# SECTION I : LOGICAL REASONING

1. A shopkeeper uses a code 'OLISPAH' = 28, where O = ₹ 1, L = ₹ 2, I = ₹ 3, so on. Use the coding of above letter, what price does 'SOAP' denote?
   (A) ₹ 120　　　　　(B) ₹ 18　　　　　(C) ₹ 16　　　　　(D) ₹ 61

2. Out of a class of 40 students only four can sing. If there are two girls singers in the entire class and total eleven boys, then in which figure shaded part will best depict the fraction of non-singer boys and girls?

   (A)　　　　　　(B)　　　　　　(C)　　　　　　(D)
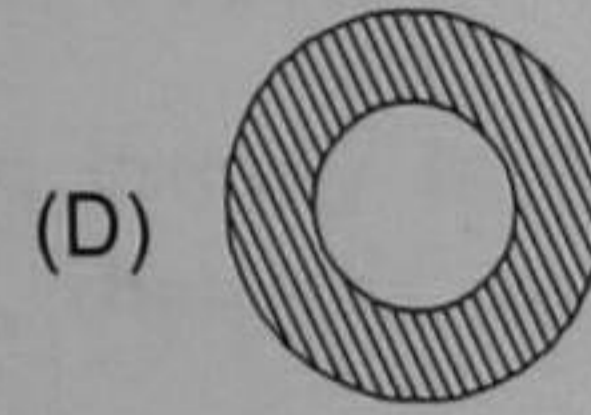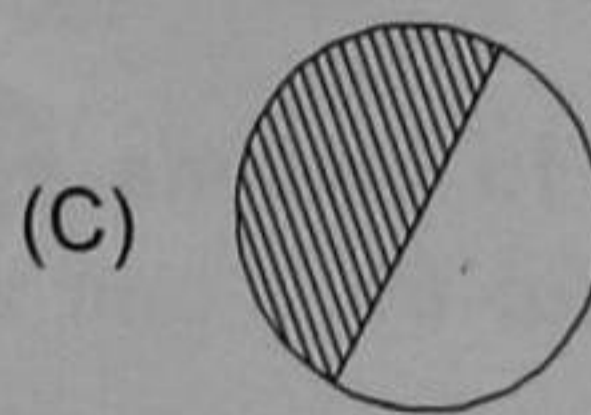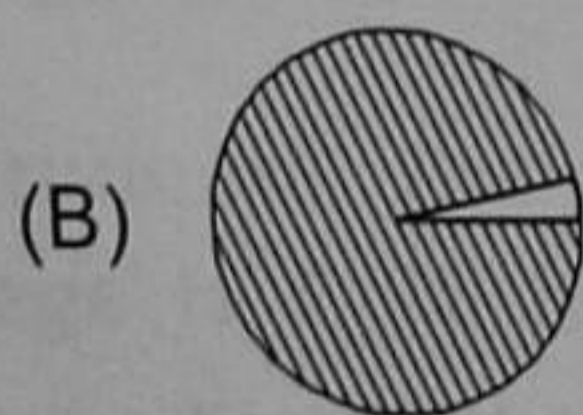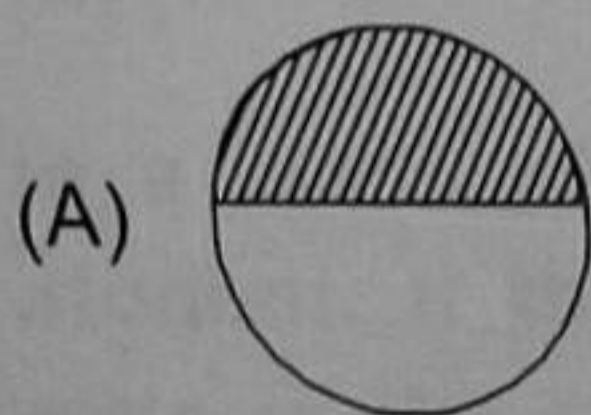
3. Study the following information carefully and answer the given question.
   Four players P, Q, R and S are holding 4 cards each. Each of them has an Ace, a King, a Queen and a Jack. All of them have all the suits (spades, hearts, clubs and diamonds).
   I. P has Ace of spades and Queen of diamonds.
   II. Q has Ace of clubs and King of diamonds.
   III.R has Queen of clubs and King of spades.
   IV.S has Jack of clubs.
   Queen of spades is with _____ .
   (A) P　　　　　　(B) Q　　　　　　(C) R　　　　　　(D) S

