

International Mathematics Assessments for Schools

2019 ~ 2020 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. What is the simplified value of

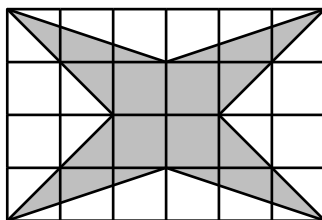
$$13+12+11+\dots+3+2+1+2+3+\dots+11+12+13?$$

(A) 181 (B) 182 (C) 183 (D) 184 (E) 185

2. If $(\Delta \times 2 + 1) \times 3 = 2019$, then what is the value of Δ ?

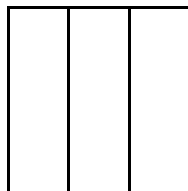
(A) 335 (B) 336 (C) 337 (D) 3028 (E) 3029

3. In the figure below, each unit square has side length of 1 cm. What is the area, in cm^2 , of the shaded region?



(A) 6 (B) 8 (C) 10 (D) 12 (E) 14

4. A square piece of paper, with a perimeter of 48 cm, is to be cut into three rectangles of the same size as shown in the figure below. What is the perimeter, in cm, of each rectangle that was cut out?



(A) 12 (B) 18 (C) 24 (D) 32 (E) 40

5. In the equation below, fill in the five numbers 7, 50, 51, 55, and 63 into the five circles to make the equality true. What is the sum of the numbers in the first three circles?

$$\bigcirc + \bigcirc + \bigcirc - \bigcirc = \bigcirc$$

(A) 105 (B) 106 (C) 113 (D) 114 (E) 118

6. How many different 3-digit numbers are there such that the sum of its digits is equal to 4?

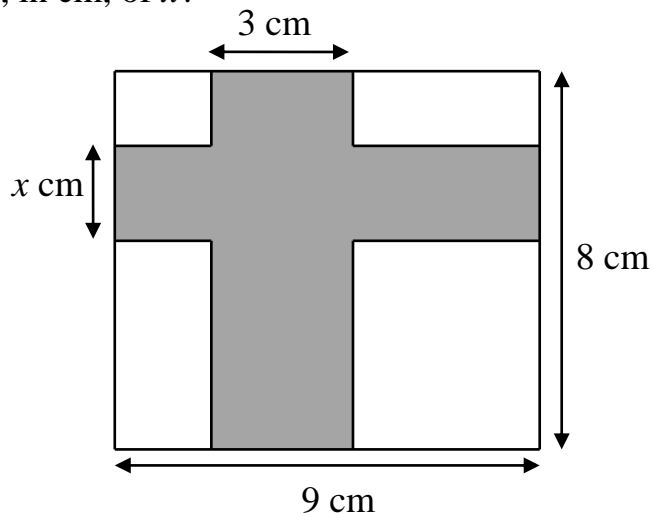
(A) 7 (B) 8 (C) 9 (D) 10 (E) 11

7. There are a total 80 pandas in a zoo, all of which are housed in three different halls. The number of pandas in Hall 1 is twice that in Hall 2, and the number of pandas in Hall 2 is three times that in Hall 3. How many pandas are there in Hall 2?
- (A) 16 (B) 24 (C) 36 (D) 48 (E) 60
-
8. Every page of a book is either all text or all illustrations and that there are exactly three pages of illustrations between every two pages of text, that is, if the last page of the book is text only, then one page before and after the three-page illustration are all-texts. If the last page is an illustration, in addition to the illustrations on the last few pages, one page before and after the other three pages of illustrations is text. If the first page of the book is text, and it has a total of 136 pages, how many pages are there in this book are illustrations only?
- (A) 104 (B) 103 (C) 102 (D) 68 (E) 34
-
9. For any positive integer, we compute by following the operating rules: If the number is an even number, then we divide it by 2; and if it is odd, then we add 1 to it. We continue to do these operations until we arrive with the value of “1” for the first time. How many numbers will leave a value of “1” after four operations?
- (A) 2 (B) 3 (C) 4 (D) 5 (E) 6
-
10. Among the numbers from 0 to 200, what is the average of all numbers that are multiples of 3?
- (A) 95 (B) 96 (C) 99 (D) 100.5 (E) 101
-

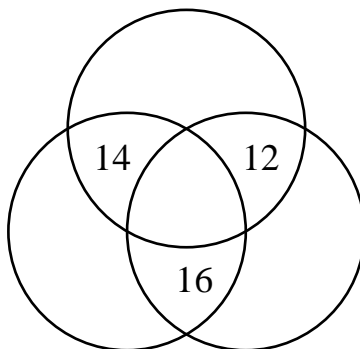
Questions 11-20, 4 marks each

11. What is the tens digit of the simplified value of the following expression:
 $1 + 12 + 123 + 1234 + 12345 + 123456 + 1234567 + 12345678 + 123456789$?
- (A) 0 (B) 2 (C) 4 (D) 6 (E) 8
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12. In the figure below, the largest rectangle has dimensions 9 cm long by 8 cm wide, with a cross-section formed by two shaded rectangles in the middle. If the total area of the shaded parts is exactly equal to the area of the un-shaded parts, then what is the value, in cm, of x ?

