

# *International Mathematics Assessments for Schools*

## **2019 ~ 2020 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.



---

## 2019 ~ 2020 UPPER PRIMARY DIVISION FIRST ROUND PAPER

---

### Questions 1-10, 3 marks each

1. What is the simplified value of  $2.5 \times 3.2 \times 0.76 \times 12.5$ ?  
(A) 0.76      (B) 7.6      (C) 76      (D) 176      (E) 760

---

2. The purchase volume of apples in a hypermarket is 1560 kg, and it is three times that of pears. What is the total purchase amount of apples and pear, in kg, of that hypermarket?  
(A) 520      (B) 2080      (C) 2180      (D) 4680      (E) 6240

---

3. Which of the following statements is correct for the approximation of the "rounding method"?  
(A) When representing approximations of numbers, 3.00 is the same as 3.0.  
(B) The approximation 4.0 is as precise as 4.  
(C) The result in approximation of  $2.019 \times 0.5$  to the nearest thousandth is 1.009.  
(D) If the approximate value of a certain number is 3, then this number must be less than 3.05.  
(E) The approximation of repeating decimal number  $2.\overline{019} = 2.019019\dots$  to the fifth place after the decimal point is 2.01902.

---

4. Which of the following statements is correct?  
(A) The quotient of the dividend divided by the divisor must be less than the dividend.  
(B) The quotient obtained when the dividend is divided by the divisor must be greater than the dividend.  
(C) The quotient obtained when a number is divided by 0.4 must be greater than this number.  
(D) If both the dividend and divisor are greater than 0, then when the divisor is doubled, the quotient is doubled.  
(E) If both the dividend and divisor are greater than 0, and if the quotient is less than the dividend, then the divisor must be greater than 1.

---

5. Use "<" to connect  $12.\overline{521}$ ,  $12.\overline{521}$ ,  $12.\overline{521}$ ,  $12.522$ .  
Which of the following statement is correct?  
(A)  $12.\overline{521} < 12.\overline{521} < 12.\overline{521} < 12.522$     (B)  $12.\overline{521} < 12.\overline{521} < 12.522 < 12.\overline{521}$   
(C)  $12.\overline{521} < 12.\overline{521} < 12.522 < 12.\overline{521}$     (D)  $12.\overline{521} < 12.\overline{521} < 12.\overline{521} < 12.522$   
(E)  $12.\overline{521} < 12.\overline{521} < 12.\overline{521} < 12.522$

---

6. The following table records the number of students in a certain primary six class in their mathematics mid-term exam.

Score	100 points	90~99 points	80~89 points	70~79 points	60~69 points	Below 60 points
No. of students	3	8	16	6	4	3

If the score of a student in this examination is more than 79 points, he/she will receive a gift. What is the percent rate of the students that will receive a gift in the mid-term exam?

$$\left( \text{Percent Rate} = \frac{\text{Number of students receiving gift}}{\text{Total number of students in the class}} \right)$$

- (A) 40%      (B) 60%      (C) 67.5%      (D) 82.5%      (E) 92.5%
- 

7. There are 110 meters of blue cloth, capable of making 22 sets of adult uniforms. After making 15 sets, the remaining cloth is just enough for 10 children's uniforms. How much less cloth, in meters, does a child uniform use than an adult uniform?

- (A) 1      (B) 1.5      (C) 2      (D) 2.5      (E) 3
- 

8. A classroom is 8 m long, 6 m wide and 4 m high. Jose wants to paint the ceiling and surrounding walls of the classroom, but the door and window with a total area of  $22 \text{ m}^2$  will not be painted. What is the total area that needs to be painted?

- (A) 138      (B) 160      (C) 186      (D) 192      (E) 208
- 

9. A two-digit prime number has two distinct digits. When the two digits are swapped, one gets another prime number. How many such two-digit primes are there?

- (A) 2      (B) 4      (C) 6      (D) 8      (E) 10
- 

10. In a division of positive integers, the quotient is 24 and the remainder is 42. When the divisor takes the smallest possible value, what is the dividend?

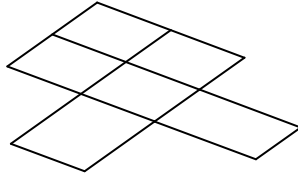
- (A) 1008      (B) 1032      (C) 1050      (D) 1074      (E) 2019
- 

### Questions 11-20, 4 marks each

11. It is known that a three-digit number  $\overline{2ab}$  is divisible by 6. What is the maximum possible value of  $a + b$ ?

- (A) 14      (B) 15      (C) 16      (D) 17      (E) 18
-

12. How parallelograms with sides on the grid lines are there in the figure below?



(A) 6                      (B) 8                      (C) 10                      (D) 13                      (E) 15

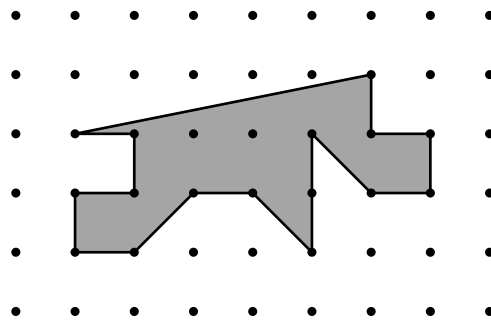
---

13. The same number of white and black balls are placed in a box. In one operation, five white balls and three black balls were taken out from the box. After several operations, there were zero white balls and only 6 black balls left in the box. How many operations was performed?

