

Quantitative Aptitude

Solved Paper of IMS Examination, 2001

Directions for questions 1 to 4: Refer to the data below and answer the questions that follow.

A bee travels according to the function $s = at^2 - bt + c$ where a, b, c are integers greater than 0 and s denotes the distance travelled and t denotes the time. Also a, b, c are in G.P. with their sum equal to 14. The difference between b and a is equal to a .

1. Which of the following can be calculated from the given data?

- (a) Maximum distance travelled
(b) Minimum distance travelled
(c) Neither (d) Both

2. The function for velocity with respect to time would be:

- (a) $4t - 1$ (b) $4t - 2$ (c) $2(2t - 2)$ (d) $4t + 8$

3. What would be the minimum distance travelled?

- (a) 1 (b) 2 (c) 6 (d) 8

4. What are the values for a, b, c ?

- (a) 1, 2, 4 (b) 2, 4, 8 (c) 3, 6, 12 (d) None of these

Directions for questions 5 to 7: Refer to the data below and answer the questions that follow.

The fibonacci series is given as follows:

1, 1, 2, 3, 5, 8, 13, ...

The n th term (t_n) of the series is equal to the sum of the $(n - 1)$ th term and $(n - 2)$ th term. If S_n denotes the sum of the first n terms of the series, then:

5. What is S_n ?

- (a) $S_{n-1} + t_{n-1}$ (b) $S_{n-2} + 2t_n$
(c) $S_{n-3} + 2t_n$ (d) None of these

6. What is the value of S_5 ?

- (a) $S_2 + S_3$ (b) $S_2 + 2t_5$ (c) $S_1 + 2t_4$ (d) None of these

7. What is $S_5 - S_4$?

- (a) S_3 (b) t_3 (c) t_5 (d) t_4

Directions for questions 8 to 10: Refer to the data below and answer the questions that follow.

Three variables x, y, z exist such that,

$$x^2 + y^2 + z^2 = 50; xy + yz + zx = 47; xyz = 60$$

8. $(x + y + z)^3$ is equal to:

- (a) 2744 (b) 1296 (c) 1728 (d) 1331

9. The value of x is equal to:

- (a) 3 (b) 6 (c) 9 (d) 2

10. The value of y is equal to:

- (a) 4 (b) 7 (c) 9 (d) 2

Directions for questions 11 to 13: Refer to the data below and answer the questions that follow.

Manoj uses a toothpaste tube of 400 gms in a month. He brushes twice a day except on Sundays when he brushes only once a day.

11. If the first of January is Monday, then what is his average usage in gms/turn in January?

- (a) 6.72 (b) 6.89 (c) 7.01 (d) 7.19

12. If the first of January is a Sunday, then what is his average usage in gms/turn in January?

- (a) 6.72 (b) 6.89 (c) 7.01 (d) 7.19

13. What should be the first of January, if the average usage in gms/turn should be minimum?

- (a) Monday (b) Tuesday
(c) Wednesday (d) Any of these

Directions for questions 14 to 16: Choose the correct alternative.

14. The reciprocal of single digit number gives a number, which is 0.AAAA... where A is 0-9. This number (0.AAAA...) when multiplied by which of the following integers would definitely yield a whole number?

- (a) 428 (b) 910 (c) 819 (d) None of these

15. If $|r - 5| = 7$ and $|2q - 4| = 12$, what is the minimum possible value of qr ?

- (a) -48 (b) -16 (c) 8 (d) 16

16. If $n = x + 1$, where x is the product of four consecutive positive integers, then which of the following is/are true?

- A. n is odd.
B. n is prime.
C. n is a perfect square.

- (a) A and C only (b) A and B only
(c) A only (d) None of these

17. A circle is inscribed and circumscribed within an equilateral triangle. Calculate the ratio of the areas of the incircle and circumcircle?