4. In a pile of 10 books, there are 3 of History, 3 of Hindi, 2 of Mathematics and 2 of English. Taking from above, there is an English book between a History and Mathematics book, a History book between a Mathematics and an English book, a Hindi book between an English and a Mathematics book, a Mathematics book between two Hindi books and one Hindi book, and two Hindi books between a Mathematics and a History book. Book of which subject is at the sixth position from the top?
   (A) English　　　　(B) Hindi　　　　(C) Mathematics　　　　(D) History

5. Consider the series

2 ★ 8 5 6 B 9 $ Q 3 E 1 7 R D 4 £ (13) U @ K (18) A (14) P

Which of the following groups of elements will come in the place of the question mark in the series given below?

682   $B5   EQ9   ?   £D7

(A) 4(13)@

(B) @(13)£

(C) U£D

(D) R13

6. In a queue, P is eighteenth from the front while Q is sixteenth from the back. If R is twenty fifth from the front and is exactly in the middle of P and Q, then how many persons are there in the queue?

(A) 45

(B) 46

(C) 47

(D) 48

7. In the following question, different alphabets stand for various symbols as indicated below:

Addition : O, Subtraction : M,   Multiplication : A, Division : Q, Equal to : X, Greater than : Y, Less than : Z

Out of the four alternatives given  only one is correct according to the above letter symbols. Identify the correct answer.

(A) 32 X 8 Q 2 A 3 Q 1 A 2

(B)   14 X 2 A 4 A 2 M 2 Q 1

(C) 2 Y 1 A 1 Q 1 O 1 A 1

(D)   16 Y 8 A 3 O 1 A 2 M 2

8. Between two book-ends in your study are displayed your five favourite puzzle books. If you decide to arrange the five books in every possible combination and moved just one book every minute, how long would it take you?

(A) 1 hour

(B) 2 hours

(C) 3 hours

(D) 4 hours

9. A cubical block with designs on the faces is presented as viewed from different directions. Find the design on the blank face (face with a question mark).



P    Q    R    S
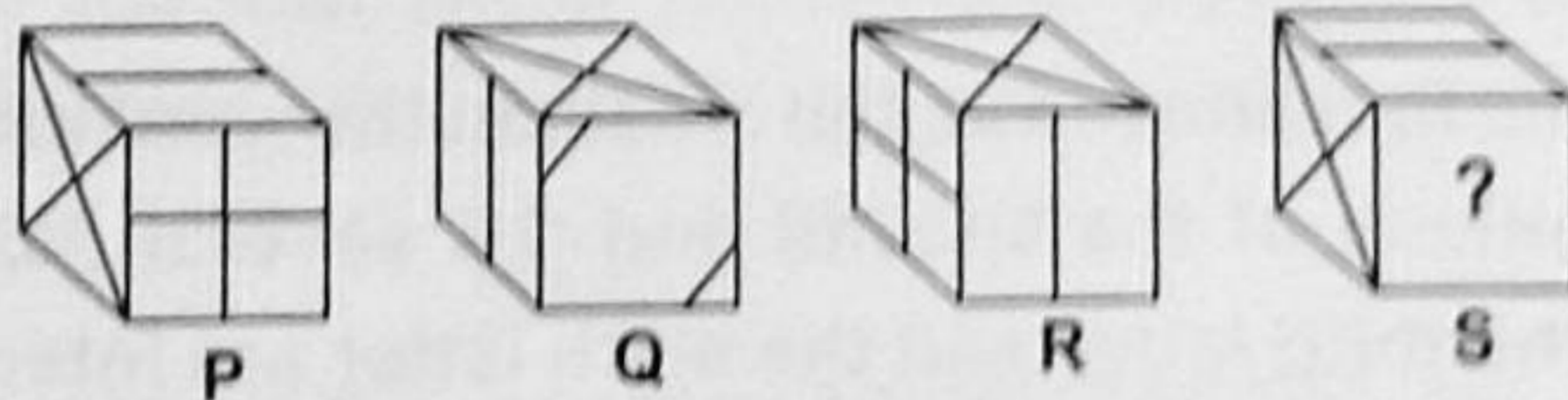
(A)     (B)     (C)     (D) 

