

**INTERNATIONAL MATHEMATICS AND SCIENCE OLYMPIAD
FOR PRIMARY SCHOOLS (IMSO) 2008
Mathematics Contest (Second Round) in Taiwan
Short Answer Problems**

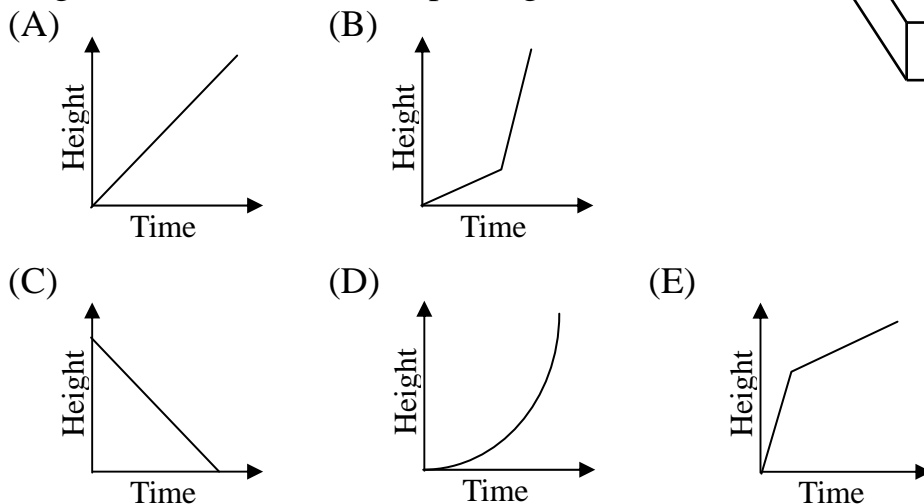
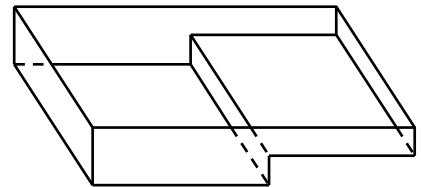
Name: _____ School: _____ Grade: _____ ID number: _____

Short Answer: there are 20 questions, fill in the correct answers in the answer sheet. Each correct answer is worth 2 points. Time limit: 60 minutes.

1. Jack wrote the word **MINES** on a frosty window. From the other side of the window it appears as :

(A) **MINES** (B) **MENIM** (C) **2NINE** (D) **MINES** (E) **2NINE**

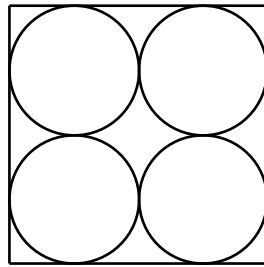
2. The swimming pool is filled with water at a constant rate. Which graph below best shows the increase in height of the water with the passing of time?



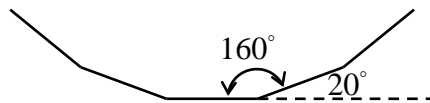
3. How many two-digit numbers have the property of being equal to 7 times the sum of their digits?
4. Two snails, Gastero and Pod, were completing in an exciting marathon. Gastero set off first, and rested for a day every third day. Pod started a week later, covered twice as much as ground in a day as Gastero did, but rested every second day. At least how many days was Pod overtake Gastero?
5. Jane and her dog Jimmy have a favorite walk in which they cover a total of 32 km between them. On the outward journey, Jimmy runs four times as far as Jane walks, and on the return he covers twice the distance she does. Jane comes back by the same route as she followed on the outward journey. How far does she walk?

