

1. If  $\sqrt{(x-1)(y+2)} = 7$ ,  $x$  and  $y$  being positive whole numbers, then the values of  $x$  and  $y$  are respectively  
(a) 8, 5                      (b) 15, 12                      (c) 22, 19                      (d) 6, 8
2. If the product of four consecutive natural numbers increased by a natural number  $p$  becomes a perfect square, then the value of  $p$  is  
(a) 8                      (b) 4                      (c) 2                      (d) 1
3. Find the value of  $x$  if  $[3^{2x-2} + 10] \div 13 = 7$   
(a) 1                      (b) 3                      (c) 4                      (d) 2
4. If  $2^x = 4^y = 8^z$  and  $xyz = 288$ , then  $\frac{1}{2x} + \frac{1}{4y} + \frac{1}{8z}$  equals  
(a)  $\frac{11}{8}$                       (b)  $\frac{11}{24}$                       (c)  $\frac{11}{48}$                       (d)  $\frac{11}{96}$
5. If  $2^{x-1} + 2^{x+1} = 320$ , then  $x$  equals  
(a) 4                      (b) 5                      (c) 6                      (d) 7
6. The sum of  $\frac{1}{\sqrt{2}+1} + \frac{1}{\sqrt{3}+\sqrt{2}} + \frac{1}{\sqrt{4}+\sqrt{3}} + \dots + \frac{1}{\sqrt{100}+\sqrt{99}}$  is equal to  
(a) 9                      (b) 10                      (c) 11                      (d) 0

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(SPACE FOR ROUGH WORK)

7. The sum of two numbers is 684 and their HCF is 57. The number of possible pairs of such number is  
(a) 2 (b) 3 (c) 4 (d) none of these
8. Find the greatest number of six digits which on being divided by 6, 7, 8, 9 and 10 leaves 4, 5, 6, 7 and 8 as remainder respectively.  
(a) 997920 (b) 997918 (c) 997922 (d) 997930
9. If  $a + b + c = 0$ , then what is the value of  $(a + b - c)^3 + (c + a - b)^3 + (b + c - a)^3$ ?  
(a)  $-8(a^3 + b^3 + c^3)$  (b)  $a^3 + b^3 + c^3$   
(c)  $24abc$  (d)  $-24abc$
10. If  $(a^2 + b^2)^3 = (a^3 + b^3)^2$  and  $ab \neq 0$ , then  $\left(\frac{a}{b} + \frac{b}{a}\right)^6$  is equal to  
(a)  $\frac{a^6 + b^6}{a^3 b^3}$  (b)  $\frac{64}{729}$  (c) 1 (d)  $\frac{a^6 + a^3 b^3 + b^6}{a^2 b^4 + a^4 b^2}$
11. If  $(x^{3/2} - xy^{1/2} + x^{1/2}y - y^{3/2})$  is divided  $(x^{1/2} - y^{1/2})$ , the quotient is :  
(a)  $x + y$  (b)  $x - y$  (c)  $x^{1/2} + y^{1/2}$  (d)  $x^2 - y^2$

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(SPACE FOR ROUGH WORK)

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12. factorise :  $x^3 + \frac{1}{x^3} - 2$

(a)  $\left(x - \frac{1}{x}\right)\left(x^2 + 1 + \frac{1}{x^2}\right)$

(b)  $\left(x + \frac{1}{x} + 1\right)\left(x^2 + \frac{1}{x^2} - \frac{1}{x} - x\right)$

(c)  $\left(x + \frac{1}{x}\right)\left(x^2 - 1 + \frac{1}{x^2}\right)$

(d)  $\left(x + \frac{1}{x} - 1\right)\left(x^2 + \frac{1}{x^2} + \frac{1}{x} + x\right)$

13. Factorise :  $a^2 + \frac{1}{a^2} + 3 - 2a - \frac{2}{a}$

(a)  $\left(a + \frac{1}{a} - 1\right)\left(a - \frac{1}{a} + 1\right)$

(b)  $\left(a + \frac{1}{a} - 1\right)\left(a + \frac{1}{a} + 1\right)$

(c)  $\left(a + \frac{1}{a} + 1\right)\left(a + \frac{1}{a} + 1\right)$

(d)  $\left(a + \frac{1}{a} - 1\right)\left(a + \frac{1}{a} - 1\right)$

14. Five times A's money added to B's money is more than Rs.51.00. Three times A's money minus B's money is Rs.21.00. If a represents A's money in Rs and b represents B's money in Rs, then :