10. In the following question, find out the figure from amongst the options which can be formed from the pieces given in Fig. (X).



Fig.(X)

(A)     (B)     (C)     (D) 

11. There is a ring road connecting points P, Q, R and S. The road is in a circular form but having several kuccha approach roads leading to the centre. Exactly in the centre of the ring road there is a tree which is 20 km from point P on the circular road. Presuming that one has gone round the circular road starting from point P and finishing at the same point after touching Q, R and S, if the person drives 20 km interior towards the tree from point P, and from there reaches somewhere in between Q and R on the ring road. How much distance would he have to travel from the tree to reach the point between Q and R?

(A) 20 km       (B) 15 km       (C) 80 km       (D) 40 km

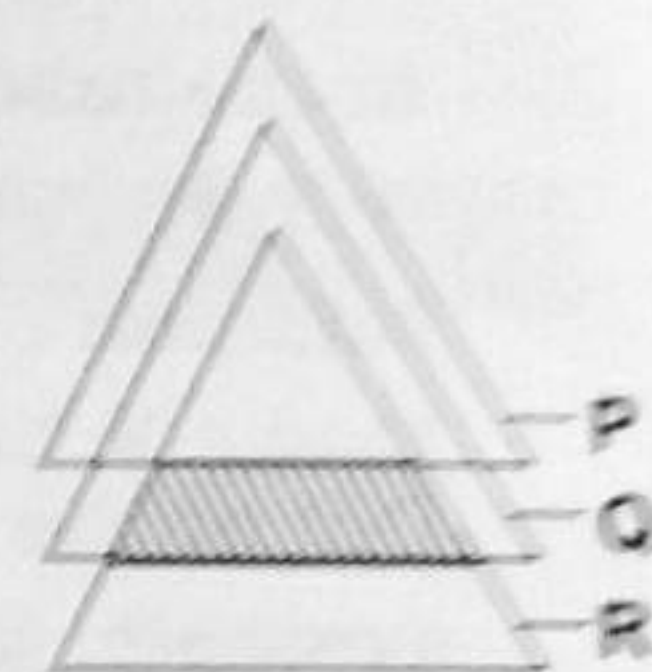12. What does the shaded portion depict, if

P = Students studying Maths,

Q = Students studying Economics

R = Football players

(A) Football players who study Maths

(B) Maths students who study Economics also

(C) Maths students who play football also

(D) Economics students who play football also

13. Which of the given options fits correctly in the blank space (?) to exhibit the similar pattern in each of the three sets below?

     168           162           176

  14   12      18   9       ?   11

(A) 8       (B) 12       (C) 16       (D) 18

14. The positions of the first and the eighth letters in the word WORKINGS are interchanged. Similarly the positions of the second and the seventh letters are interchanged and the positions of the third letter and the sixth letter are interchanged and the positions of the remaining two letters are interchanged with each other, which of the following will be the third letter to the left of R after rearrangement?

