

International Math Kangaroo Contest



Online Training March 8/9, 2014 Instructor:Velian Pandeliev

Grade 3 - 4

International Math Kangaroo Contest (51 participating countries)



International Facts

- The contest began in 1991 in France and it runs every year.
- Open for students aged 6-18.
- Currently, there are 51 countries in the international association "Kangaroo Without Borders".
- Over 6,355,000 students participated worldwide in 2013.
- The first Canadian edition of the Math Kangaroo was in 2001 in Ottawa.

23 Locations Across Canada



Contest Information

Date: March 23, 2014 (Sunday)

Who can write: Students in grades I-I2

The Kangaroo math contest has **24** multiple-choice questions.

You will have **60** minutes to answer them all.

- They are divided into three parts of **8** questions each:
- Part A (easy) correct answer is worth 3 points
- Part B (medium) correct answer is worth 4 points
- Part C (hard) correct answer is worth 5 points
- Questions left blank are worth 0 points.Wrong answers carry a penalty of -1 point.The maximum score is **120 points**.To avoid negative scores, everyone start with 24 points.

Calculators are not permitted.

The Response Form



International Contest - Game "Math Kangaroo" Canada, 2013



SAMPLE Response form Grade 3-4

Student's Name:

YOUR NAME

Grade: YOUR GRADE

E-mail: EMAIL ADDRESS

Phone: PHONE

Please, circle the correct answer:

1	ABCDE	9	ABCDE	17	ABCDE
	ABCDE	9	ABCDE	.,	ABCDE

Strategies

The Kangaroo math contest consists of 24 multiple-choice questions to be answered in 60 minutes.

That means you only have two and a half minutes for every question!

If you get stuck on a question, skip it, do the other ones and come back to it when you're sure you have time to try again.

Very few students finish the entire contest in the time allotted and answer every question correctly.

Do not be discouraged if you find you can't do some questions.

Remember, if you don't know the answer, don't guess! It's better to leave the answer blank than to risk losing I point if you guessed wrong.

This Session

In this session I will talk a bit about the contest and what you should expect.

Then I will give you 12 questions typical of the Grade 3-4 contest.

You will be presented with each question and you'll have about a minute to work on it independently and give me an answer in the poll on the right.

Then I will talk you through one possible solution.

Don't worry about copying down everything on the slides as they will be posted to the Math Kangaroo site after the session.

Please have pen and paper handy, and put your thinking caps on!

Question I (3 points)

How many three-digit numbers can be written using the digits 0 and 7 only?

(A) 8	(B) 7	(C) 6	(D) 5	(E) 4
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The main thing to remember here is that no number can start with the digit 0.

This means that the first digit of all our numbers has to be 7.

Then, we write out every three-digit number that starts with 7 and contains only 7's and 0's:

700
707 Are there any others?
770
777 How can we be sure?



Question 2 (3 points)

Anthony's garden path is made up of 14 square tiles of size 1m x 1m. Each tile has a black dot in the middle. Anthony has painted a black line joining the dots, as shown:



How long is the black line?

(A) 12 m	(B) 13 m	(C) I4 m	(D) 15 m	(E) 28 m

First we notice that the line joining two tiles is the same length as the side of the square, 1 m.

Then we count how many lines we need to join 14 dots:

13 lines.





- Santara Statistica (In Antipular Statistics)

Question 3 (3 points)

In this year's number, 2014, the units digit is twice as big as the thousands digit. How many years will pass before this happens again for the first time?

(A) 10 (B) 100 (C) 1000 (D) 2014	(E) 28
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In order to solve this problem, we need to know what units and thousands digits are. But first, what is a digit?

Digits are the symbols that make up numbers (0,1,2,3,4,5,6,7,8,9).

We write them side by side to form numbers, and where a digit is tells us how much it adds to the value of our number.

thousands	hundreds	tens	units
2	0		4
× 1000	× 100	× 10	хI
2000	+ 0	+ 10	+ 4

Question 3 (3 points)

In this year's number, 2014, the units digit is twice as big as the thousands digit. How many years will pass before this happens again for the first time?

(A) I 0 (B) I 0 (C) I 000 (D) 2014 (E) 28	
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In the number 2014, we see that the units digit (4) is twice the thousands digit (2). We need to figure out when is the soonest this will be true again.

We are looking for the next time this happens, so the thousands digit will still be 2 (otherwise we have to wait 1000 years!)

So, when is the next time the units digit will be 4 again?

2015, 2016, 2017 ... 2024.

So, 2024 is the next year for which the units digit is two times the thousands digit. The answer is

Question 4 (3 points)

How many squares (of any size) are there in the picture below?





