MOCK TEST 2

Collected and created by: Tran Huu Hieu

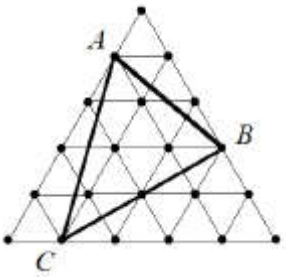
Duration:120 minutes – No calculator used.

P1. Calculate

$(6 + 7 + 8 – 9 – 10) + (11 + 12 + 13 – 14 – 15) + (16 + 17 + 18 – 19 – 20) + …+ (2006 + 2007 + 2008 – 2009 – 2010) + (2011 + 2012 + 2013 – 2014 – 2015)$

P2. Mary writes down a three-digit number. William copies her number twice in a row to form a six-digit number. When William's number is divided by the square of Mary's number, the answer is an integer. What is the value of this integer?

P3. In the figure below, the large equilateral triangle is formed by 25 smaller equilateral triangles each with an area of 1 cm^2. What is the area of triangle ABC, in cm^2?



P4. What is the number and the letter in the 1000^{th} column in the following pattern?

P	O	L	E	U	N	G	K	U	K	P	O	L	E	U	N	…
2	0	1	2	7	1	8	2	0	1	2	7	1	8	2	0	…

P5. The average of 20 numbers is 18. The 1^{st} number is increased by 2, the 2^{nd} number is increased by 4, the 3^{rd} is increased by 6, …, the 20^{th} number is increased by 40 (that is, the n^{th} number is increased by 2n). What is the average of the 20 increased numbers?

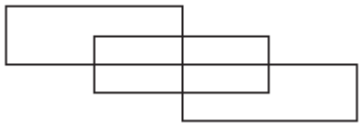
P6. N is a positive integer and $N! = N\times(N – 1)\times(N – 2)\times…\times3\times2\times1$. How many 0's are there at the end of the simplified value of $\dfrac{2015!}{1997!}$

P7. A fruit company orders 4800 kg of oranges at \$1.80 per kg. The shipping cost is \$3000. Suppose 10% of the oranges are spoiled during shipping, and the remaining oranges are all sold, what should be the selling price per kg if the fruit company wants to make an 8% profit?

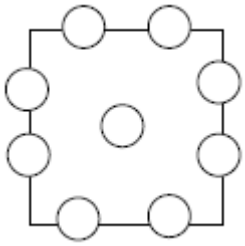
P8. Find the last digit of 7^{2015}. (Note: $7^{2015} = \underbrace{7\times7\times7\times…\times7}_{2015\ factors}$)

P9. How many two-digit numbers have the property of being equal to 7 times the sum of their digits?

P10. In the diagram shown, the number of rectangles of all sizes is …?

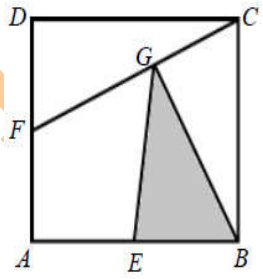


P11. Each of the numbers from 1 to 9 is placed, one per circle, into the figure shown. The sum along each of the 4 sides is the same. How many different numbers can be placed in the middle circle to satisfy these conditions?



P12. For admission to the school play, adult were charged \$130 each and students \$65 each. A total of \$30225 was collected, from fewer than 400 people. What was the smallest possible number of adults who paid?

P13. In the figure given below, the side of the square ABCD is 2 cm. E is the midpoint of AB and F is the midpoint of AD. G is a certain point on CF and 3CG = 2GF. What is the area of the shaded triangle BEG, in cm^2?



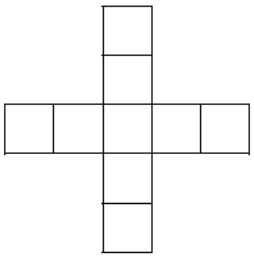
P14. A six – digit number *ababab* is formed by repeating a two-digit number *ab* three times, e.g. 525252. If all such numbers are divisible by *p*, find the maximum value of *p*?

P15. A palindrome is a number that can be read the same forwards and backwards. For example, 246642, 131 and 5005 are palindromic numbers. Find the smallest even palindrome that is larger than 56789 which is also divisible by 7.

P16. Ben and Josh together have to paint 3 houses and 20 fences. It takes Ben 5 hours to paint a house and 3 hours to paint a fence. It takes Josh 2 hours to paint a house and 1 hour to paint a fence. What is the minimum amount of time, in hours, that it takes them to finish painting all of the houses and fences?