(A) G       (B) I       (C) S       (D) N

15. There are four persons K, L, M and N. The total amount of money with K and L together is equal to the total amount of money with M and N together. But the total amount of money with L and N together is more than the amount of money with K and M together. The amount of money with K is more than that with L. Who has the least amount of money?

(A) L                          (B) M

(C) N                          (D) Can't be determined

16. Study the letter-series given below and answer the question that follows:

H D Y S M W N B Q P O C R T B L Z V E G U F

Which three letters have the same distance as they have in the alphabetical order though they have changed places in the above series?

(A) HMP      (B) NQZ      (C) QOE      (D) YLF

17. Which one of the given options can be added in all the given letters to make meaningful words?

SI (_ _ _),Pr (_ _ _), Tr (_ _ _), Br (_ _ _), S (_ _ _)

(A) our      (B) ick      (C) een      (D) eep

18. In the following question, two rows of numbers are given. The resultant number in each row is to be worked out separately based on the following rules and the question below the rows of numbers is to be answered. The operations of numbers progress from left to right.

Rules:

I. If an odd number is followed by a two-digit odd number then the second number is to be subtracted from the first number.

II. If an even number is followed by a number which is a perfect square of a number then the second number is to be divided by the first number.

III. If an even number is followed by a two-digit even number then the first number is to be multiplied by the second number.

13    11    4

17    13    12

If the resultant of the first set of numbers is multiplied by the resultant of the second set of numbers, what will be the outcome?

(A) 48      (B) 69      (C) 75      (D) 96

19. In the given problem, out of the four figures marked (A), (B), (C) and (D) three are similar in a certain manner. However, one figure is not like the other three. Choose the figure which is different from the rest.

(A)       (B)       (C)       (D) 

20. The number of squares in the given figure is _____.
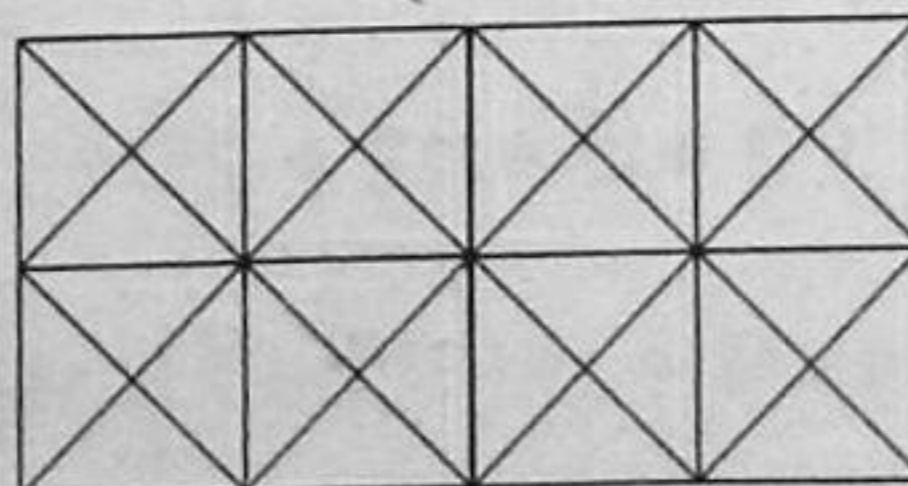


(A) 11      (B) 21      (C) 24      (D) None of these

21. Consider the following statements:
    1. Identity relation in a finite set A is the greatest relation in A.
    2. The universal relation in a set containing at least two elements is not anti-symmetric.
    3. The union and intersection of two symmetric relations are also symmetric relations.

    Which of these is/are correct?

    (A) Only (1)　　　(B) Only (2) and (3)　(C) Only (1) and (3)　(D) All of these

22. If $\tan\alpha = \dfrac{1}{\sqrt{x(x^2 + x + 1)}}$, $\tan\beta = \dfrac{\sqrt{x}}{\sqrt{x^2 + x + 1}}$ and $\tan\gamma = \sqrt{x^{-3} + x^{-2} + x^{-1}}$, then $\alpha + \beta$ is _____.

