注意：

允許學生個人、非營利性的圖書館或公立學校合理使用本基金會網站所提供之各項試題及其解答。**可直接下載而不須申請**。

重版、系統地複製或大量重製這些資料的任何部分，必須獲得財團法人臺北市九章數學教育基金會的授權許可。

申請此項授權請電郵 ccmp@seed.net.tw

Notice:

Individual students, nonprofit libraries, or schools are permitted to make fair use of the papers and its solutions. Republication, systematic copying, or multiple reproduction of any part of this material is permitted only under license from the Chiuchang Mathematics Foundation.

Requests for such permission should be made by e-mailing Mr. Wen-Hsien SUN ccmp@seed.net.tw

International Mathematics Assessments for Schools

2018 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.

2018 UPPER PRIMARY DIVISION FIRST ROUND PAPER

Questions 1-10, 3 marks each

1. What is the least common denominator of these three fractions: $\frac{1}{4}$, $\frac{5}{6}$ and $\frac{3}{8}$?

   （A）12　（B）16　（C）24　（D）48　（E）96

2. What is the largest possible integer that can be placed in the □ below such that the inequality is satisfied?

   $$9 \times \square < 2018$$

   （A）202　（B）212　（C）218　（D）224　（E）230

3. 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

4. If we add 6 to the denominator of $\frac{2}{3}$, then what number should be added to its numerator such that the value of the fraction remains unchanged?

   （A）3　（B）4　（C）5　（D）6　（E）7

5. There are 240 kg of flour in a restaurant, which is planned to be used for 8 days. After some modifications in the menu recipe, daily consumption of flour is now reduced by 6 kg. How many days will the stock of flour last?

   （A）10　（B）12　（C）16　（D）20　（E）24

6. 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

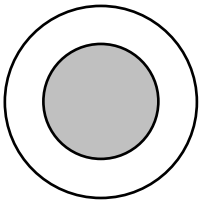
7. Three hundred pairs of shoes were shipped to a department store. The shoes were packed into 2 wooden boxes and 9 carton boxes. Each wooden box contains the same number of shoes, while each carton box also contains the same number of shoes. If 3 carton boxes contain the same number of shoes as 1 wooden box, how many pairs of shoes does each wooden box contain?

   （A）24　（B）30　（C）45　（D）60　（E）100

8. Which of the following statements below is true:
   （A）A proper fraction is always less than 1.
   （B）An improper fraction is always larger than 1.
   （C）A mixed fraction is always larger than an improper fraction.
   （D）The maximum proper fraction with fractional unit $\frac{1}{4}$ is $\frac{4}{4}$.
   （E）There are only 4 proper fractions less than $\frac{5}{6}$.

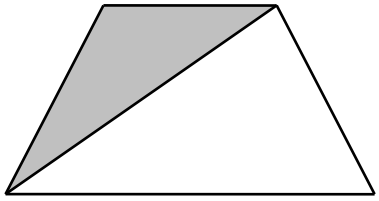
9. The fraction below each figure indicates the ratio of the area of the shaded region compared to the area of the whole figure. Which of the following options is always correct?

（A）Circle



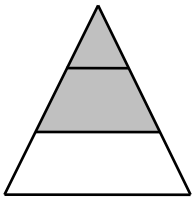
$\frac{1}{2}$

（B）Trapezoid



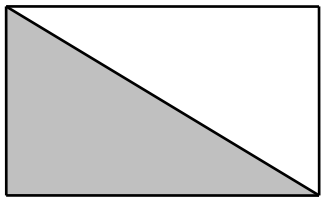
$\frac{1}{2}$

（C）Triangle



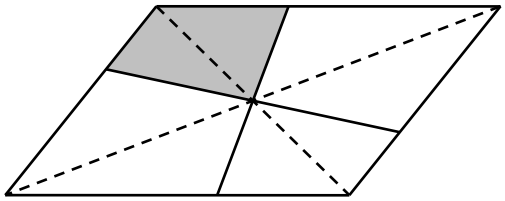
$\frac{2}{3}$

（D）Rectangle



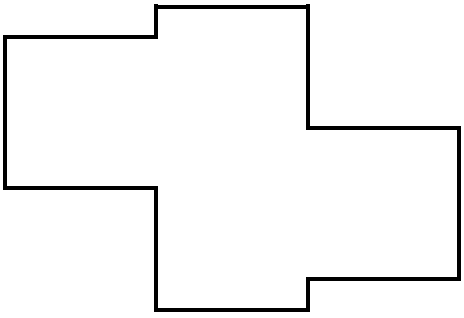
$\frac{1}{2}$

（E）Parallelogram



$\frac{1}{4}$

10. 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

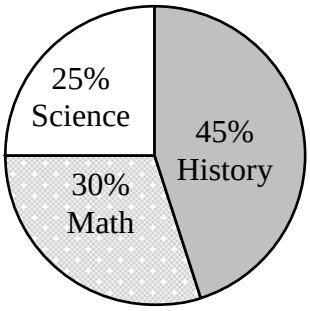
Questions 11-20, 4 marks each

11. When dividing, Mike mistakenly wrote 54 instead of 45. The resulting quotient is now 18 with remainder 18. What should be the correct quotient?

（A）15　（B）18　（C）22　（D）24　（E）28

---

12. The figure below shows a statistical pie chart of the number of History, Math and Science books in the library of Sun Light Elementary School. It is known the total number of books of these three subjects is 1200. How many more History Books are there than Science Books?



