International Mathematics Assessments for Schools

2017 UPPER PRIMARY DIVISION FIRST ROUND PAPER

Time allowed：75 minutes

When your teacher gives the signal, begin working on the problems.

INSTRUCTION AND INFORMATION

GENERAL

1. Do not open the booklet until told to do so by your teacher.
2. No calculators, slide rules, log tables, math stencils, mobile phones or other calculating aids are permitted. Scribbling paper, graph paper, ruler and compasses are permitted, but are not essential.
3. Diagrams are NOT drawn to scale. They are intended only as aids.
4. There are 20 multiple-choice questions, each with 5 choices. Choose the most reasonable answer. The last 5 questions require whole number answers between 000 and 999 inclusive. The questions generally get harder as you work through the paper. There is no penalty for an incorrect response.
5. This is a mathematics assessment, not a test; do not expect to answer all questions.
6. Read the instructions on the answer sheet carefully. Ensure your name, school name and school year are filled in. It is your responsibility that the Answer Sheet is correctly coded.

THE ANSWER SHEET

1. Use only pencils.
2. Record your answers on the reverse side of the Answer Sheet (not on the question paper) by FULLY filling in the circles which correspond to your choices.
3. Your Answer Sheet will be read by a machine. The machine will see all markings even if they are in the wrong places. So please be careful not to doodle or write anything extra on the Answer Sheet. If you want to change an answer or remove any marks, use a plastic eraser and be sure to remove all marks and smudges.

INTEGRITY OF THE COMPETITION

The IMAS reserves the right to re-examine students before deciding whether to grant official status to their scores.

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Questions 1-10, 3 marks each

1. What is the simplified value of $\dfrac{20\times17}{2+0+1+7}$?

（A）340 （B）$\dfrac{34}{2017}$ （C）10 （D）20 （E）34

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2. What is the remainder when 2017 is divided by 9?

（A）0 （B）1 （C）2 （D）3 （E）7

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3. Positive integers are arranged in the array as shown below, what is the sum of all the integers located on the fifth row ?

$$\begin{array}{ccccccc} & & & 1 & & & \\ & & 2 & 3 & 4 & & \\ & 5 & 6 & 7 & 8 & 9 & \\ 10 & 11 & 12 & 13 & 14 & 15 & 16 \\ & & & \vdots & & & \end{array}$$

（A）91 （B）164 （C）172 （D）189 （E）215

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4. Arrange the numbers $2.\overline{718}$, $2.7\overline{18}$, $2.71\overline{8}$ and 2.71828 in increasing order. (Repeating decimals are denoted by drawing a horizontal bar above the recurring figures.)

（A）$2.7\overline{18}<2.\overline{718}<2.71828<2.71\overline{8}$ （B）$2.71828<2.7\overline{18}<2.\overline{718}<2.71\overline{8}$

（C）$2.7\overline{18}<2.71828<2.\overline{718}<2.71\overline{8}$ （D）$2.71828<2.71\overline{8}<2.7\overline{18}<2.\overline{718}$

