International Mathematics Assessments for Schools

2011 UPPER PRIMARY DIVISION SECOND ROUND PAPER

Time allowed：120 minutes

Name**:** ____________________ Contestant number: __________ Score**:** _______________

INSTRUCTION AND INFORMATION

- Do not open the booklet until told to do so by your teacher.
- Remember to write down your name and contestant number in the spaces indicated on this page.
- The second round paper is composed of three sections with a total of 100 points.
- Question 1~5 in which blanks are to be filled in and only **ENGLISH LETTER** are required. Only one answer in each question. Each question is worth 4 points. There is no penalty for a wrong answer.
- Question 6~13 in which blanks are to be filled in and only **ARABIC NUMERAL** answers are required. For problems involving more than one answer, points are given only when **ALL** answers are correct. Each question is worth 5 points. There is no penalty for a wrong answer.
- Complete solutions of question 14 and 15 are required for full credits. Partial credits may be awarded. Each problem is worth 20 points.
- No calculator or calculating device or electronic devices are allowed.
- Answer must be in pencil or in blue or black ball point pen.
- All papers shall be collected at the end of this test.

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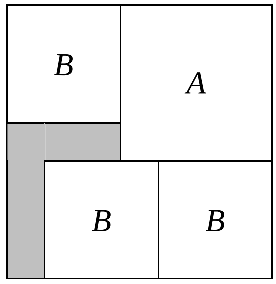
Questions 1-5, 4 marks each

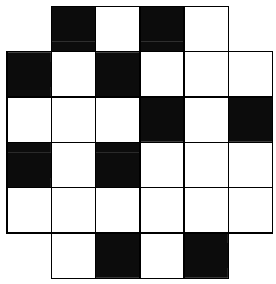
1. As shown in the diagram, a square floor has been paved partially with two types of square tiles, *A* and *B*, of respective areas 1600 cm^2 and 900 cm^2. How many square tiles of area 100 cm^2 are required to pave the remaining (shaded) part of the floor?



（A）6　　（B）7　　（C）8
（D）9　　（E）10

Answer：＿＿＿＿＿＿

2. As shown in the diagram, some of the squares are painted black. If we wish to have 75% of the whole figure black, how many more squares must be painted black?



（A）10　　（B）11　　（C）12
（D）14　　（E）16

Answer：＿＿＿＿＿＿

3. The 12 people at a party are 6 couples. Each man shakes hands with everyone else except his own wife. No two women shake hands with each other. What is the total number of handshakes among these 12 people?

（A）40　　（B）45　　（C）48　　（D）51　　（E）60

Answer：＿＿＿＿＿＿

4. The website of a company sends out an advertisement to the email boxes of its clients every 500 hours. Mickey received an advertisement from this website at 9 am last Tuesday. On which day will Mickey receive the next advertisement?

（A）Monday　（B）Tuesday　（C）Wednesday（D）Thursday（E）Friday

Answer：＿＿＿＿＿＿

5. In the correct addition below, each letter stands for a digit. What is the value of the sum $A+10B+C+D+E+F$?

$$\begin{array}{cccc} & A & 2 & E \\ & 1 & B & D \\ + & F & 2 & C \\ \hline & 6 & 3 & 2 \end{array}$$

（A）15 （B）24 （C）96 （D）100 （E）106

Answer：________

Questions 6-13, 5 marks each

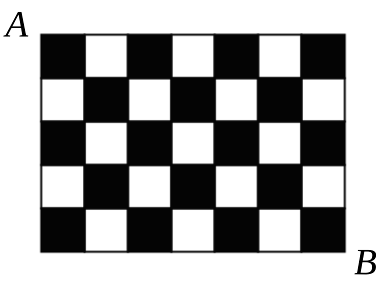
6. When a bus left the depot, one-half of the seats were empty. At the first stop, a number of passengers got on but nobody got off. Now one-sixth of the seats are empty. At the second stop, 7 passengers got on and 2 got off. Then there were no empty seats and each passenger had a seat. How many seats did this bus have?

Answer：________ seats

7. Using each of the digits 3, 4, 5 and 6 exactly once, form two 2-digit numbers. What is the difference between the largest possible product and the smallest possible product of two such numbers?