- (a) 22 : 7 (b) 2 : 1 (c) 1 : 4 (d) 1 : 2

18. Consider a sequence of five consecutive integers. The average of the first 3 integers is $n - 1$. The average of the last three five integers is:

- (a) n (b) $n + 1$
(c) $k \times n$, where k is a function of n (d) $n + 2$

19. If a, b and c are the sides of a triangle and $a^4 + b^4 + 2a^2b^2 = c^4$, then the triangle is:

- (a) right-angled triangle (b) acute-angled triangle
(c) equilateral triangle (d) obtuse-angled triangle

20. X is picked up by his father by car from school everyday and they reach home at 5.00 p.m. One day, since school got over an hour earlier than usual, he started walking towards home at 3 km/hr. He met his father on the way and they reached home 15 minutes earlier than their usual time. What is the speed of the car?

(a) 15 km/hr (b) 20 km/hr (c) 21 km/hr (d) 16 km/hr
 21. The expenses of a boarding house are partly fixed and partly variable with the number of boarders. The expenses are Rs 90 per head when there are 25 boarders and Rs 75 per head, when there are 50 boarders. Find the expense per head when there are 100 boarders.

(a) Rs 50 (b) Rs 65 (c) Rs 60 (d) None of these

22. The third term of a G.P. is 3, then what is the product of the first five terms?

(a) 243 (b) 234 (c) 342 (d) Insufficient data

23. There are 8 different locks with exactly one key for each lock. All the keys have been mixed up. What is the maximum number of trials required in order to determine which key belongs to which lock?

(a) 7! (b) 28 (c) 8! (d) 36

24. What is the number of five digit natural numbers containing exactly one 3?

(a) 9^5 (b) $9^4 \times 8$ (c) 29889 (d) None of these

25. The value of $\frac{1}{4} + \frac{1}{9} + \frac{1}{16} + \dots + \frac{1}{n^2}$ is:

(a) less than 1 (b) greater than 1
 (c) equal to 1 or less than 1 (d) equal to $\frac{1}{n^2}(n+2)$

26. The average of n consecutive numbers will always be a whole number if:

(a) $n > 3$ (b) n is a square of a whole number
 (c) $n < 5$ (d) n is odd

27. A singles tennis tournament is held, in which 30 men participated. If a player is eliminated as soon as he loses a match, how many matches are required to determine the winner?

(a) 29 (b) 30 (c) 31 (d) 32

28. In a certain examination, the number of students who passed, was three times the number of those who were rejected. If there had been 16 fewer candidates and if six more had been rejected, the number of those who passed and of those who were rejected would have been in the ratio 2 : 1. Find the number of candidates?

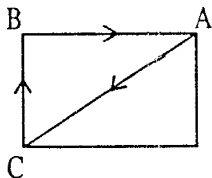
(a) 120 (b) 130 (c) 136 (d) 156

29. Vinayak bought a calculator for Rs $60x$ and sold it for Rs $(600 - 6x)$ at a loss of $x\%$. What is the net loss?

(a) Rs 10 (b) Rs 60 (c) Rs 30 (d) Data insufficient

30. If a , b and c are the unequal numbers such that a , b and c are in A.P. and $(b-a)$, $(c-b)$ and a are in G.P., then $a : b : c$ is:

(a) 1 : 3 : 5 (b) 2 : 3 : 4 (c) 1 : 2 : 4 (d) 1 : 2 : 3



Baburao likes to take morning walk in a nearby field. In this rectangular field, he starts from a corner point A and reaches the diagonally opposite corner point C in two hours. While returning back, he walks along the path C—B—A, where B is the third corner point. If his speeds while going to C and returning back are 5 km/hr and 7 km/hr respectively, and it is given that he took two hours for return journey, find the length of the field.

(a) 8 km (b) 6 km (c) 4 km (d) 10 km

32. A and B are two stations 300 km apart. Two trains T_1 and T_2 start from A and B respectively, towards each other at the same time. T_1 reaches B nine hours and T_2 reaches A four hours after they meet. Find the difference between the speeds of T_1 and T_2 .

