1. If $A \neq 0$ and

$$\begin{array}{cccc} & A & B & C & D \\ \times & & & & E \\ \hline 2 & 0 & 0 & 7 \end{array}$$

then the value of C is

(A) 0 (B) 2 (C) 5 (D) 8 (E) 9

2. The number of regions a plane could be divided into by three distinct straight lines on the plane is (For example, if two straight lines intersect, then the plane is divided into four regions)

I 7
II 6
III 4

(A) I only (B) I and II only (C) I and III only
(D) II and III only (E) All

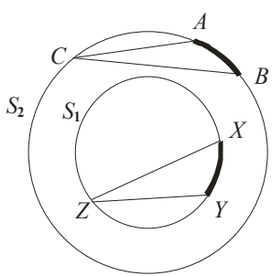
3. What is the average of 6, 6, 66, 66, 666, 666, 6666, 6666, 66666, 66666, 666666, 666666?

(A) 11111 (B) 12345 (C) 111111 (D) 123456 (E) 654321

4. Let S_1 and S_2 be two circles having the same center and with radii r_1 and r_2 respectively.

If arc length AB = arc length XY and $3A\hat{C}B = 2X\hat{Z}Y$, then $\frac{r_1}{r_2}$ is

(A) $\frac{1}{3}$ (B) $\frac{2}{3}$ (C) $\frac{3}{2}$
(D) 3 (E) 6



5. The number of solution pairs (x, y) of positive integers of $4 < x + y \leq 7$ is

(A) 14 (B) 15 (C) 28 (D) 30 (E) 32

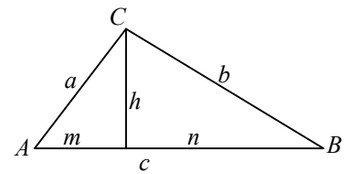
26. At a dance the boys *Wimal*, *Kamal* and *Bimal* dance only with the girls *Sita*, *Rita*, *Kamala* and *Nimala*. There are three dances in all and the boys take part in all three dances. However one girl does not dance at all. Also no boy dances with the same girl twice.

I Probability (*Sita* does not dance at all) = $\frac{1}{4}$
II Probability (*Wimal*'s first dance is with *Sita*) = $\frac{1}{4}$
III Probability (*Wimal* dances with *Sita* first, *Rita* second and *Kamala* third) = $\frac{1}{12}$

(A) Only I is correct (B) Only I and II are correct (C) Only I and III are correct
(D) Only II and III are correct (E) All are correct

27. Let ABC be a triangle right-angled at C. The lengths of the sides AC, BC and AB are a, b and c respectively. The perpendicular drawn from the vertex C to AB has length h, and divides AB into two segments of lengths m and n respectively. Which one of the following is not always true?

(A) $\frac{a^2}{b^2} = \frac{m}{n}$ (B) $n = \frac{b^2}{c}$ (C) $h^2 = mn$
(D) $\frac{h^2}{n} = \frac{b^2}{c}$ (E) $h = \frac{ab}{c}$



28. In the correctly worked out subtraction problem below on the right, any letter can represent any digit but S, A and N are non zero, and $E = 3$ and $P = 9$.

The number of sets of values for the letters is
(i.e., the number of subtraction problems it gives rise to is)

(A) 0 (B) 2 (C) 3 (D) 4 (E) 5

$$\begin{array}{cccccccc} S & R & I & L & A & N & K & A \\ - & & A & P & I & E & C & E \\ \hline & N & O & P & E & A & C & E \end{array}$$

29. A hare races with a tortoise that has a head start of d_0 meters. The hare and the tortoise have speeds of u ms^{-1} and v ms^{-1} respectively, and $u > v$. Let $t_1 = \frac{d_0}{u}$, $d_1 = vt_1$, $t_2 = \frac{d_1}{u}$, $d_2 = vt_2$, ...

Which of the following is/are true?

