6. If $|X| + x + y = 5$ and $x + |y| - y = 10$, what is the value of $x + y$?

   A. 1 B. 2 C. 3 D. 4 E. 5