(a)  $a > 9, b > 6$

(b)  $a > 9, b < 6$

(c)  $a > 9, b = 6$

(d)  $a > 9$ , but we can put no bounds on b

15. A sports club has 130 members. An increase of 10% in the number of men and 20% in the number of ladies brought up the membership of 148. How many men and ladies were there originally ?

(a) 90 men, 40 women

(b) 80 men, 50 women

(c) 60 men, 70 women

(d) 50 men, 80 women

16. The difference of mother's age and her daughter's age is 21 years and the twelfth part of the product of their ages is less than the mother's age by 18 years. The mother's age is

(a) 22 years

(b) 32 years

(c) 24 years

(d) 42 years

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(SPACE FOR ROUGH WORK)

17. One-fourth of a herd of cows is in the forest. Twice the square root of the herd has gone to mountains and the remaining 15 are on the banks of a river. The total number of cows is:  
(a) 6 (b) 100 (c) 63 (d) 36
18. The speed of a boat in still water is 15 km/hr. It can go 30 km upstream and return downstream to the original point in 4 hrs 30 min. The speed of the stream is  
(a) 5 km/hr (b) 8 km/hr (c) 10 km/hr (d) 15 km/hr
19. How many integers are there in the solution set of  $|2x + 6| < \frac{19}{2}$ ?  
(a) None (b) Two (c) Fourteen (d) Nine
20. If  $a : (b + c) = 1 : 3$  and  $c : (a + b) = 5 : 7$ , then  $b : (a + c)$  is equal to  
(a) 1 : 2 (b) 2 : 3 (c) 1 : 3 (d) 2 : 1
21. If  $x : a = y : b = z : c$  then  $\frac{ax - by}{(a+b)(x-y)} + \frac{by - cz}{(b+c)(y-z)} + \frac{cz - ax}{(c+a)(z-x)}$  is equal to  
(a) 1 (b) 2 (c) 3 (d) 0
22. Vessels A and B contain mixtures of milk and water in the ratio 4 : 5 and 5 : 1 respectively. In what ratio should quantities of mixtures be taken from A to B to form a mixture in which milk to water is in the ratio 5 : 4?  
(a) 2 : 5 (b) 2 : 3 (c) 4 : 3 (d) 5 : 2
23. Concentrations of three solutions A, B and C are 20%, 30% and 40% respectively. They are mixed in the ratio 3 : 5 : x resulting in a solution of 30% concentration. Find x.  
(a) 5 (b) 2 (c) 3 (d) 4

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(SPACE FOR ROUGH WORK)

24. If the price of a book is first decreased by 25% and then increased by 20%, the net change in the price of the book is  
(a) 10% decrease (b) 5% decrease (c) No change (d) 5% increase
25. The price of an article was increased by  $r\%$ . Later the new price was decreased by  $r\%$ . If the latest price was Rs 1, then the original price was  
(a) Rs 1 (b) Rs  $\left(\frac{1-r^2}{100}\right)$  (c) Rs  $\frac{\sqrt{1-r^2}}{100}$  (d) Rs  $\frac{10000}{10000-r^2}$
26. A solution of salt and water contains 15% salt by weight. 30 kg of water evaporates and the solution now contains 20% of the salt. The original quantity of the solution is  
(a) 100 kg (b) 110 kg (c) 115 kg (d) 120 kg
27. A dishonest dealer uses a scale of 90 cm instead of a metre scale and claims to sell at cost price. His profit is  
(a) 9% (b) 10% (c)  $10\frac{9}{11}\%$  (d)  $11\frac{1}{9}\%$
28. If 7% of the sale price of an article is equivalent to 8% of its cost price and 9% of its sale price exceeds 10% of its cost price by Rs 1, then what is the cost of the article?  
(a) Rs 400 (b) Rs 350 (c) Rs 300 (d) Rs 280
29. A person sold his watch for Rs 144. If the percentage of his profit was equal to the cost price, then the watch would have cost him  
(a) Rs 100 (b) Rs 90 (c) Rs 85 (d) Rs 80
30. At what per cent above the cost price must a shopkeeper mark his goods so that he gains 20% even after giving a discount of 10% on the marked price.  
(a) 25% (b) 30% (c)  $33\frac{1}{3}\%$  (d)  $37\frac{1}{2}\%$