I For all n, $t_n > 0$ II For all n, $t_1 + \ldots + t_n < \frac{d_0}{u - v}$

III The hare overtakes the tortoise after $\frac{d_0}{u - v}$ seconds

(A) I only (B) II only (C) I and II only (D) I and III only (E) All

30. If for a positive integer n, $f(n)$ = the sum of the digits of n, which of the following is /are true?

I For all n, $f(n) \leq n$ II There is n such that $f(n \times f(n)) = 3$

III For all m and n, $f(m+n) = f(m) + f(n)$

(A) I only (B) II only (C) III only (D) I and II only (E) I and III only

21. For any positive integer n, $x_{n+1} = \dfrac{1}{1+x_n}$ and $y_{n+1} = \dfrac{1-y_n}{y_n}$. Consider the following:

I If $x_1 y_1 = -1$ then $x_3 y_3 = -1$ II If $x_3 y_3 = -1$ then $x_1 y_1 = -1$

III If $x_3 = y_1$ then $x_2 = y_2$

(A) Only I is correct (B) Only I and II are correct (C) Only I and III are correct
(D) Only II and III are correct (E) All are correct

22. Consider the following "proof":

Step 1: Let $x = y + 1$

Step 2: Then $2007x - 2006x = 2007y - 2006y + 2007 - 2006$

Step 3: Rearranging and factoring out, $2007(x - y - 1) = 2006(x - y - 1)$

Step 4: Canceling $x - y - 1$, $2007 = 2006$ ″

What can you conclude?

I Step 1 is incorrect
II Step 2 is incorrect
III Step 4 is incorrect

(A) I only (B) II only (C) III only (D) I and II only (E) I and III only

23. *Supun* spends 40 rupees everyday at the open canteen of the Faculty of Science, University of Colombo to buy some of the following.

a) *Bani*s which are 5 rupees each b) *Malupan* which are 5 rupees each
c) *Cutlets* which are 10 rupees each

In how many ways can he spend his money on any given day?

(A) 20 (B) 24 (C) 25 (D) 30 (E) 50

24. Each student who takes part in the *SLMC* 2007 competition is given a five digit index number. A pair of numbers with the same number of digits is said to be *matching* if the average of each pair of corresponding digits of the two numbers is again a digit. If no two students are assigned the same index number, what is the minimum number of students that should be picked in order to ensure that the index numbers of at least two students in the group picked are matching?

(A) 30 (B) 31 (C) 32 (D) 33 (E) 34

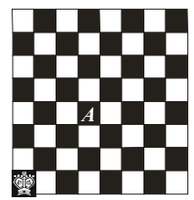
25. The coefficient of x^2 in $(1+x)(1+2x)(1+3x)(1+4x)(1+5x)(1+6x)$ is

(A) 100 (B) 125 (C) 150 (D) 175 (E) 200

6. For integers a and b, $a \otimes b = \dfrac{b}{1+\dfrac{1}{a}}$, where $1 \le a \le 10$, $1 \le b \le 10$. How many pairs (a, b) are there such that $a \otimes b$ is an integer?

(A) 12 (B) 14 (C) 15 (D) 17 (E) 18

7. In a chessboard which consists of an 8×8 grid of squares, a king can move one square at a time in any direction including diagonally. If a king stands on the lower left corner of the chess board, in how many ways can the king move to the square labeled A in 4 moves?



(A) 6 (B) 8 (C) 10 (D) 12 (E) 14

8. A three digit number is called a *lucky number* if it is a product of 4 different prime numbers. Which one of the following numbers is a lucky number?