（E）$2.7\overline{18}<2.\overline{718}<2.71\overline{8}<2.71828$

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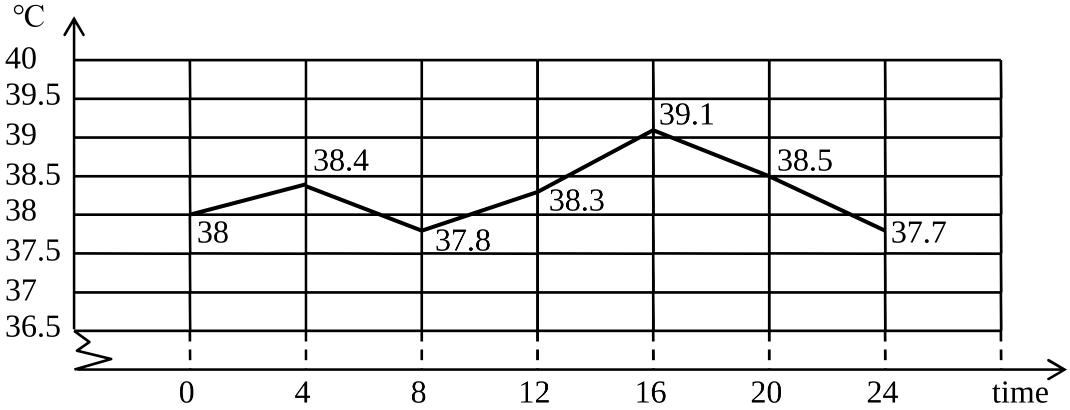
5. The figure below plots the body temperature records of one patient in a day. The records started at 00:00 AM and were taken every 4 hours. After how many hours did the patient recorded his highest temperature?



（A）0 （B）4 （C）12 （D）16 （E）24

6. On a 5×5 table below, place into each cell the sum of its row number and column number. For example, value of a below is $2+3=5$. How many odd numbers are filled into the table?

	1	2	3	4	5
1					
2			a		
3					
4					
5					

(A) 5 (B) 10 (C) 12 (D) 18 (E) 25

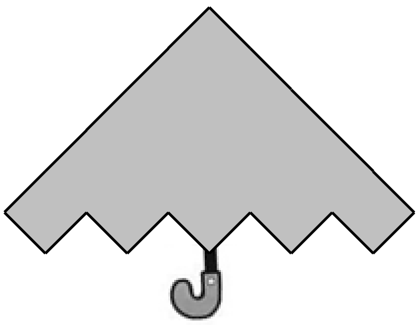
7. There are 23 kids seated in a row. They call out the numbers from left to right as 1, 2, 3, 4, 1, 2, 3, 4, 1, 2, … for the first round. They call out 1, 2, 3, 4, 1, 2, 3, 4, 1, 2, … from right to left for the second round. How many kids call out the same number in two rounds?

(A) 11 (B) 12 (C) 15 (D) 18 (E) 23

8. Salted water with 3.2% concentration weights 500 g. How many salt, in grams, is left if the water is vaporized completely?

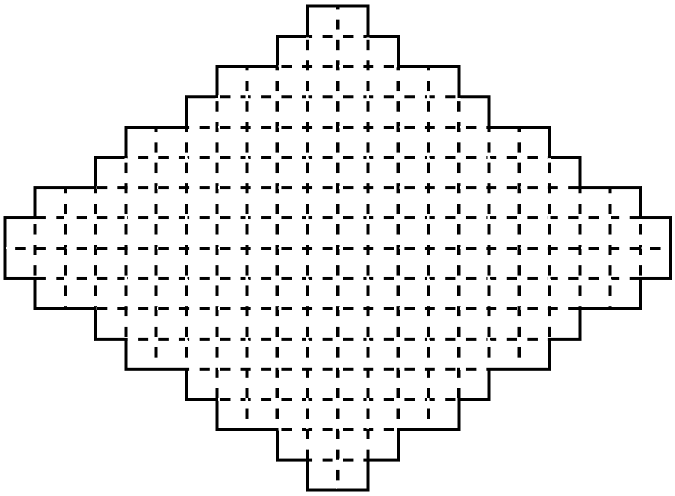
(A) 16 (B) 32 (C) 64 (D) 100 (E) 128

9. In the figure below, Tom combined some squares of the same size into a shape of umbrella. Find the least number of squares he would use.



(A) 5 (B) 9 (C) 12 (D) 15 (E) 20

10. The shape enclosed by solid lines in the figure below is composed of unit squares. What is the maximum area of a rectangle that can be cut from the shape along grid lines?