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(SPACE FOR ROUGH WORK)

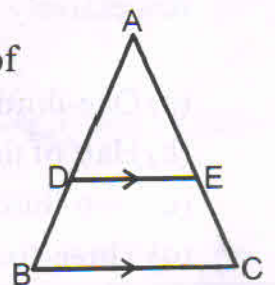
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31. A shopkeeper sold an article offering a discount of 5% and earned a profit of 23.5%. What would have been the percentage of profit earned if no discount was offered ?  
(a) 24.5                      (b) 25                      (c) 28.5                      (d) 30
32. If the average of  $m$  numbers is  $n^2$  and that of  $n$  numbers is  $m^2$ , then the average of  $(m + n)$  numbers is  
(a)  $m - n$                       (b)  $mn$                       (c)  $(m + n)$                       (d)  $m/n$
33. If the average of  $a, b, c$  is  $M$  and  $ab + bc + ca = 0$ , then the average of  $a^2, b^2, c^2$  is  
(a)  $M^2$                       (b)  $3M^2$                       (c)  $6M^2$                       (d)  $9M^2$
34. The batting average of a cricket player for 40 innings is 50 runs. His highest score in an innings exceeds his lowest score by 172 runs. If these two innings are excluded, the average of the remaining 38 innings is 48 runs. Determine his highest score, scored in one innings.  
(a) 175                      (b) 180                      (c) 174                      (d) 185
35. Rs 1000 invested at 5% p.a. simple interest. If the interest is added to the principal after every 10 years, the amount will become Rs 2000 after  
(a) 15 years                      (b)  $16\frac{2}{3}$  years                      (c) 18 years                      (d) 20 years
36. A sum of money at compound interest amounts to three times of itself in three years. In how many years will it be nine times of itself ?  
(a) 6 years                      (b) 5 years                      (c) 9 years                      (d) 7 years
37. The half life of Uranium - 233 is 160000 years, i.e. Uranium 233 decays at a constant rate in such a way that it reduces to 50% in 160000 years. In how many years will it reduce to 25% ?  
(a) 80000 years                      (b) 240000 years                      (c) 320000 years                      (d) 40000 years
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**(SPACE FOR ROUGH WORK)**

38. 12 men and 16 boys can do a piece of work in 5 days; 13 men and 24 boys can do it in 4 days. The ratio of the daily work done by a man to that of a boy is  
 (a) 2 : 1                      (b) 3 : 1                      (c) 3 : 2                      (d) 5 : 4
39. Two pipes A and B can fill a cistern in 12 minutes and 15 minutes respectively but a third pipe C can empty the full tank in 6 minutes. A and B are kept open for 5 minutes in the beginning and then C is also opened. In what time will the cistern be emptied?  
 (a) 30 min                      (b) 33 min                      (c) 37.5 min                      (d) 45 min
40. A and B run a kilometre and A wins by 25 seconds. A and C run a kilometre and A wins by 275 m. B and C run the same distance and B wins by 30 sec. The time taken by A to run a kilometre is  
 (a) 2 min 25 sec                      (b) 2 min 50 sec                      (c) 3 min 20 sec                      (d) 3 min 30 sec
41. Twice the speed of a boat downstream is equal to thrice the speed upstream. The ratio of its speed in still water to its speed in current is  
 (a) 1 : 5                      (b) 1 : 3                      (c) 5 : 1                      (d) 2 : 3
42. At his usual rowing rate, Rahul can travel 12 miles downstream in a certain river in 6 hours less than it takes him to travel the same distance upstream. But if he could double his usual rowing rate for his 24 mile round trip, the downstream 12 miles would then take only one hour less than the upstream 12 miles. What is the speed of the current in miles per hour?  
 (a)  $1\frac{1}{3}$                       (b)  $1\frac{2}{3}$                       (c)  $2\frac{1}{3}$                       (d)  $2\frac{2}{3}$

43. In the given figure, DE is parallel to BC and the ratio of the areas of  $\triangle ADE$  and trapezium BDEC is 4 : 5. What is DE : BC?