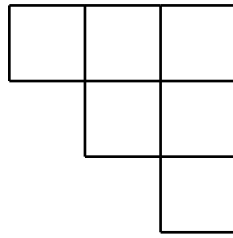


- (A) 1 (B) 2 (C) 3 (D) 4 (E) 5
-
13. Use the digits 2, 0, 1, and 9 exactly once to form different 4-digit numbers. How many of these 4-digits numbers will be greater than 1905?
- (A) 12 (B) 13 (C) 15 (D) 17 (E) 19
-
14. After deleting one of the six numbers 2, 3, 12, 26, 29 and 41, the five remaining numbers can be divided into two groups with the same sum. What is the number that was deleted?
- (A) 3 (B) 12 (C) 26 (D) 29 (E) 41
-
15. As shown in the diagram, three of the seven areas enclosed by the three circles are each filled with a number, and it is known that the numbers 13, 15, 17, and 18 can be filled inside the four blank areas such that the sum of the four numbers in each circle are all equal. What is the sum?



- (A) 58 (B) 59 (C) 60 (D) 61 (E) 62

16. In the figure below, each unit square has a side length of 1 cm. How many squares and rectangles are there?



- (A) 9 (B) 12 (C) 14 (D) 15 (E) 16
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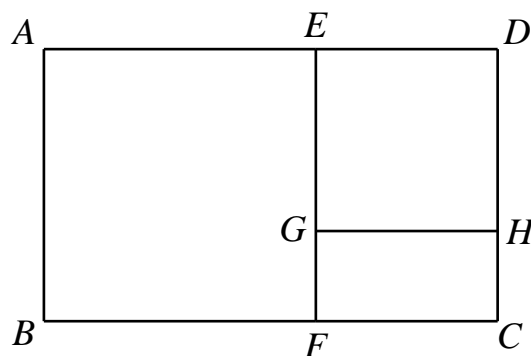
17. A theater has nine rows of seats. The first row has a total of 19 seats and starting from the second row, each row has two more seats than the previous row. How many seats does this theater have in total?

- (A) 173 (B) 187 (C) 243 (D) 261 (E) 280
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18. Divide the six positive integers 2, 3, 7, 13, 18, and X into three groups so that the first group contains one number, the second group contain two numbers, and the third group contain three numbers, where X must belong in the third group. If the number in the first group is greater than the sum of the numbers in the second group, and that the sum of the numbers in the second group is greater than the sum of the numbers in the third group, then what is the maximum possible value of X ?

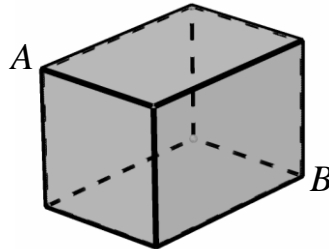
- (A) 4 (B) 5 (C) 6 (D) 7 (E) 8
-

19. In the figure below, rectangle $ABCD$ has a perimeter of 32 cm, where both $ABFE$ and $EGHD$ are squares. If the perimeter of $GFCH$ is 12 cm, then what is the area, in cm^2 , of rectangle $ABCD$?



- (A) 28 (B) 39 (C) 48 (D) 55 (E) 60
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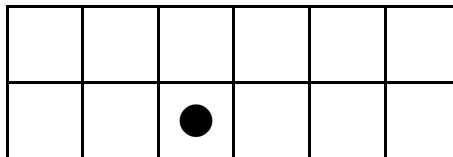
20. As shown in the figure below, an ant starting from vertex A of the cuboid needs to move along the edges to reach its destination, vertex B . If the ant can only pass through three edges, how many possible paths can the ant crawl to reach the destination?



(A) 3 (B) 6 (C) 9 (D) 12 (E) 15

Questions 21-25, 6 marks each

21. A 5-digit number is formed by using digits that are all different. It is known that four of the digits used are 3, 6, 8 and 9, and that the difference between any two adjacent digits is greater than 3. How many 5-digit numbers are there that satisfy the condition?
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22. Joe has a total of 31 dollars that he will use to purchase four different items that have unit prices of 2, 3, 5 and 7 dollars each respectively. If he needs to purchase at least one piece of each item, and Joe has to use all his money without leftovers, in how many different ways can he buy the goods?
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23. It is known that the sum of the ages of A and B this year is 60 years old. 2 years ago, the sum of the ages of B and C is also 60 years old and 3 years from now, the sum of the ages of A and C is still 60 years old. How old is A this year?
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24. A coin is placed in one of the unit squares in the grid as shown below. How many rectangles (including squares) can be formed that contains the coin?



25. There are 25 boys in a class, 16 of whom are members of the football team, 12 in the basketball team and 10 in the volleyball team. It is known that no one participates in all three sports at the same time, and each boy participates in at least one team. If five boys participate in both the football and basketball teams, and three boys participate in both the basketball and volleyball teams. How many boys are there that participate in both the football and volleyball teams?
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