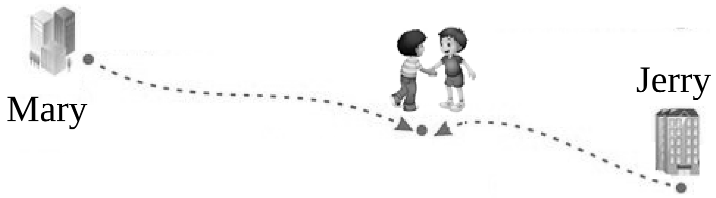
（A）80　（B）96　（C）100　（D）112　（E）128

Questions 11-20, 4 marks each

11. Given six cards with numbers 1, 2, 3, 4, 5 and 6 one card for each number. Each time Lee takes 2 cards, he computes the difference (larger one minus small one) and discards the two cards. Find the maximum possible sum of the three differences after all cards are discarded.

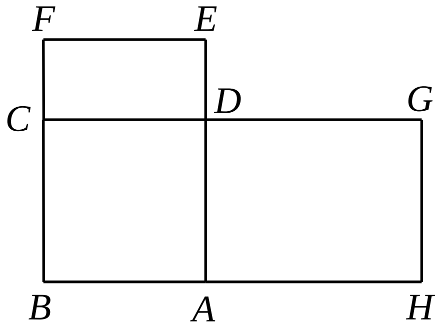
（A）3　（B）5　（C）7　（D）8　（E）9

12. The houses of Mary and Jerry are connected by a trail. One day, they started from their respective house at the same time, and walked towards the other's house. The speed of Mary is 1.5 times that of Jerry and they met 12 minutes later. On the next day, Mary left his house and walked to Jerry's house with the same speed. How long would he take to reach Jerry's house?



（A）15　（B）18　（C）20　（D）24　（E）30

13. In the figure below, the area of square *ABCD* is 36 cm^2, the area of rectangle *CDEF* is 18 cm^2 and the area of *ADGH* is 48 cm^2. What is the perimeter, in cm, of *BFEDGH*?



（A）18　（B）36　（C）46　（D）48　（E）56

14. There are two routes starting in a bus stop. A bus departs for the first route every 8 minutes and departs the second route every 10 minutes. At 6:00 in the morning, two buses depart for the two routes at the same time. Among the choices below, when will the buses depart for the two routes simultaneously?

（A）7:30　（B）8:20　（C）9:40　（D）10:00　（E）11:00

15. Let *a*, *b*, *c*, *d*, *e* and *f* are distinct digits such that the expression $\overline{ab}+\overline{cd}=\overline{ef}$. What is the least possible value of $\overline{ef}$?

（A）30　（B）34　（C）36　（D）39　（E）41

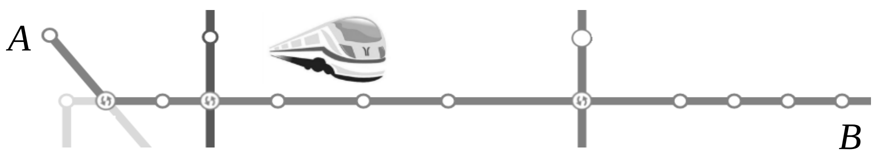
16. Henry starts working at 9∶00 in the morning and finishes at 5∶00 in the afternoon. How many more degrees does the minute hand rotates than the hour hand does on the clock during this period?

（A）120　（B）1200　（C）1320　（D）2640　（E）2880

17. The average score of a class in an exam is 70. Two students got 0 for absence and the average of remaining students is 74. What is the total number of students in the class?

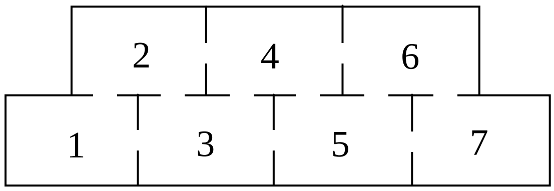
（A）25　（B）28　（C）30　（D）35　（E）37

18. The price criteria of the subway ticket of a city is as follows: \$2 for within 4 km, \$1 more per 4 km for distances between 4 km and 12 km, \$1 more per 6 km for distances over 12 km. It costs \$8 to take subway from station *A* to station *B*. Which of the following is closest to the distance between *A* and *B*?