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

---

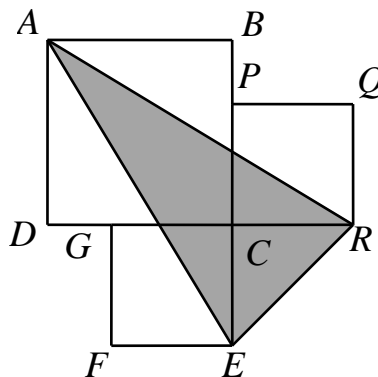
14. In the figure below, the distance between two adjacent vertices is 1 cm. What is the area of the shaded portion of the figure, in  $\text{cm}^2$ ?



(A) 7.5                      (B) 8                      (C) 8.5                      (D) 9                      (E) 9.5

---

15. The side length of square  $ABCD$  is 6 cm, while that of square  $CEFG$  and  $CPQR$  are both 4 cm, as shown in the figure. What is the area, in  $\text{cm}^2$ , of the shaded portion?



(A) 32                      (B) 36                      (C) 40                      (D) 42                      (E) 48

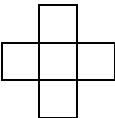
---

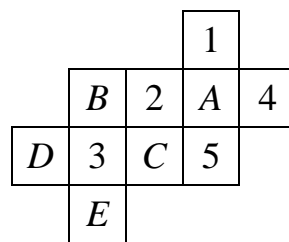
16. There are three kinds of lunch boxes in the school cafeteria, the prices are \$15, \$13 and \$11, respectively. At a certain day noon time, the total income of the cafeteria from selling lunch boxes was \$2019. How many lunch boxes might the cafeteria sold at noon time on that day?

(A) 105      (B) 130      (C) 155      (D) 185      (E) 205

---

17. Each square in the figure below is filled with a positive integer so that the sum of

each  (five squares) is divisible by 3.

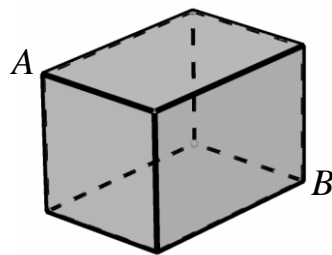


What is the minimum value of  $A + B + C + D + E$ ?

(A) 3      (B) 6      (C) 8      (D) 9      (E) 15

---

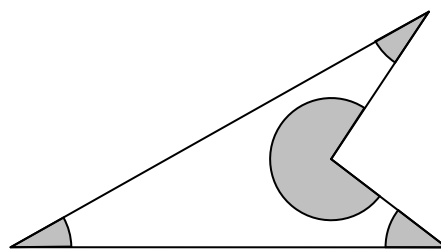
18. As shown in the figure below, an ant starting from vertex  $A$  of the cuboid needs to move along the edges to reach its destination, vertex  $B$ . If the ant can only pass through three edges, how many possible paths can the ant crawl to reach the destination?



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

---

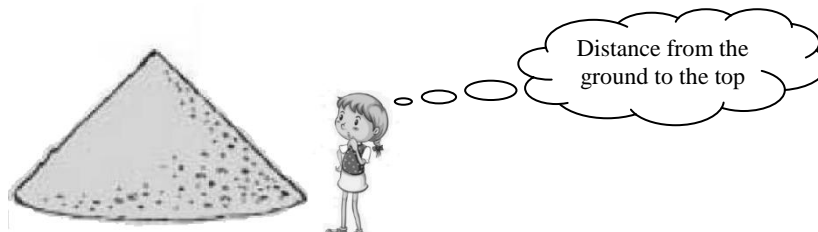
19. Given a concave quadrilateral, draw a sector with radius of 5 cm from each of the four vertices as shown below. What is the area, in cm, of these four sectors? (Assume  $\pi = 3.14$ )



(A) 39.25      (B) 78.5      (C) 157      (D) 235.5      (E) Undetermined

---

20. There is a conical wheat heap on the yard, which weighs about 10 385.55 kg. If the bottom circumference is 18.84 m, the weigh of the wheat is 735 kg per  $\text{m}^3$ . What is the approximate distance, in cm, from top of the heap to the ground? (Assume  $\pi = 3.14$ )



- (A) 0.5      (B) 0.8      (C) 1      (D) 1.2      (E) 1.5

### Questions 21-25, 6 marks each

21. 34, 40 and 28 divided by a positive integer give the same remainder. What is the maximum possible value of this positive integer?
22. A pile of 54 cards contains a complete set of playing cards with two “ghost” cards. It is known that on top of the pile is “King heart”. If in each operation the top 4 cards are moved to the bottom without changing their order and direction. At least how many operations will it take such that “King heart” appears on the top again?
23. There is a series of integers: 1, 1, 3, 5, 11, 21, 43, 85, 171, 341, 683, 1365, 2731, ... , this series has totally 109 numbers, and starting from the third number, each term is sum of the last number before it and twice the second last number before it. If we divide these 109 integers by 7, we get 109 remainders. What is the sum of all these remainders?
24. Suppose  $a, b, c, d, e, f, g, h, i, j$  is an arrangement of 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 with different letters representing different numbers. At most how many of the ten fractions  $\frac{a}{b}, \frac{b}{c}, \frac{c}{d}, \frac{d}{e}, \frac{e}{f}, \frac{f}{g}, \frac{g}{h}, \frac{h}{i}, \frac{i}{j}, \frac{j}{a}$  can be reduced to integer values?
25. Arrange all positive integers less than 30 in a line, calculate the reciprocal of the product of every three successive numbers, then add the reciprocals to obtain  $S$ , that is;

$$S = \frac{1}{1 \times 2 \times 3} + \frac{1}{2 \times 3 \times 4} + \dots + \frac{1}{26 \times 27 \times 28}.$$

What is the numerator of  $S$  reduced to the simplest fraction?