(a) 10 km/hr (b) 15 km/hr
 (c) 20 km/hr (d) 25 km/hr

33. Jayesh owns 2.5 per cent stock of company LLH, that yields Rs 250 a year. He sells out $\frac{1}{5}$ of the stock at 80 and

invests the proceeds in a dotcom venture at 120. What dividend must the dotcom stock pay so that he may thereby increase his income by Rs 50? (Assume the par value of the stock as Rs 100).

(a) 8% (b) 7.5% (c) 9% (d) 8.5%

34. In a trapezium PQRS, $PQ \parallel RS$, $l(RS) = 25$ cm, $l(PR) = l(QS) = 20$ cm and $\angle SPR = \angle SQR = 90^\circ$. Find the area of trapezium.

(a) 132 cm^2 (b) 192 cm^2 (c) 184 cm^2 (d) None of these

35. Which of the following statements is not false?

(a) The average of prime numbers is always a prime number.
 (b) The average of five even numbers is always an odd number.
 (c) The average of seven odd numbers is always an odd number.
 (d) The average of five numbers cannot be greater than average of any three numbers.

36. Prakash purchased grain at price of Rs 1/kg spending Rs 100. He then sold the same at the rate of Rs 2/kg. Next week, he again purchased grain at a rate of Rs 2/kg, again spending Rs 100. But this time, he sold the grain at the rate of Rs 1/kg. What is the net loss/profit in the total transaction?

(a) No net profit or loss (b) Loss of Rs 50
 (c) Profit of Rs 50 (d) Loss of Rs 100

37. Supply the missing digit in the number 3_930 . The number is divisible by 3 and is divisible by only one of 11, 9 and 7 but is not divisible by 19. The number is:

(a) 3 (b) 6 (c) 9 (d) 3 or 9

38. If 15 men working $7\frac{1}{2}$ hours a day, can finish a work

in 30 days, then how many days will be taken by 18 men working 6 hours a day to finish the work, it being given 3 men work as much as 2 men of the former type in the same time?

- (a) $42\frac{1}{6}$ days (b) $46\frac{7}{8}$ days
(c) $30\frac{1}{3}$ days (d) $50\frac{5}{6}$ days

39. Two clocks are set correct at 10:00 a.m. on Friday. The first clock gains 2 minutes every hour and gains twice as much as the second clock. What time will the second clock register when the correct time is 2:00 p.m. on the following Monday?

- (a) 3:15 p.m. (b) 3:16 p.m. (c) 4:32 p.m. (d) 3:18 p.m.

40. The number of divisors of 2700 including 1 and 2700 equals:

- (a) 12 (b) 16 (c) 36 (d) 18

41. The number of distinct positive integers that can be formed using 0, 1, 2, 4, where each integer is used at the most once is equal to:

- (a) 48 (b) 84 (c) 64 (d) 36

42. Let x_1, x_2, \dots be positive integers in A.P. such that $x_1 + x_2 + x_3 = 12$ and $x_4 + x_5 = 14$. Then x_5 is:

- (a) 7 (b) 1 (c) 4 (d) None of these

43. Two men set out at the same time to walk towards each other from points A and B, 72 km apart. The first man walks at the constant rate of 4 km/hr. The second man walks 2 km the first hour, $2\frac{1}{2}$ the second hour, 3 km the third hour

and so on. Then the men will meet:

- (a) in 7 hours (b) nearer A than B
(c) nearer B than A (d) Midway between A and B

Directions for questions 44 to 47: Refer to the data below and answer the questions that follow.

$$F(x) = \sum_{x=1}^n (x^3 + x^2 + 1)$$

44. Find $F(x)$, for $n = 3$

- (a) 45 (b) 38 (c) 53 (d) 23

45. If n is odd, then $F(x)$ would be:

- (a) even (b) odd (c) prime (d) Data Insufficient

46. If n is divisible by 2, then for $x = \frac{n}{2}$, $F(x)$ would be:

- (a) even (b) odd (c) negative (d) Data Insufficient

47. Let $F_1(x) = F(x) + 2$. If n is odd, then $F_1(x)$ would be:

- (a) even (b) odd (c) prime (d) Data Insufficient

ANSWERS AND EXPLANATIONS

1. (b) $S = at^2 - bt + c \therefore \frac{ds}{dt} = 2at - b, \frac{d^2s}{dt^2} = 2a > 0 \therefore a > 0$