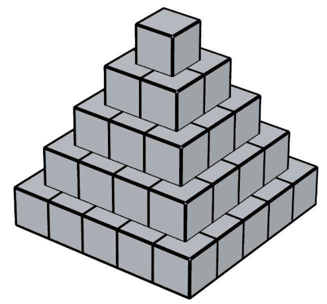
（A）12 km　（B）18 km　（C）24 km　（D）36 km　（E）48 km

19. The figure below shows the floor plan of a library. Each room is connected to adjacent rooms. One starts from room 1 and walks through all rooms without repetitions (going back). How many unique paths are there?



(A) 4 (B) 8 (C) 10 (D) 12 (E) 14

20. In the figure below, 55 unit cubes were stacked in a pile. Paint the surface of the pile of cubes but the face on the ground is not painted. How many unpainted unit cubes are there when the stack is separated?

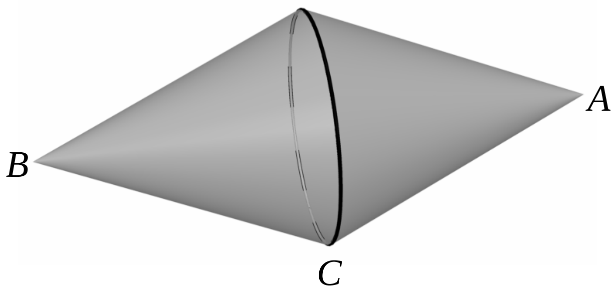


(A) 6 (B) 9 (C) 13 (D) 14 (E) 18

Questions 21-25, 6 marks each

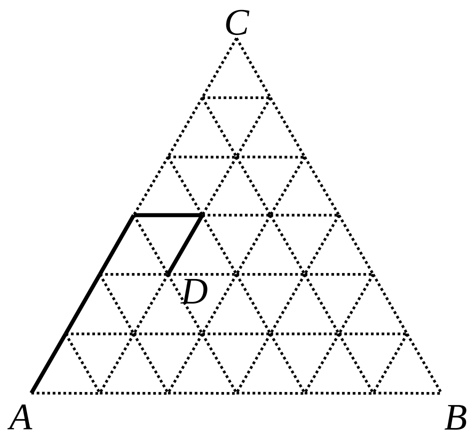
21. There are 50 mail boxes. One day 151 letters are distributed into these mail boxes. It turns out that one mail box has more letters than any other mail box. What is minimal number of letters this mail box can have?

22. In the figure below, a bottle consists of side faces of two identical cones. The radius of the bottom of the cone is 5 cm while the distance between *A* and *B* is 24 cm. There is a hole at *A* and is sealed elsewhere. The bottle is now filled up with water and placed on a horizontal table with *BC* along the table top face. What is the volume, in cm^3, of the water left, if the thickness of the bottle surface and size of hole is ignored (take π as 3.14)?



23. The sum of all the digits of a 3-digit number is divided by 4. Now, the sum of all digits of the number which is equal to the previous 3-digit number plus 1 is also divided by 4. What is the largest possible such number?

24. In the figure below, the side length of equilateral triangle *ABC* is 6 cm. Each side is divided into 6 equal segments and connects corresponding dividing points to get an equilateral network. Call a point "reachable" if it can be connected to *A* by a broken line of length 5 cm along the grid lines without passing any lattice point twice. For example, point *D* in the figure is reachable. Find the number of reachable points in the figure.



25. The students in a research class are clustered into two groups: the morning and afternoon sessions. A student takes part in exactly one group in each session (the two groups in each session can be different and the number of students in each group can be different). Each group has at least one student and at most 6 students. Each student reports the number of students in the group he or she belongs to in two sessions. One finds that no two students report the same pair of numbers (with order, for example, (1, 4) and (4, 1) are different). What is maximum number of students in the class?

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