(A) 110 (B) 126 (C) 130 (D) 210 (E) 550

9. Which of the following is/are true about lucky numbers as defined in problem 8?

I Every lucky number is divisible by 2
II Every lucky number is divisible by 3
III Every lucky number is divisible by 6

(A) None (B) I only (C) I and II only (D) I and III only (E) All

10. $(2007^3 - 3(2007)^2(1007) + 3(2007)(1007)^2 - 1007^3)^2$ equals

(A) 10^{12} (B) 10^{18} (C) $(3114)^6$ (D) 10^{24} (E) $(3114)^{12}$

11. The number of solution pairs (x, y) of positive integers of the equation $223x + 3y = 2007$ is

(A) 0 (B) 1 (C) 2 (D) 3 (E) 6

12. The number $5^{2007} - 3^{2007}$ is not divisible by

(A) 2 (B) 7 (C) 19 (D) 49 (E) 98

(Hint: For any positive integer n, $a^n - b^n = (a-b)(a^{n-1} + a^{n-2}b + \cdots + ab^{n-2} + b^{n-1})$)

13. Which one of the following is correct?

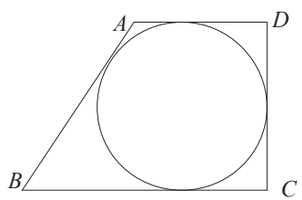
(A) $2^6 - 1$ is a prime (B) $2^7 - 1$ is not a prime (C) $2^8 - 1$ is a prime
(D) $2^{10} - 1$ is a prime (E) $2^{11} - 1$ is not a prime

14. A positive integer n has only the digits 3 and 6, and each of them occurs at least once. Consider the following:

I If n is divisible by 6 then the last digit on the right must be 6
II If the last digit on the right is 6, then n must be divisible by 6
III If n has ten 3 digits and one 6 digit, then n must be divisible by 9

(A) All are incorrect (B) Only I and II are correct (C) Only I and III are correct
(D) Only II and III are correct (E) All are correct

15. A circle of radius 2 is inscribed in the trapezium $ABCD$ where $AB = 10$ and $A\hat{D}C = B\hat{C}D = 90^0$. The area of the trapezium is



(A) 20 (B) 24 (C) 28 (D) 32 (E) 36

16. In the correctly worked out multiplication problem below, different letters represent different digits and $G \neq 0$.

$$4 \times GOOD = LUCK$$

The maximum value $LUCK$ can take is

(A) 8460 (B) 8476 (C) 9760 (D) 9784 (E) none of the given

17. A four digit number has exactly two digits in common with each of the following numbers; 648, 362, 147, and 129. What is the sum of its digits?

(A) 13 (B) 14 (C) 15 (D) 16 (E) 17

18. A quiz had 3 questions on three ex-presidents *Mr. Tough, Mrs. Emotional* and *Mr. Action* of the *Land of Liars*. Consider the following answers.

	Question 1	Question 2	Question 3
Student 1	*Mr. Tough*	*Mr. Tough*	*Mr. Action*
Student 2	*Mrs. Emotional*	*Mr. Tough*	*Mr. Action*
Student 3	*Mr. Action*	*Mr. Tough*	*Mr. Tough*

If each student had exactly one correct answer, what can you conclude?

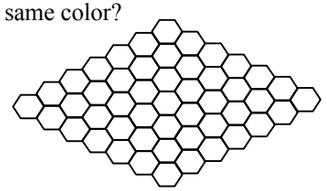
I *Mr. Action* is the correct answer to at least two questions
II *Mr. Tough* is the correct answer to exactly one question
III *Mrs. Emotional* is the correct answer to exactly one question

(A) Nothing (B) I only (C) III only (D) I and III only (E) II and III only

19. The *Land of Liars* has a jumbo cabinet of 100 ministers. Monthly allocation for each of the 100 ministries in millions of rupees is 15, 10, or 5 according to its size, and the monthly allocation for all the ministries is 1200 million rupees. If the cabinet of 100 ministers each with one ministry consists of only *green*, *blue* and *red* clansmen, and if *green*, *blue* and *red* ministers have accepted only big (15 million), medium (10 million), and small (5 million) ministries respectively, what is the minimum number of *green* ministers in the cabinet?

(A) 39 (B) 40 (C) 41 (D) 42 (E) None of the given

20. What is the least number of colors you need to color all the hexagons in the following diagram so that no two hexagons having a common side have the same color?



(A) 2 (B) 3 (C) 4 (D) 5 (E) 6