\therefore Minimum distance can be calculated

2. (c) $\therefore a, b, c$ are in G.P. $\therefore b^2 = ac \dots (i)$

$$a + b + c = 14$$

$$b - a = a \therefore b = 2a \therefore (2a)^2 = ac \text{ or } 4a^2 = ac$$

$$\text{or } 4a = c \therefore a + b + c = 14$$

$$\therefore a + 2a + 4a = 14 \Rightarrow a = 2 \therefore b = 4 \quad c = 8$$

$$\therefore \frac{ds}{dt} = 2at - b = 2 \times 2t - 4 = 2(2t - 2)$$

3. (c) For maximum or minimum

$$\frac{ds}{dt} = 0 \Rightarrow 2(2t - 2) = 0 \Rightarrow t = 1$$

$$\therefore S = at^2 - bt + c = 2t^2 - 4t + 8 \\ = 2 \times 1^2 - 4 \times 1 + 8 = 6$$

(Minimum distance $t = 1$)

4. (b) $a = 2, b = 4, c = 8$

$$5. (c) \quad t_n = t_{n-1} + t_{n-2} \\ S_n = t_1 + t_2 + t_3 + \dots + t_{n-3} + t_{n-2} + t_{n-1} + t_n \\ = S_{n-3} + t_n + t_n = S_{n-3} + 2t_n$$

$$6. (b) \quad S_5 = 1 + 1 + 2 + 3 + 5 = 12$$

$$S_2 = 2, t_5 = 5$$

$$\therefore S_2 + 2t_5 = 2 + 2 \times 5 = 12$$

$$S_5 = S_2 + 2t_5$$

$$7. (c) \quad S_n = 1 + 1 + 2 + 3 = 7$$

$$\therefore S_5 - S_4 = 12 - 7 = 5 = t_5$$

$$\text{or } t_n = S_n - S_{n-1} \therefore S_5 - S_4 = t_5$$

$$8. (c) \quad (x + y + z)^2 = x^2 + y^2 + z^2 + 2(xy + yz + zx) \\ = 50 + 2 \times 47 = 144$$

$$\therefore (x + y + z)^2 = 144 \Rightarrow x + y + z = 12$$

$$\therefore (x + y + z)^3 = 12^3 = 1728$$

$$9. (a) \quad xyz = 60 = 2 \times 3 \times 10 \text{ or } 3 \times 4 \times 5 \text{ or } 2 \times 5 \times 6$$

But only 3, 4, 5 the values of x, y, z satisfy the other two conditions $x^2 + y^2 + z^2 = 50$ and $xy + yz + zx = 47$

$$\therefore x = 3$$

$$10. (a) \quad y = 4$$

11. (b) \therefore 1st January is Monday

\therefore Sunday falls on 7th, 14th, 21st, 28th

\therefore 4 Sundays + 27 other days

\therefore He brushes $4 \times 1 + 27 \times 2 = 58$ times in January

$$\therefore \text{Average usage} = \frac{400}{58} = 6.89$$

12. (c) 1st January is Sunday

\therefore on 8th, 15th, 22nd, 29th January is also Sunday

5 Sundays \therefore He brushes $5 \times 1 + 26 \times 2 = 57$

$$\text{Average usage} = \frac{400}{57} = 7.01$$

13. (d) If first of January is Monday or Tuesday or Wednesday, Sunday comes four times \therefore If 1st January is Sunday or Saturday then Sunday comes 5 times

Average usage will be minimum if Sundays are less.