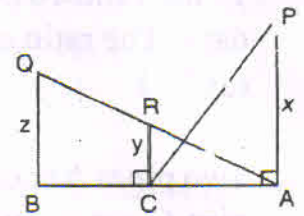
- (a) 1 : 2                      (b) 2 : 3  
 (c) 4 : 5                      (d) None of these



(SPACE FOR ROUGH WORK)

44. In the given figure, if  $PA = x$ ,  $RC = y$  and  $QB = z$ , then which one of the following is correct ?

- (a)  $2y = x + z$
- (b)  $4y = x + z$
- (c)  $xy + yz = xz$
- (d)  $xy + xz = yz$



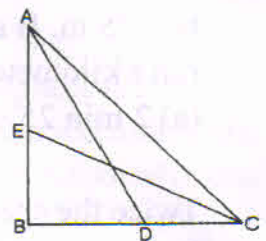
45. In  $\triangle PQR$ ,  $PD \perp QR$  such that D lies on QR. If  $PQ = a$ ,  $PR = b$ ,  $QD = c$  and  $DR = d$ , then

- (a)  $(a - d)(a + d) = (b - c)(b + c)$
- (b)  $(a - c)(b - d) = (a + c)(b + d)$
- (c)  $(a - b)(a + b) = (c + d)(c - d)$
- (d)  $(a - b)(c - d) = (a + b)(c + d)$

46. In the given figure  $\triangle ABC$  is a right-angled at B. AD and CE are the two medians drawn from A and C respectively. If  $AC = 5$  cm and

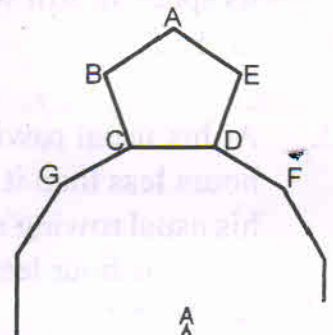
$AD = \frac{3\sqrt{5}}{2}$  cm, then CE equals

- (a) 2 cm
- (b)  $2\sqrt{5}$  cm
- (c)  $5\sqrt{2}$  cm
- (d)  $3\sqrt{2}$  cm



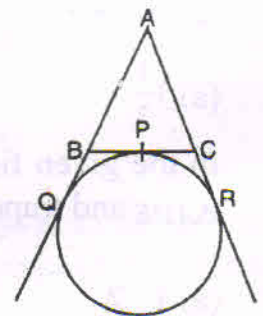
47. ABCDE is a regular pentagon with sides of length 6 cm. CD is also a side of a regular polygon with n sides. Given that  $\angle EDF = 90^\circ$ , find n.

- (a)  $18^\circ$
- (b)  $10^\circ$
- (c)  $20^\circ$
- (d)  $12^\circ$



48. If the figure shown here, a circle touches the side BC of a triangle ABC at P and AB and AC produced at Q and R respectively. What is AQ equal to ?

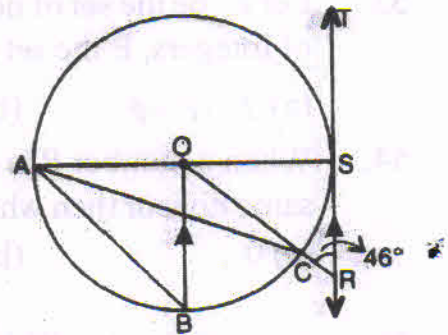
- (a) One-third of the perimeter of  $\triangle ABC$
- (b) Half of the perimeter of  $\triangle ABC$
- (c) Two-third of the perimeter of  $\triangle ABC$
- (d) Three-fourth of the perimeter of  $\triangle ABC$



(SPACE FOR ROUGH WORK)

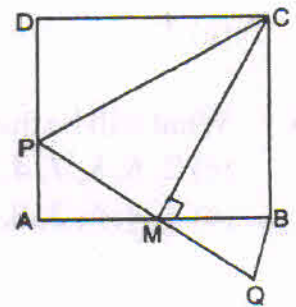


49. In the given figure, RST is the tangent to the circle with centre O, at S. AOS is a straight line BO  $\parallel$  RT and  $\angle ORS = 46^\circ$ . Then  $\angle BAC$  equals



- (a)  $22^\circ$                       (b)  $46^\circ$   
 (c)  $23^\circ$                       (d)  $32^\circ$

50. In the given figure, ABCD is a square. M is the mid-point of AB and  $PQ \perp CM$ . Which of the following statements is not true?