（A）300　（B）240　（C）180　（D）120　（E）60

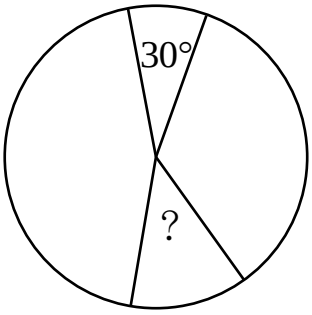
---

13. Cut a right cylinder starting from the diameter of its top face along an up and down direction, such that it is divided into two identical pieces. The cross section is a square. How many times of height of the cylinder is the circumference of its top face?（Use $\pi = 3.14$）

（A）1　（B）1.5　（C）1.57　（D）3.14　（E）6.28

---

14. Two sectors are located in a circle as shown in the figure below. The first sector has a central angle $30°$ and has an area of 37.68 cm^2, while the second sector has an area of 56.52 cm^2. Find the measure, in degrees, of the central angle of the second sector.（Use $\pi = 3.14$）



（A）36　（B）40　（C）45　（D）50　（E）60

---

15. 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 three-digit palindrome numbers are divisible by 9?
（A）10　（B）12　（C）15　（D）20　（E）24

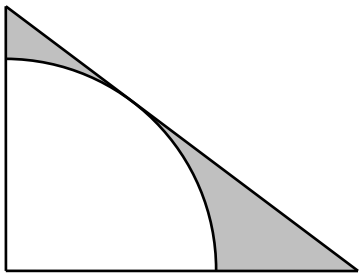
16. The table below shows an attendance sheet (which is incompletely filled-out) of a company on Oct. 30.

Employees / Department	Total number of Employees	Employees on Duty	Percentage
Department 1	150		96%
Department 2			
Total		234	97.5%

What is the total number of employees in Department 2 on Oct. 30?
（A）90　（B）100　（C）144　（D）150　（E）160

17. When some three-digit number is divided by 37, it gives a result of quotient *a* with remainder *b*, where a and b are non-negative integers. What is the maximum possible value of $a+b$?
（A）60　（B）62　（C）64　（D）66　（E）68

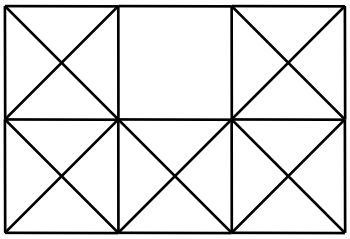
18. The side lengths of a right triangle are 3 cm, 4 cm and 5 cm, respectively. A quarter-circle is placed inside this triangle and touches the hypotenuse, as shown in the figure below. What is the area, in cm^2, of the shaded region?
($\pi = 3.14$, round-off to one decimal place)



（A）0.5　（B）1.5　（C）2.5　（D）3　（E）4.5

19. The greatest common divisor of *n* and 24 is 2, while the greatest common divisor of $n+1$ and 24 is 3. Which of the following numbers cannot be *n*?
（A）2　（B）14　（C）20　（D）38　（E）50

20. In the figure below, six identical squares are used to form a 3×2 rectangle, wherein the diagonals of five of these squares are drawn. How many right isosceles triangles are there in the figure?

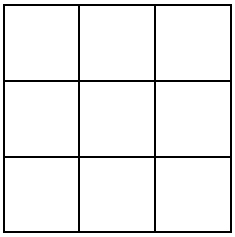


（A）20　　（B）48　　（C）51　　（D）52　　（E）53

Questions 21-25, 6 marks each

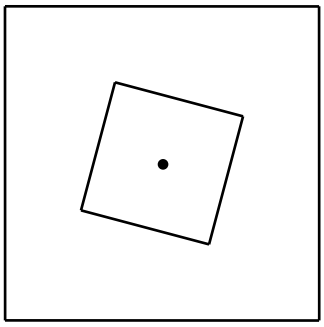
21. Mike constructs a sequence in the following way: the first two terms are 1 and 2. Starting from the third term, each term is the smallest possible integer that is not relatively prime to the previous term and has not yet appeared in any of the previous terms. Find the 20^{th} term of this sequence.

22. Shade 3 unit squares on the 3×3 grid below, such that there must be two shaded squares in some row and two shaded squares in some column but it must not have three shaded squares in any row or column. Find the total number of ways in shading the figure.

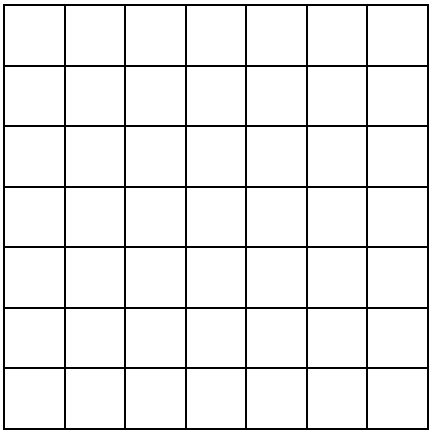


23. Three robots are programmed to count numbers. Robot A starts with the number 20 and it counts by increasing the number by 11 every second. Robot B starts with the number 2018 and it counts by decreasing the number by 100 every second. Robot C starts with some number and it counts by decreasing the number by 1 for the 1^{st} second, 2 for the 2^{nd} second, 3 for the 3^{rd} second and so on. If all three Robots started counting at the same time, and after some time, all of them got the same number, then what is the number that Robot C starts with?

24. Two squares having the same center are shown in the figure below. The larger square has a side length of 20 cm. The smaller square rotates around its center. During the rotation, it is known that the minimum distance between the vertices of the smaller square and the sides of the larger square is 4 cm. What is the area, in cm^2, of the smaller square?



25. Cut the 7×7 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.)



***