International Mathematics Assessments for Schools

2018 MIDDLE 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. 1. What is the value of $19\times1+19\times3+19\times5+19\times7+\cdots+19\times19$?

（A）1900 （B）1919 （C）2900 （D）2919 （E）3800

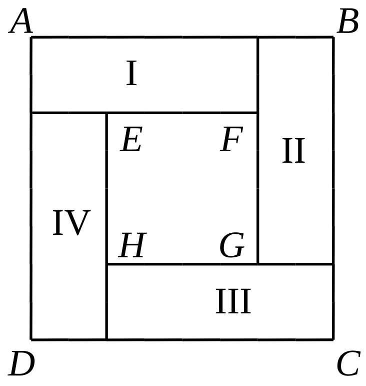
2. If $(\Delta\times2-1)\times2=2018$, then what is the value of Δ?

（A）502 （B）503 （C）504 （D）505 （E）506

3. Five students sit along a circle and starts to call out some numbers one-by-one. Student A calls out “1”, B calls out “2”, C calls out “3”, D calls out “4”, E calls out “5” and then it returns back to Student A who calls out “6” and so on, where each student increases the previously called number by one and calls it out. Which student calls out the number “99”?

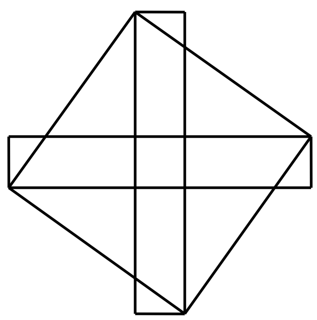
（A）A （B）B （C）C （D）D （E）E

4. In the figure shown below, four rectangles of the same size, denoted by I, II, III and IV, are placed together, where *ABCD* and *EFGH* are both squares. If rectangle I has a perimeter of 20 cm, then what is the perimeter, in cm, of *ABCD*?



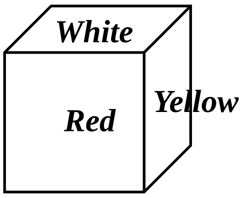
（A）40 （B）60 （C）80 （D）100 （E）120

5. How many triangles in total are there in the figure below?



（A）4 （B）8 （C）12 （D）14 （E）16

6. The six faces of a cube are colored using six different colors namely red, blue, yellow, green, black and white in some order. Turn the cube arbitrarily and it shows the two possible scenarios below. What is the color opposite to the face of green?

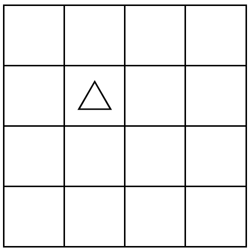


（A） Red　（B） Yellow　（C） Blue　（D） Black　（E） White

7. Consider every positive integers whose digits do not include 2 and that sum of its digits is equal to 3 and arrange all such integers in increasing order. What is the sum of the three smallest integers that satisfy the conditions?

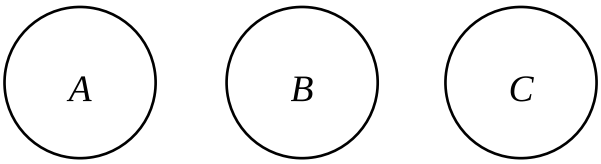
（A） 36　（B） 63　（C） 144　（D） 206　（E） 414

8. In the 4×4 square table shown below, a △ is placed on the second row and second column. What is the total number of squares with sides falling on the grid lines and containing △?



（A） 8　（B） 10　（C） 11　（D） 12　（E） 14

9. In the figure below, a frog jumps between the three circles. In each jump, it goes from one circle into another circle. It is known that the frog starts from A and ends at A after 4 jumps. How many different paths can the frog have?



（A） 4　（B） 5　（C） 6　（D） 7　（E） 8

10. In 1202 A.D., Italian mathematician Fibonacci (1170～1250) wrote in his book 《Liber Abaci》 the following interesting problem: Exactly two months after their birth, a pair of rabbits will give birth to a new pair (one male and one female) and then give birth to a pair each month after that. There is only one pair of new born rabbits at the beginning. If the rabbits never die, how many pair of rabbits are there after exactly 12 months?

（A） 144　（B） 233　（C） 234　（D） 235　（E） 377

Questions 11-20, 4 marks each

11. Define "*" as an operation such that $4*2=82$, $6*3=183$, $8*4=324$, $9*3=276$ and $9*5=454$. What is the value of $10*2$?
(A) 55 (B) 125 (C) 202 (D) 208 (E) 2002

12. Bob got a score of 94 on foreign language test, and his average score on the native language and math tests is 97. What is his average score on these three tests?
(A) 94 (B) 94.5 (C) 95 (D) 95.5 (E) 96

13. Color the surfaces of a $5\times5\times5$ wooden cube red, then cut it into smaller $1\times1\times1$ cube pieces. How many of these smaller cubes have exactly two red faces?
(A) 36 (B) 48 (C) 61 (D) 90 (E) 98