    (A) $\gamma$　　　(B) $2\gamma$　　　(C) $-\gamma$　　　(D) None of these

23. The $\displaystyle\lim_{x \to \frac{\pi}{2}} \tan^{-1}\left(\dfrac{\sin(a\tan^3 x + b\tan^2 x + c\tan x)}{a\tan^3 x + b\tan^2 x + c\tan x}\right)$ is

    (A) 0　　　(B) 1　　　(C) $\dfrac{\pi}{4}$　　　(D) $\dfrac{\pi}{2}$

24. The solution of the quadratic equation $(3|x| - 3)^2 = |x| + 7$ which belongs to the domain of definition of the function $y = \sqrt{x(x - 3)}$ are given by _____.

    (A) $\pm\dfrac{1}{9}, \pm 2$　　(B) $-\dfrac{1}{9}, 2$　　(C) $\dfrac{1}{9}, -2$　　(D) $-\dfrac{1}{9}, -2$

25. Let $f : R \to R$ be a differentiable function and $f(1) = 4$. Then, the value of $\displaystyle\lim_{x \to 1} \int_4^{f(x)} \dfrac{2t}{x - 1}\,dt$, if $f'(1) = 2$ is

    (A) 16　　　(B) 8　　　(C) 4　　　(D) None of these

26. There are 5 duplicate and 10 original items in an automobile shop and 3 items are brought at random by a customer. The probability that none of the items is duplicate, is _____.

    (A) $\dfrac{20}{91}$　　(B) $\dfrac{22}{91}$　　(C) $\dfrac{24}{91}$　　(D) $\dfrac{89}{91}$

27. The $n^{th}$ term of the series $1 + 2 + 5 + 12 + 25 + \ldots\ldots$ is _____.

    (A) $(n - 1)(n - 2)$

    (B) $\dfrac{1}{3}n(n - 1)(n - 2) + n$

    (C) $n$

    (D) None of these

28. $S$ and $T$ are the foci of an ellipse and $B$ is an end of the minor axis. If $\triangle STB$ is equilateral, then $e$ is _____.

(A) $\dfrac{1}{2}$      (B) $\dfrac{1}{3}$      (C) $\dfrac{1}{4}$      (D) None of these

29. Let $\Delta \neq 0$ and $\Delta^c$ denotes the determinant of cofactors, then $\Delta^c = \Delta^{n-1}$ where $n(> 0)$ is the order of $\Delta$. On the basis of above information, answer the below question.

If $a^2 + b^2 + c^2 = \lambda^2$, then the value of $\begin{vmatrix} a^2 + \lambda^2 & ab + c\lambda & ca - b\lambda \\ ab - c\lambda & b^2 + \lambda^2 & bc + a\lambda \\ ac + b\lambda & bc - a\lambda & c^2 + \lambda^2 \end{vmatrix} \times \begin{vmatrix} \lambda & c & -b \\ -c & \lambda & a \\ b & -a & \lambda \end{vmatrix}$ is _____.

(A) $8\lambda^6$      (B) $27\lambda^9$      (C) $8\lambda^9$      (D) $27\lambda^6$

30. If $af(x) + bf\left(\dfrac{1}{x}\right) = x + \dfrac{5}{x}, (a \neq b)$, then $f(x)$ is equal to

(A) $\dfrac{1}{a^2 - b^2}\left(x + \dfrac{1}{x}\right)$

(B) $\dfrac{1}{a^2 - b^2}\left[x(5a - b) + \dfrac{1}{x}(5b - a)\right]$

(C) $\dfrac{1}{a^2 - b^2}\left[x(a - 5b) + \dfrac{1}{x}(5a - b)\right]$

(D) None of these

31. The number of ordered triplets of positive integers which are solutions of the equation $x + y + z = 100$, is _____.

(A) 6005      (B) 4851      (C) 5081      (D) None of these

32. Two persons $A$ and $B$ throw a die alternately till one of them gets a 3 and wins the game, the respective probabilities of winning, if A begins are _____.