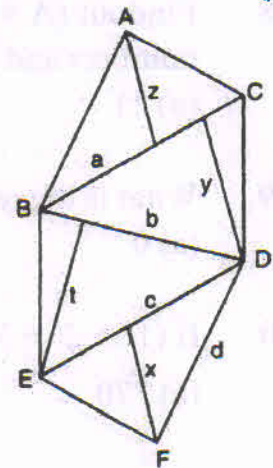


- (a)  $AM = MB$                 (b)  $CP = CQ$   
 (c)  $CP = CB$                 (d)  $PM = MQ$

51. A circle is inscribed in an equilateral triangle of side a. What is the area of any square inscribed in the circle?

- (a)  $\frac{a^2}{3}$                       (b)  $\frac{a^2}{4}$                       (c)  $\frac{a^2}{6}$                       (d)  $\frac{a^2}{8}$

52. What is the area of the plot shown in the figure?



- (a)  $\frac{1}{2}(az + by + ct + dx)$   
 (b)  $\frac{1}{2}(bt + cx + ay + az)$   
 (c)  $\frac{1}{2}(cx + bt + by + az)$   
 (d)  $\frac{1}{2}(d+t)(c+x) + \frac{1}{2}(a+b)(y+z)$

(SPACE FOR ROUGH WORK)

53. Let  $Z_N$  be the set of non-negative integers,  $Z_P$  be the set of non-positive integers,  $Z$  the set of integers,  $E$  the set of even integers and  $P$  the set of prime numbers. Then,

- (a)  $E \cap P = \phi$       (b)  $Z_N \cap Z_P = \phi$       (c)  $Z - Z_N = Z_P$       (d)  $Z_N \Delta Z_P = Z - \{0\}$

54. When a number  $P$  is divided by 4 it leaves remainder 3. If twice of  $P$  is divided by the same divisor then what will be the remainder ?

- (a) 0      (b) 1      (c) 2      (d) 6

55.  $4^{61} + 4^{62} + 4^{63} + 4^{64}$  is divisible by

- (a) 3      (b) 10      (c) 11      (d) 13

56. What will be the missing digits in the following product and find a, b, c, d, e, f respectively.

- (a) 2, 6, 8, 7, 4, 3      (b) 2, 7, 6, 8, 3, 4  
 (c) 3, 4, 6, 2, 8, 7      (d) 3, 4, 6, 2, 7, 8

$$\begin{array}{r} 1 \ a \ 4 \\ \times \ 3 \ b \\ \hline 8 \ c \ 8 \\ e \ 7 \ 2 \\ \hline f \ 5 \ d \ 8 \end{array}$$

57. Which of the following is the square root of  $7 - 4\sqrt{3}$  ?

- (a)  $2 - \sqrt{3}$       (b)  $5 - \sqrt{3}$       (c)  $2 - \sqrt{5}$       (d) None of these

58. Findout  $(A + B + C + D)$  such that  $AB \times CB = DDD$  where  $AB$  and  $CB$  are two digit numbers and  $DDD$  is a three digit number

- (a) 21      (b) 19      (c) 17      (d) 18

59. What is the remainder when  $5^{87}$  is divided by 15 ?

- (a) 0      (b) 5      (c) 10      (d) None of these

60. If  $(1^2 + 2^2 + 3^2 + \dots + 10^2) = 385$ , then the value of  $(2^2 + 4^2 + 6^2 + \dots + 20^2) = ?$

- (a) 770      (b) 1155      (c) 1540      (d)  $385^2$

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(SPACE FOR ROUGH WORK)