$$14. (c) \quad 0, AAAA \dots = \frac{A}{9}$$

\therefore Product will be a whole no. if the other no. is a multiple of 9

$$15. (a) \quad |r - 5| = 7 \therefore r - 5 = \pm 7 \Rightarrow r = -2 \text{ or } 12$$

$$|2q - 4| = 12 \therefore 2q - 4 = \pm 12 \Rightarrow q = 8, -4$$

- qr may (8×-2) or (8×12) , (-4×-2) or (-4×12)
i.e., -16, 96, 8, -48 Minimum value = -48
16. (a) $n = x + 1$ of the four consecutive integers 2 are even, two are odd \therefore Product is even i.e. x is even $\therefore x + 1$ is odd and a perfect square also, we can verify by taking the nos. 1, 2, 3, 4 or 2, 3, 4, 5 etc.
17. (c) In an equilateral Δ , Angle bisectors are also \perp bisectors.
AD bisects $\angle A$ and AD is \perp bisector of BC. AD is also median $\therefore AI : ID = 2 : 1$
AI is radius of circumcircle and ID is radius of incircle.
Let $ID = r$ and $AI = 2r$
 $\therefore \frac{\text{Area of incircle}}{\text{Area of circumcircle}} = \frac{\pi(r)^2}{\pi(2r)^2} = \frac{1}{4} = 1 : 4$
18. (b) Let 5 consecutive integers be $x, x + 1, x + 2, x + 3, x + 4$
A.T.S. $\frac{x + x + 1 + x + 2}{3} = n - 1 \Rightarrow x = n - 2$
 $\frac{x + 2 + x + 3 + x + 4}{3} = \frac{3x + 9}{3} = x + 3 = n \quad 2 + 3 = n + 1$
19. (a) $a^4 + b^4 + 2a^2b^2 = c^4 \Rightarrow (a^2 + b^2)^2 = (c^2)^2$ or $a^2 + b^2 = c^2$
 \therefore It is a rt $\angle d \quad \Delta$
20. (c) As they reached 15 minutes earlier
 \therefore The father met his child $\frac{15}{2}$ minimum earlier than their time
 $\therefore X$ walked for $60 - \frac{15}{2} = \frac{105}{2}$ min = $\frac{105}{2 \times 60}$ hr
 \therefore The child covered the distance = $3 \times \frac{105}{2 \times 60} = \frac{21}{8}$ km
which was to be covered by car in $\frac{15}{2}$ min
 $= \frac{15}{2} \times \frac{1}{60} = \frac{1}{8}$ hr
 $\therefore S = \frac{D}{t} = \frac{21}{8} \div \frac{1}{8} = 21$ km / hr
21. (c)
22. (a) Let the G.P. be $a, ar, ar^2, ar^3, ar^4, \dots$
A.T.S. $ar^2 = 3$
Product of first five terms
 $= a \times ar \times ar^2 \times ar^3 \times ar^4 = a^5 r^{10} = (ar^2)^5$
 $= 3^5 = 243$
23. (c)
24. (c) We want to form 5-digit nos \therefore we have to fill five places. We can fill extreme left $x \times x \times x \times x$ place by any one of digits 1, 2, 3, ... 9 i.e. in 9 ways
[\therefore we can't place 0 in extreme left]
If we place 3 in extreme left, other 4 places can be filled in $9 \times 9 \times 9 \times 9$ i.e. 9^4 ways