(A) $\dfrac{1}{11}, \dfrac{4}{11}$      (B) $\dfrac{5}{6}, \dfrac{1}{6}$      (C) $\dfrac{4}{7}, \dfrac{3}{7}$      (D) $\dfrac{6}{11}, \dfrac{5}{11}$

33. If $\cot(\cos^{-1}x) = \sec\left(\tan^{-1}\dfrac{a}{\sqrt{b^2 - a^2}}\right)$, then $x$ is equal to _____.

(A) $\dfrac{b}{\sqrt{2b^2 - a^2}}$      (B) $\dfrac{a}{\sqrt{2b^2 - a^2}}$      (C) $\dfrac{\sqrt{2b^2 - a^2}}{a}$      (D) $\dfrac{\sqrt{2b^2 - a^2}}{b}$

34. If $y = \ln\left(\dfrac{x}{a + bx}\right)^x$, then $x^3\dfrac{d^2y}{dx^2}$ is equal to _____.

(A) $\left(\dfrac{dy}{dx} + x\right)^2$      (B) $\left(\dfrac{dy}{dx} - y\right)^2$      (C) $\left(x\dfrac{dy}{dx} + y\right)^2$      (D) $\left(x\dfrac{dy}{dx} - y\right)^2$

35. If $A$ be a square matrix of order $n$ and if $|A| = D$ and $|\text{adj } A| = D'$, then

(A) $DD' = D^2$      (B) $DD' = D'^{-1}$      (C) $DD' = D^n$      (D) None of these

36. The value of $\displaystyle\int_{0}^{3\pi/2} \frac{\left|\tan^{-1}\tan x\right| - \left|\sin^{-1}\sin x\right|}{\left|\tan^{-1}\tan x\right| + \left|\sin^{-1}\sin x\right|}\, dx$ is equal to _____.

(A) $\dfrac{\pi}{2}$    (B) $\pi$    (C) $\dfrac{3\pi}{2}$    (D) None of these

37. The length of longer diagonal of the parallelogram constructed on $5\vec{a} + 2\vec{b}$ and $\vec{a} - 3\vec{b}$, if it is given that $|\vec{a}| = 2\sqrt{2}, |\vec{b}| = 3$ and angle between $\vec{a}$ and $\vec{b}$ is $\dfrac{\pi}{4}$, is

(A) 15    (B) $\sqrt{113}$    (C) $\sqrt{593}$    (D) $\sqrt{369}$

38. If in a $\triangle ABC$, $\angle C = 90°$, then the maximum value of $\sin A \sin B$ is _____.

(A) $\dfrac{1}{2}$    (B) 1    (C) 2    (D) None of these

39. Consider the following statements I and II :

I :    Both $\sin x$ and $\cos x$ are decreasing function in $\left(\dfrac{\pi}{2}, \pi\right)$.

II :   If a differentiable function decreases in $(a, b)$, then its derivative also decreases in $(a, b)$.

Which of the following is true?
(A)  Both I and II wrong.
(B)  Both I and II are correct but II is not the correct explanation for I.
(C)  I is correct and II is the correct explanation for I.
(D)  I is correct, II is wrong.

40. The parabolas $y^2 = 4x$ and $x^2 = 4y$ divide the square region bounded by the lines $x = 4$, $y = 4$ and the coordinate axes. If $S_1$, $S_2$, $S_3$ are respectively the areas the these parts numbered from top to bottom, then $S_1 : S_2 : S_3$ is _____.

(A)  1 : 1 : 1    (B)  2 : 1 : 2    (C)  1 : 2 : 3    (D)  1 : 2 : 1

## SECTION III : EVERYDAY MATHEMATICS

41. Jairam purchased a house in ₹ 15000 and paid ₹ 5000 at once. Rest of the money he promised to pay in annual installment of ₹ 1000 with 10% per annum interest. How much money is to be paid by Jairam?