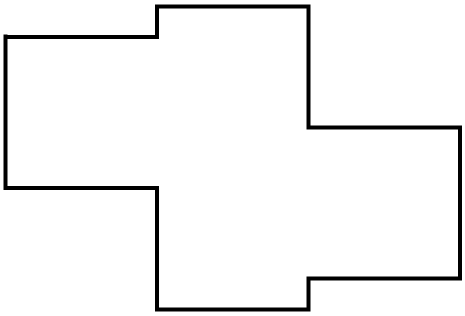
14. A palindrome number is a positive integer that is the same when read forwards or backwards. The numbers 909 and 1221 are examples of palindromes. How many palindrome numbers are there between 10 and 1000?
(A) 90 (B) 99 (C) 100 (D) 106 (E) 108

15. In the month of February of some year, there are more Saturdays than any other days in a week. What day is the last day of this month?
(A) Wednesday (B) Thursday (C) Friday (D) Saturday (E) Sunday

16. Four students namely Annie, Benny, Charlie and Deany all paid the same amount of money to buy some number of notebooks together. After distributing the notebooks, Annie, Benny and Charlie got 6, 7 and 11 notebooks more than Deany, respectively. As such, to be fair, Annie, Benny and Charlie gave back a total of $48 to Deany. What is the price of each notebook?
(A) 2 (B) 6 (C) 8 (D) 12 (E) 16

17. A train left town A at 8:30 AM some day and arrived at town B at 1:50 AM of the next day. There is no time difference between the two places. How long did the train travelled for the trip?
(A) 5 hours 20 minutes (B) 10 hours 20 minutes (C) 15 hours 20 minutes (D) 16 hours 20 minutes (E) 17 hours 20 minutes

18. Mike placed 4 identical squares, each with side length 5 cm and are non-overlapping, to form a new figure as shown below. Find the perimeter, in cm, of this new figure.



(A) 15 (B) 20 (C) 30 (D) 45 (E) 50

19. Adam owns an old watch, which is slower than a normal watch by the same amount of time for each hour. At 8 o'clock in the morning, the old watch reads 8 o'clock. At 9 o'clock in the morning, it reads 8:58. What time does it read when the real time is 4 o'clock in the afternoon?

(A) 3：42 (B) 3：44 (C) 3：46 (D) 4：08 (E) 4：16

20. Identical equilateral triangles are placed together into two figures as shown below. One can cover Figure B using 5 pieces of Figure A. How many different ways can we do the covering?

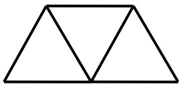


Figure A

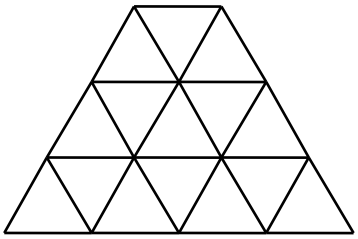
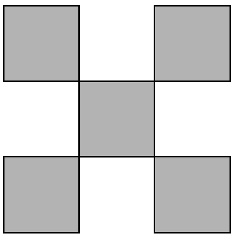


Figure B

(A) 3 (B) 4 (C) 5 (D) 6 (E) 7

Questions 21-25, 6 marks each

21. Put some unit cubes into a 3D model such that in the model, each cube touches some other cubes in at least one point. It is known that the model looks like the figure below from three directions of upright front, left and top. What is the least number of unit cubes needed to make such a model?



22. How many ways can we divide 6 students into 3 groups so that each group has exactly 2 students?

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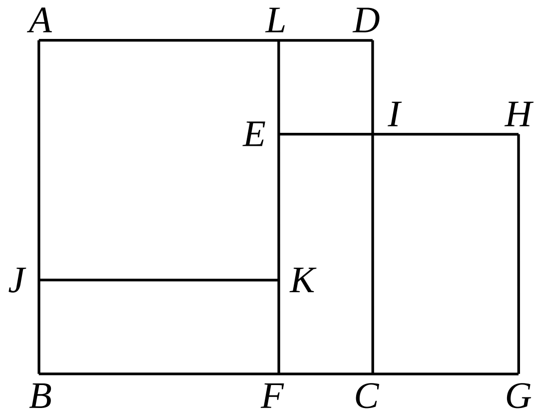
23. In the figure below, *ABCD*, *EFGH* and *AJKL* are squares. The area of *AJKL* is 2018 cm^2. If rectangles *EFCI* and *JBFK* both have an area of 1360 cm^2, then what is the area, in cm^2, of *CGHI*?



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24. Three pairs of red, four pairs of yellow and five pairs of white socks are placed in a bag. Now, blindly take a sock out each time. How many socked are needed to be taken out to guarantee having six pairs of socks? (Note: Two socks of the same color are considered a pair)

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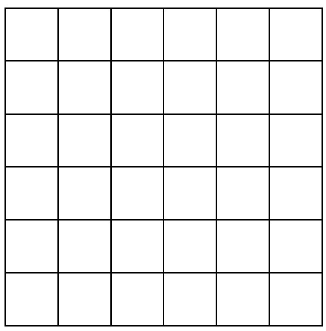
25. Cut the 6×6 square table below into rectangles along grid lines such that no two rectangles are identical. What is the maximum number of rectangles one can get? (Note: A square is considered a rectangle.)



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