2015 Taiwan Selection Test for PMWC and EMIC

Intermediate Round Paper I (Time Allowed : 90 Minutes)

- Write down all answers on the answer sheet. Each problem is worth 10 points and the total is 120 points.

1. A passenger fell asleep when the train is halfway to it destination. He woke up when the remaining part of the journey is equal to half the distance covered by the train while he was asleep. What fraction of the journey was he asleep?

2. Two clocks both show 9:00 am. When the first clock shows 10:00 am, the second clock shows 10:04 am. Both clocks run at constant speed. When the first clock shows 1:30 pm on the same day, what time is shown on the second clock?

3. At most how many acute angles can a convex polygon have?

4. A bakery sells three types of pies, meat pies, fruit pies and plain pies. It has 15 kinds of meat pies, 42 kinds of fruit pies and 25 kinds of plain pies. Kerry wants to buy 2 pies of different types. How many different choices can he make?

5. Each physics book costs \$50, each chemistry book costs \$75 and each biology book costs \$100. There are 60 books in a shipment. The total cost of the physics books is equal to the total cost of the chemistry books, which is greater than the total cost of the biology books. Moreover, the number of physics books is odd. How many biology books are there in this shipment?

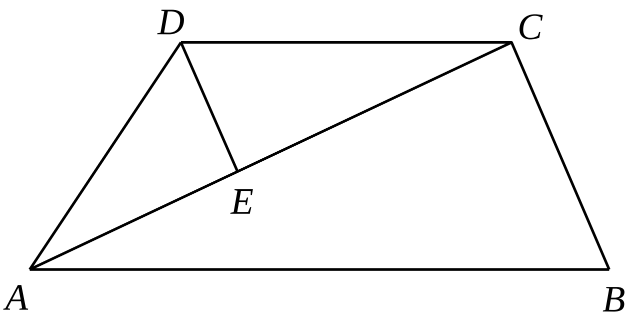
6. Each of A, B, C and D plays a game against each of the other three. There are no draws. A, B and C have the same number of wins, and A beat D. How many wins does D have?

7. There are three piles of beads, containing respectively 11, 7 and 6 beads. In each move, we may choose two piles and double the number of beads in the smaller pile by transferring the appropriate number of beads from the larger pile. What is the minimum number of moves required to obtain three piles each containing 8 beads?

8. In a four-digit even number, none of the digits is 6, 7, 8 or 9. What is the sum of all such numbers?

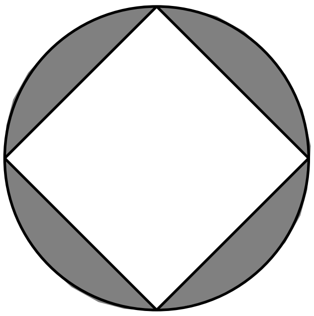
9. Wendy has been walking for 3.5 hours. In any one-hour period, she covers exactly 5 km. What is the maximum value of her speed, in km per hour?

10. In the quadrilateral *ABCD*, *AB* is parallel to *CD*. The line through *D* parallel to *BC* intersects *AC* at *E*. If the areas of triangles *ADE* and *CDE* are 60 cm^2 and 80 cm^2 respectively, what is the area, in cm^2, of *ABCD*?



11. What is the maximum number of positive integers we can choose among the first 2015 such that the difference between any two chosen numbers is not a prime number?

12. Each vertex of a square lies on a circle. The part of the circle outside the square has area 224 cm^2. What is the radius, in cm, of the circle if we take $\pi = \frac{22}{7}$?

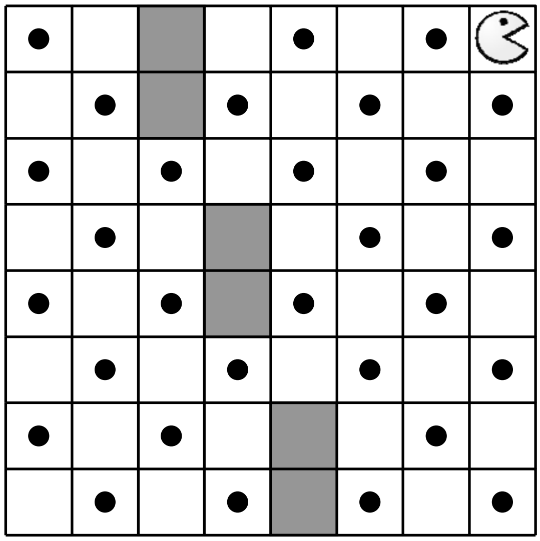


2015 Taiwan Selection Test for PMWC and EMIC

Intermediate Round Paper II (Time Allowed : 60 Minutes)

- Each question is worth 25 marks for a maximum score of 100 marks. Fill in the answers in the space provided. Detailed solutions to Problems 2 and 4 are required.

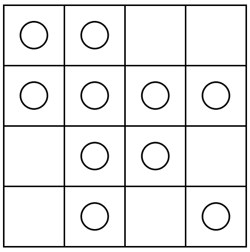
1. The diagram below shows the 8×8 playing board of a video game. The six shaded squares are impassible. Some squares are marked with dots. Starting from the top left corner, Miss Pacman moves from square to adjacent square on the same row or the same column. As she passes a square with a dot, she eats the dot. Find a path which she can follow in order to eat all the dots and then return to her starting square, without passing through any square more than once.



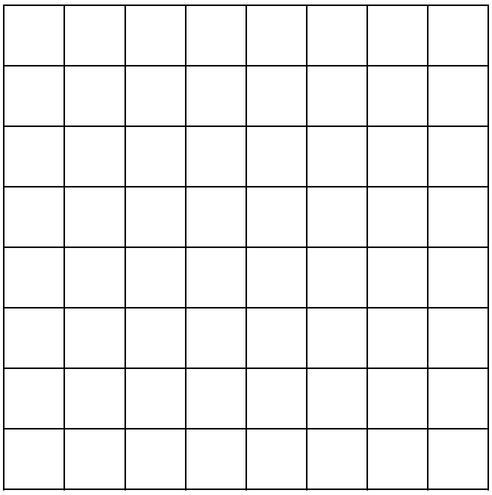
2. There are at least 9 real coins among 10 coins, and the last may be real or fake. All real coins weigh the same. A fake coin is either heavier or lighter than a real coin. We wish to determine whether there is a fake coin, and if so, whether it is heavier or lighter. What is the minimum number of weighings required on a standard balance?

Answer： _______________ weighings

3. We wish to place 10 identical counters on different squares of a 4×4 chessboard such that the number of counters in each row and in each column is even, the following figure is an example. Find the number of different solutions.



4. In an 8×8 chessboard, the distance between two squares is defined as the difference between their row numbers plus the difference between their column numbers, always subtracting the smaller number from the larger. Each square is to be painted in one colour, and two squares at a distance 6 apart must be painted in different colours. What is the minimum value of colours required?



Answer： The minimum value is ____, ______________________________