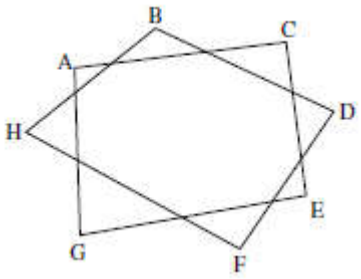
P17. Arrange the numbers 1 to 9, using each number only once and placing only one

number in each cell so that the totals in both directions (vertically and horizontally) are the same. How many different sums are there?



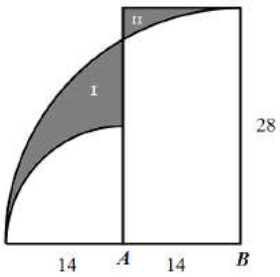
P18. Find the value of S where $S = \frac{1}{2} + \frac{1}{2\times 7} + \frac{1}{7\times 5} + \frac{1}{5\times 13} + \ldots + \frac{1}{11\times 25}$

P19. In the following 8-pointed star, what is the sum of the angles A; B; C; D; E; F; G; H?

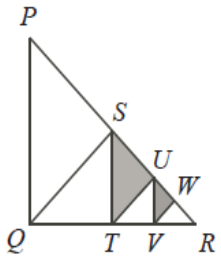


P20. The pages of a book are numbered consecutively: 1, 2, 3, 4 and so on. No pages are missing. If in the page numbers the digit 3 occurs exactly 99 times, what is the number of the last page?

P21. In the figure below, A and B are the centres of two quarter-circles of radius 14 cm and 28 cm, respectively. Find the difference between the areas of region **I** and **II** in cm^2. (Use $\pi = \frac{22}{7}$)



P22. In the right-angled triangle PQR, PQ = QR. The segments QS; TU and VW are perpendicular to PR, and the segments ST and UV are perpendicular to QR, as shown. What fraction of triangle PQR is shaded?

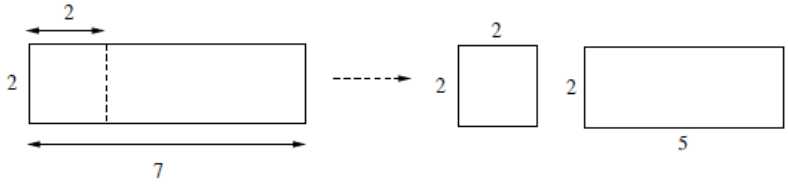


P23. How many ways can we select six consecutive positive integers from 1 to 999 so that the tailing of the product of these six consecutive positive integers end with exactly four 0's?

P24. Eleven consecutive positive integers are written on a board. Maria erases one of the numbers. If the sum of the remaining numbers is 2012, what number did Maria erase?

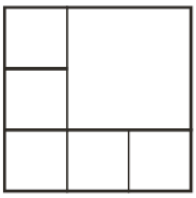
P25. A 'Lucky number' has been defined as a number which can be divided exactly by the sum of its digits. For example: 1729 is a Lucky number since $1 + 7 + 2 + 9 = 19$ and 1729 can be divided exactly by 19. Find the smallest Lucky number which is divisible by 13.

P26. Given a non-square rectangle, a *square-cut* is a cutting-up of the rectangle into two pieces, a square and a rectangle (which may or may not be a square). For example, performing a square-cut on a 2×7 rectangle yields a 2×2 square and a 2×5 rectangle, as shown.



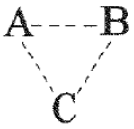
You are initially given a 40×2011 rectangle. At each stage, you make a square-cut on the non-square piece. You repeat this until all pieces are squares. How many square pieces are there at the end?

P27. You must color each square in the figure below in red, green or blue. Any two squares with adjacent sides must be of a different color. In how many different ways can this coloring be done?



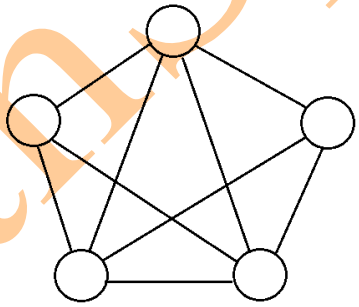
P28. Given the number pattern:

Row 1			1			
Row 2			3		5	
Row 3		7		9		11
Row 4	13		15		17	19
Row 5	21	23		25	27	29
…	…	…	…	…	…	…



A triangle of three numbers is taken from the pattern above, such that A and B are two successive number in the i^{th} row and C is in the $(i + 1)^{th}$ row just below A and B. If A + B + C = 2093, find the value of C?

P29. The diagram below shows five circles, some pairs of which are connected by line segments. Five colors are available. Find the number of different ways of painting the circles if two circles connected by a line segment must be painted in different colours.



P30. The figure is consist of three circle each of radius 1 cm with six identical shaded parts. Find the total area of the six shaded in cm^2? (in π)