- If we place 3 in any of four places, the no. of nos.
 $= 8 \times 9^3 \times 4 = 9^3 \times 32$
Total no. of 5 digit nos. having exactly one 3
 $= 9^4 + 9^3 \times 32 = 29889$
25. (a)
26. (d) $\frac{x + (x + 1) + (x + 2)}{3} = x + 1$ (whole no.),
 $\frac{x + x + 1 + x + 2 + x + 3}{4} = x + \frac{3}{2}$, not a whole no.
Average will be a whole no. if n is odd.
27. (a)
28. (c) Let the no. of rejected students be x and that of passed be $3x$ \therefore Total students = $4x$
A.T.S. $\frac{4x - 16}{x + 6} = 2 \Rightarrow x = 34$
 \therefore Total = $4 \times 34 = 136$
29. (b) A.T.S. $\frac{60x - (600 - 6x)}{60x} = x \Rightarrow x = 10 \quad x \neq 100$
Net loss = 10% of $60x = \frac{10}{100} \times 60 \times 10 = \text{Rs } 60$
30. (d) a, b, c are in A.P. $\therefore 2b = a + c \dots (i)$
 $b - a, c - b, a$ are in G.P. $\therefore (c - b)^2 = a(b - a) \dots (ii)$
We can see by inspection, only (d) satisfies the two conditions.
31. (a) $D = S \times t$
 $\therefore AC = 5 \times 2 = 10$ km, $BC + AB = 7 \times 2 = 14$
Also $l^2 + b^2 = AC^2$ or $b + l = 14$ km
 $l^2 + (14 - l)^2 = 10^2 \Rightarrow l = 8, 6 \quad \therefore l = 8$ km, $b = 6$ km
32. (a) $\frac{S_1}{S_2} = \sqrt{\frac{T_2}{T_1}} = \sqrt{\frac{4}{9}} = \frac{2}{3}$
 \therefore Let speed of $T_1 = S_1 = 2x$ and $S_2 = 3x$
A.T.S. $2x \times 9 + 3x \times 4 = 300 \Rightarrow x = 10$
Difference in speeds = $3x - 2x = x = 10$ km/hr
33. (b) Total stock = $250 \times \frac{1000}{2.5} = \text{Rs } 10000$
 $\frac{1}{5}$ of total stock = $\frac{10000}{5} = \text{Rs } 2000$
S.P. of $\frac{1}{5}$ of stock = $\frac{80}{100} \times 2000 = \text{Rs } 1600$
By investing Rs 120, stock bought worth Rs 100
By investing Rs 1600, stock bought worth
 $= \frac{100}{120} \times 1600 = \text{Rs } \frac{4000}{3}$
Income from $\frac{1}{5}$ of original stock = $\frac{250}{5} = \text{Rs } 50$
Increase in income = Rs 50
Let reqd dividend be $x\%$

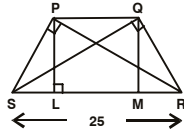
$$\therefore \frac{x}{100} \times \frac{4000}{3} = 50 + 50 \Rightarrow x = 7.5$$

$$34. (b) SP = \sqrt{RS^2 - PR^2} = \sqrt{25^2 - 20^2} = 15$$

$$QR = \sqrt{25^2 - 20^2} = 15$$

$$PL = \sqrt{PS^2 - SL^2}$$

$$= \sqrt{225 - x^2}$$



$$\text{Let } SL = x \therefore LR = 25 - x$$

$$PL = \sqrt{PR^2 - LR^2} = \sqrt{20^2 - (25 - x)^2}$$

$$\therefore 225 - x^2 = 20^2 - (25 - x)^2 \Rightarrow x = 9$$

$$\therefore PL = \sqrt{225 - 9^2} = 12$$

$$MR = SL = x = 9 \therefore PQ = LM = 25 - 9 - 9 = 7 \text{ cm}$$

$$\text{Area of a trap.} = \frac{1}{2} (PQ + SR) \times PL = \frac{1}{2} (7 + 25) \times 12 = 192 \text{ cm}^2$$

35. (c)

36. (c) CP = Rs 100 \therefore S.P. = Rs 200 then he purchased the grain for Rs 100 at the rate of Rs 2/kg

\therefore He purchased $\frac{100}{2} = 50$ kg. Again sold at Re 1/kg

\therefore S.P. of 50 kg = Rs 50. Net S.P. = 100 + 50 = Rs 150
Net gain = 150 - 100 = Rs 50

37. (c) 39930 is divisible by 3 and 11 but not by 19

38. (b) 15 men working $\frac{15}{2}$ hours a day, can finish a work

in 30 days

\therefore 1 man working 1 hour a day can do the same work

in $30 \times \frac{15}{2} \times 15 = 225 \times 15$ days

\therefore 1 man's 1 day's work by working 1 hour a day
 $= \frac{1}{225 \times 15}$