(A) ₹ 21555    (B) ₹ 20475    (C) ₹ 20500    (D) ₹ 20700

42. In the battle of Mahabharat Veer Arjun destroyed all the 125 raths (horse-carts). Out of which few were driven by 3 horses each and rest were driven by 5 horses each. Thus, he captured 125 damaged raths along with 575 horses. The raths which were driven by 5 horses belonged to the Kaurav and the raths which were driven by 3 horses belonged to the allied army of Kaurav. It is known that no horse was injured in the battle. The number of raths originally belonged to the Kaurav (not to their allied army) is :

(A)  60    (B)  25    (C)  75    (D)  None of these

43. A survey was conducted at a coaching institution and it was found that there were 34 students who appeared in MAT. There were 37 students who appeared in CAT of which 17 students appeared in MAT. 30 students appeared in XAT of which 13 students appeared in MAT. Of the XAT applicants (i.e., appeared students) 14 appeared in CAT and 6 appeared in all the three. How many students appeared in CAT but not in MAT or XAT?

(A) 9      (B) 10      (C) 12      (D) None of these

44. A company produces 4 of central heating radiator known as types P, Q, R and S. A builder buys radiators for all the houses on a new estate. There are 20 small houses, 30 medium-sized houses and 15 large houses. A small house needs 3 radiators of type P, 2 of type Q and 2 of type R. A medium-sized house needs 2 radiators of type P, 3 of type R and 3 of type S.

A large house needs 1 radiator of type Q, 6 of type R and 3 of type S. The costs of the radiators are ₹ 30 for type P, ₹ 40 for Q, ₹ 50 for R and ₹ 80 for S.

Using matrix multiplication twice, find the total cost of all the radiators for the estate.

(A) ₹ 20068      (B) ₹ 27680      (C) ₹ 30680      (D) ₹ 27600

45. A pack of 16 cards contains 4 cards of each of the colours red, blue, green and yellow. The four cards of each colour are numbered 1, 2, 3 and 4. The pack is shuffled and one card is drawn at random. Find the probability that it is red card numbered 4 or a blue card.

(A) $\dfrac{4}{13}$      (B) $\dfrac{8}{17}$      (C) $\dfrac{5}{16}$      (D) None of these

46. A clock loses 2 minutes in an hour and another clock gains 2 minutes in every 2 hours. Both these clocks are set correctly at a certain time on Sunday and both the clocks stop simultaneously on the next day with the time shown being 9 am and 10:06 am. What is the correct time at which they stopped?

(A) 9:54 am      (B) 9:44 am      (C) 9:46 am      (D) None of these

47. It costs ₹ 10 a kilometre to fly and ₹ 2 a km to drive. If one travels 200 km covering $x$ km of the distance by flying and the rest by driving, then the cost of the trip is

_____.

(A) ₹ 2000      (B) ₹ 24000      (C) ₹ (8x + 400)      (D) ₹ (12x + 400)

48. A cat takes 7 steps for every 5 steps of a dog, but 5 steps of a dog are equal to 6 steps of cat. What is the ratio of speed of cat to that of dog?

(A) 42 : 25      (B) 24 : 19      (C) 7 : 6      (D) None of these

49. In the Awadh school Gomti Nagar, there are 500 students. 60% of the students are boys, 40% of whom play hockey and the girls don't play hockey. 75% of girls play badminton. There are only two games to be played. The number of students who don't play any game is _____.

(A)  10%

(B)  36%

(C)  46%

(D)  Can't be determined

50. 16 workers working 6 hours a day can build a wall of length 150 metres, breadth 20 m and height 12 m in 25 days. In how many days 12 workers, working 8 hours a day can build a wall of length 800 m, breadth 15 m and height 6 m.

(A)  40

(B)  50

(C)  55

(D)  62