6. When it is $\frac{1}{5}$ full of water (by weight) a jug weights 560 grams. When it is $\frac{4}{5}$ full, the jug weights 740 grams. What does the jug weigh when it is empty?
7. How many integers from 1 to 1200 are not divisible by 2, 3 or 5?
8. A benefactor left a sum of money to be divided equally amongst a number of charities. From the full amount of money, Oxfam received \$4000 plus one ninth of the remainder. Next, from what was left, Save the Children received \$6000 plus one ninth of the remainder. Then what was left was distributed amongst the other charities. How many charities eventually benefited?
9. The pages of a book are numbered consecutively: 1, 2, 3, 4 and so on. No pages are missing. If in the page numbers the digit 3 occurs exactly 99 times, what is the number of the last page?
10. For admission to the school play, adult were charged \$130 each and students \$65 each. A total of \$30225 was collected, from fewer than 400 people. What was the smallest possible number of adults who paid?
11. *Peter* : How many scouts attended the jamboree last weekend?
Paul : I cannot remember, but I know that when the organizers attempted to group us into “threes” there were 2 scouts left over. However, when they attempted to group us into “fives” there were 3 scouts left over. Also the number of scouts present was odd and less than 1000.
Peter : I need more information!
Paul : I remember two other facts. The total present was a palindromic number (i.e. it reads the same backwards as forwards). Also, when they attempted to divide us into “sevens” there were 5 scouts left over.
Peter : Now I know the answer.
 How many scouts were present at the jamboree?
12. Alistair and I travelled by car to my cousin’s wedding, which was due to begin at 12 noon in a village an exact number of miles away. Alistair had slept in, so we did not leave until 7.30 a.m., later than planned. On the first 15 miles of road we averaged 40 miles per hour. Then, on a main road, we covered an exact number of ninths of the total distance at an average of 49 miles per hour, until we had to turn into a country lane for the final one-seventh of the journey. Here we were held up, first by a tractor and later by a flock of sheep, but eventually we reached our destination just before the bridge arrived at the church, with the clock striking 12. What was our average speed on the last frustrating leg of our journey?

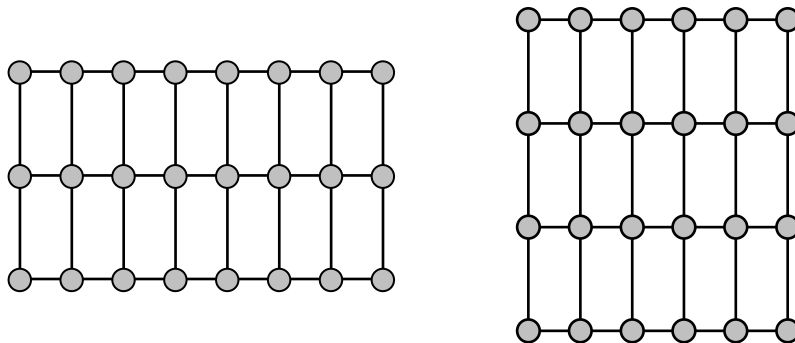
13. How many integers between 1 and 1,000,000 contain the digit 5 at least twice?
14. A certain positive integer n has its digits all equal to 3 and is exactly divisible by 383. Find the last five digits in the quotient $n \div 383$.
15. The square alongside has sides of length 8 units. The four identical circles fit tightly inside the square. What is the radius of the largest circle that will fit in the central hole?



16. The Big Wheel at a fairground is a regular polygon. Here is a part of it. How many sides does it have?

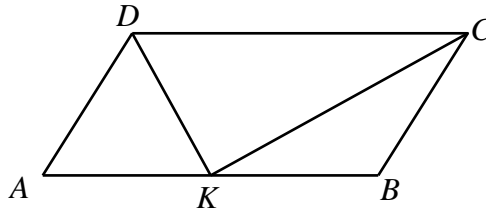


17. I have a collection of Mathematical Challenge posters, all on A3 paper, so that they are rectangular in shape and have the same measurements. I have some drawing pins which I am going to use to pin the posters on my wall. Each poster must have a pin at each of its four corners, but adjacent posters can share a pin by allowing them to overlap slightly. I want to arrange them so that they cover a rectangular area of the wall, with their longer sides vertical.

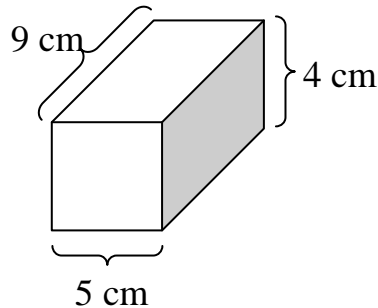


In the diagrams, 24 pins are used for 14 posters and 15 posters respectively. What is the greatest number of posters that I can pin up using 36 drawing pins?

18. In a parallelogram $ABCD$, $AB=2AD$. K is the midpoint of AB . Find the size of $\angle DKC$.



19. To cover the Christmas present (shown alongside) with sticky backed paper, you will require six rectangular pieces. What are the dimensions of the smallest single rectangular piece of sticky backed paper from which you could cut out the six pieces with the minimum of wastage?



20. A hexagon $ABCDEF$ has each side 6 cm in length. The angles at A , C , E are all right angles, and the angles at B , D , F are obtuse angles. Find the area of the hexagon.