\therefore 2 men's 1 day's work = $\frac{2}{225 \times 15}$

A.T.S. 3 men's (second type) 1 day's work = $\frac{2}{225 \times 15}$

18 men's 1 day's work = $\frac{2}{225 \times 15} \times \frac{18}{3} = \frac{4}{1125}$

\therefore 18 Men's 1 day's work, working 6 hrs a day
 $= \frac{4 \times 6}{1125} = \frac{8}{375}$

\therefore Req'd. no. of days = $\frac{375}{8} = 46 \frac{7}{8}$

39. (b) Time from 10.00 a.m. on Friday to 2.00 p.m. on Monday
 $= 24 \times 3 + 4 = 76$ hrs

IInd clock gain 1 min every 1 hr [\therefore Ist clock gains

\therefore In 24 hrs, second clock 2 min and twice as gains 24 min much as IInd clock]

\therefore 24 hrs of correct clock = 24 hrs + 24 min of second

$$\text{clock} = \frac{122}{5} \text{ hrs}$$

$$\therefore 76 \text{ hrs of correct clock} = \frac{122}{5} \times \frac{76}{24} = \frac{1159}{15} = 77 \text{ hrs } 16 \text{ min}$$

Req'd time on second clock = 77 hrs 16 min after 10 a.m. = 3.16 p.m. on Monday

$$40. (c) 2700 = 2^2 \times 3^3 \times 5^2$$

Req'd no. of divisors = $(2 + 1)(3 + 1)(2 + 1) = 36$

41. (a) One digit nos. = 3 \therefore 0 can't be placed at ten's

Two digit nos. = $3 \times 3 = 9$ place \therefore ten's place can

Three digit nos. = $3 \times 3 \times 2 = 18$ be fill in 3 ways and one's

Four digit nos. $3 \times 3 \times 2 \times 1 = 18$ can't place 0 in extreme

$= 18$ left and each digit

\therefore Total no. of distinct should be used at most

nos. = $3 + 9 + 18 + 18 = 48$ once

42. (a) Let d be the common difference of an A.P.

$$\therefore x_2 = x_1 + d, x_3 = x_1 + 2d, x_4 = x_1 + 3d, x_6 = x_1 + 5d$$

$$x_1 + x_2 + x_3 = 12 \Rightarrow x_1 + x_1 + d + x_1 + 2d = 12$$

$$\text{or } 3x_1 + 3d = 12 \text{ or } x_1 + d = 4 \quad \dots (i)$$

$$x_4 + x_6 = 14 \Rightarrow x_1 + 3d + x_1 + 5d = 14$$

$$\text{or } x_1 + 4d = 7 \quad \dots (ii)$$

Solving (i) and (ii), we get $x_1 = 3$ $d = +1$

$$x_5 = x_1 + 4d = 3 + 4 \times 1 = 7$$

or $\therefore x_5 = x_1 + 4d$, we can also find from (ii) $x_5 = 7$

43. (d) Let they meet after x hrs

\therefore Distance covered by b in x hrs

$$= S_x = \frac{x}{2} [2 \times 2 + (x - 1) \frac{1}{2}] = \frac{x}{4} (x + 7) \text{ km}$$

Distance covered by A in x hrs = $4x$ km

$$\text{A.T.S. } 4x + \frac{x}{4} (x + 7) = 72 \Rightarrow x = 9$$

They meet after 9 hrs

A covers $9 \times 4 = 36$ km \therefore B also covers 36 km

\therefore They meet midway between A and B

$$44. (c) F(x) = \sum_{x=1}^3 (x^3 + x^2 + 1)$$

$$F(x) = (1^3 + 1^2 + 1) + (2^3 + 2^2 + 1) + (3^3 + 3^2 + 1) = 53$$

45. (b) If n is odd, F(x) is odd

46. (d)

$$47. (b) F_1(x) = F(x) + 2$$

If n is odd $F(x)$ is odd from (45)

$\therefore F_1(x) = \text{odd no.} + 2 = \text{odd no.}$

Quantitative Aptitude

Solved Paper of Corporation Bank P.O. Exam. held in April 2002

1. The ratio of Amit and Sumit's ages is 5 : 6. If the ratio of one-third of Amit's age and half of Sumit's age is 5 : 9, what will be Sumit's age?