This is easy: we have to count and make sure we don't miss any. How many IxI squares are there? What about 2x2? Are we done? No, how many 3x3? I square

4 squares

Question 5 (4 points)

The natural numbers from 1 to 20 were written on the blackboard. Alice put a square around all the numbers which were multiples of 2, and Bobby circled all the numbers which were multiples of 3.

How many numbers had a circle and a square around them?

(A) 4	(B) 3	(C) 2	(D) I	(E) None
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14

One way to solve this problem is just to do what Alice and Bobby have done:



A quicker way is to notice that if a number is a multiple of 2 and 3 at the same time, it is a multiple of 6.

Then, we can just list the multiples of 6 between 1 and 20: 6, 12, 18.

Question 6 (4 points)

The carpenter shop has two machines: A and B.A is a printing machine and B is a rotating machine. Here's what they do:





We notice that we need to rotate our piece so that the red dot is in the bottom right corner. We can only use machine B to do this. How many times do we need to use machine B? 4 B's will get the piece in the position we want. While this is happening, we need to draw on the piece so that the line does not touch the red dot. When should we do that?



Machine A paints a horizontal line.

We should use machine A after the first B so the painted line does not touch the red dot.



So, the answer is:



Question 7 (5 points)

In the yard there were rabbits and ducks. Eddie counted 60 legs and 24 wings. How many rabbits were there in the yard?



(A) 6 ((B) 8	(C) 9	(D) 18	(E) 36
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We know that Eddie counted 24 wings.

Since only ducks have wings, we can figure out how many ducks there were in the yard:

Each duck needs 2 wings, so there were

 $24 \div 2 = 12$ ducks in total.

12 ducks would also need $12 \times 2 = 24$ legs.

So, if 24 of the 60 legs Eddie counted belonged to ducks, how many are left for rabbits?

60 - 24 = 36 legs

Each rabbit has 4 legs, so there were $36 \div 4 = 9$ rabbits

Question 8 (5 points)

There are 3 red, 3 white and 3 blue marbles in a bag. What is the smallest number of marbles we have to pull out of the bag with our eyes closed to be sure that we have taken at least one marble of every colour?

We have to be certain that we will have one marble of every colour. We could get lucky and pull out three different marbles right away, but what if we are not so lucky?

In fact, to be sure, we have to show that we will have one marble of each colour even if we are the most unlucky ever. What is our most unlucky situation?

OOOO OOO We pulled out 6 marbles and still no red!

Now there are only red marbles left, so the next one will give us one of each colour. To be sure, we need

Question 9 (5 points)

132 people crossed the river in boats. 60 people used 5-person boats, 36 people used 4-person boats and the rest used 3person boats. If all boats were full, how many boats in total did they use to cross the river?

(A) I 2 (B) 2 I	(C) 33	(D) 36	(E) 48
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This is a heavy arithmetic question with a lot of opportunities for mistakes. Let's put down what we know:

How many people?	Size of boat?	How many boats?
132	(TOTAL)	33
- 60	÷ 5	+12
- 36	÷ 4	+ 9
36	÷ 3	+12
	21	

Question 10 (4 points)

Bill built a cube using 27 smaller identical cubes, as shown in the picture below. He painted the surface of the big cube gray. How many of the small cubes have exactly two gray faces?



Question II (5 points)

Five friends were measuring each other's heights. They discovered that Eddie is taller than Albert, Bianca is taller than Diana but shorter than Eddie. Also, Eddie is shorter than Chris. Which of the five friends is the tallest?

(A) Albert (B)	Bianca (C) Chri	s (D) Diana	(E) Eddie
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We know that Eddie is taller than Albert, so Albert isn't the tallest. Eddie > Albert

Bianca is taller than Diana, so Diana isn't the tallest.

Bianca > Diana

But Bianca is also shorter than Eddie, so Bianca isn't the tallest.

Eddie > Bianca > Diana

Eddie is the tallest so far, but the last statement says he's shorter than Chris.

Therefore, Chris is the tallest.



Question 12 (4 points)

Some girls formed a circle. Mary was the fifth to the left of Dasha, but she was also sixth to the right of Dasha. How many girls were there in the circle?



Question 13 (4 points)

Some of the girls in Math Club play basketball and all basketball players are tall.

Which of these sentences is true?

A) All girls who play basketball are in Math Club.

B) No girls in Math Club are tall.

- C) All girls in Math Club are tall.
- D) Some girls in Math Club are tall.
- E) None of these sentences are true.

We know that some girls from Math Club play basketball, but that doesn't tell us anything about whether all basketball players are in Math Club. So A) is not true.

All the basketball-playing Math Club girls are tall, so B) is not true. There could be a girl in Math Club who is not tall, so C) is false, but we know that some girls in Math Club (those who play basketball) are tall, so D is true.



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Thank you! See you on March 23!