Answer：________

8. As shown in the diagram, a 5×7 grid is painted in checkerboard fashion, The length of the side of each square is 1 cm. An ant, starting from A at the top left corner, crawls along the grid lines to B at the bottom right corner. If during its movement, a black square is always on the left side of the ant, what is the minimum distance, in cm, the ant must crawl?



Answer：________ cm

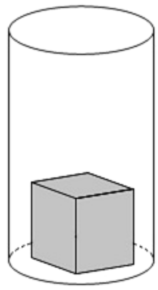
9. The sum of two positive integers a and b is 432, and the sum of their greatest common divisor and their least common multiple is 7776.
What is the product ab?

Answer：________

10. When harvested from the land, 90% of a turnip consisted of water. After being exposed in the sun for an hour, 10% of the water had evaporated. Now what the percentage of the turnip consisted of water? (Give the answer in percentages, correct to 2 decimal places.)

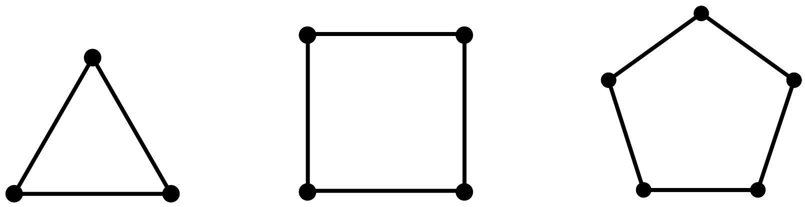
Answer： ______ %

11. As shown in the diagram, an empty cylindrical vessel of negligible thickness lies on a horizontal surface. The base radius of the vessel is 5 cm and the height is 20 cm. Inside the vessel is a wooden cube which has side length 6 cm, and its weight is evenly distributed. When floating in water, the top and bottom faces of the cube will be horizontal, and $\frac{1}{3}$ of its volume is above water. How much water, in cm^3, must be poured into the vessel so that the top face of the cube is level with the mouth of the vessel? ($\pi = 3.14$)



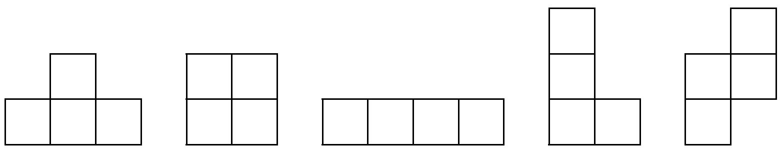
Answer： ______ cm^3

12. As shown in the diagram, it takes 3 sticks to form an equilateral triangular frame, 4 sticks to form a square frame and 5 sticks to form a regular pentagonal frame. We use 100 sticks to make some equilateral triangular, squares and regular pentagonal frames, with at least one of each and no stick left. What is the number of possible values for the total number of frames made?



Answer： ______

13. As shown in the diagram, there are five pieces used in the video game Tetris. We have four identical copies of each piece. From the twenty copies, we choose four and try to use them to form a 4×4 square. The copies may be turned or flipped. How many different choices are there?



(a) (b) (c) (d) (e)

Answer： ______

Questions 14 and 15, complete solutions are required for full credits, 20 marks each

14. A magic number is a positive integer with distinct digits such that the difference between the number obtained by writing its digits in descending order and the number obtained by writing its digits in ascending order is equal to the positive integer itself. For example, 495 is a magic number since $954-459=495$, and 6174 is another magic number since $7641-1467=6174$. Are there five-digit magic numbers? If so, find an example. If not, give an explanation.

Answer：________________

15. As shown in the diagram, Leon has a 5×5 sheet of stamps. He cuts out the 5 stamps marked X. In doing so, he satisfies the following three conditions.

（1） No stamps on the edge or at a corner can be cut.

（2） If two stamps share a common edge, they cannot both be cut.

（3） After cutting, the remaining part of the sheet is still in one connected piece.

As it turns out, 5 is the maximum number of stamps that can be cut. Now Leon has a 7×7 sheet of stamps. What is the maximum number of stamps that can be cut if the same three conditions must be satisfied? Give a method for cutting that many stamps, and a proof that no larger number of stamps can be cut.

	X		X	
		X		
	X		X	

Answer： __________ stamps