- (a) 12 years (b) 15 years (c) 30 years
(d) Cannot be determined (e) None of these

2. What will come in place of question mark, in the following equation?

$$98.9 \div 11 + 7.01 \times 15.98 = (?)^2$$

- (a) 10 (b) 11 (c) 15 (d) 121 (e) 144

3. A boat can go 30 km downstream in 2 hours whereas it takes 6 hours to return upstream. If the speed of the current be half that of the boat, what is the speed of the boat (in km/hr)?

- (a) 8 (b) 5 (c) 10 (d) 16 (e) None of these

4. The ratio of arts, science and commerce students in a college is 3 : 5 : 8. If the number of students in the three branches increases by 20%, 40% and 25% respectively, what is the new ratio?

- (a) 50 : 35 : 18 (b) 18 : 35 : 50 (c) 20 : 9 : 17
(d) 12 : 19 : 36 (e) None of these

5. If $4x + 5y = 83$ and $\frac{3x}{2y} = \frac{21}{22}$, how much is $y - x$?

- (a) 17 (b) 8 (c) 10 (d) 6 (e) 4

Directions (Qs. 6-10): In the following questions, a number series is given, out of which, one number is incorrect. Find the incorrect number.

6. 36 20 12 8 6 5.5 4.5

- (a) 36 (b) 12 (c) 8 (d) 5.5 (e) 4.5

7. 2 3 6 15 45 156.5 630

- (a) 3 (b) 15 (c) 156.5 (d) 45 (e) None of these

8. 2 3 10 40 172 885 5346

- (a) 3 (b) 40 (c) 885 (d) 172 (e) None of these

9. 1 8 4 27 9 64 17 125

- (a) 17 (b) 4 (c) 9 (d) 64 (e) 125

10. 19 28 39 51 67 84 103

- (a) 19 (b) 28 (c) 39 (d) 51 (e) 67

Directions (Qs. 11-15): Answer the following questions on the basis of the given information:

- (1) In a State 'X', the ratio of males, females and children above 10 years is 11 : 10 : 9. The percentage literacy in males is 50% which equals 5500. 20% of the children are illiterate and 30% females are literate.
(2) The number of children below 10 years of age is 10% of the number of females. 5% of the total population is below the poverty line and out of these, 80% are illiterates.

11. How many people are below poverty line and are illiterate?

- (a) 7200 (b) 840 (c) 3000 (d) 1,000 (e) 900

12. What is the total population of the State 'X'?

- (a) 21,000 (b) 20,000 (c) 10,000 (d) 1,000 (e) 840

13. How many children above 10 years are literates?

- (a) 11,000 (b) 9,000 (c) 7,200 (d) 1,000 (e) 7,000

14. What is the percentage of women? (approximate)

- (a) 50 (b) 45 (c) 55 (d) 52 (e) 48

15. How many men are illiterate?

- (a) 2250 (b) 2500 (c) 3500
(d) Data inadequate (e) None of these

Directions (Qs. 16-20): Study the table given below and answer the questions that follow it.

Percentage marks obtained by five students in 6 subjects

Student \ Subject	(1) (Out of 80)	(2) (Out of 75)	(3) (Out of 100)	(4) (Out of 120)	(5) (Out of 125)	(6) (Out of 150)
A	80	72	76	80	50	65
B	60	70	88	90	65	72
C	45	65	44	72	72	82
D	50	75	72	84	64	70
E	65	45	68	60	80	66

16. What is the approximate total percentage marks of student A?

- (a) 65 (b) 74 (c) 63 (d) 75 (e) 70

17. What is the difference in marks obtained by students A and E in the subjects 3 and 4?

- (a) 30 (b) 41 (c) 34 (d) 32 (e) 30

18. What is the average of marks obtained by all the students in subject 6?

- (a) 71% (b) 69% (c) 64% (d) 75% (e) 68%

19. What is the average percentage of marks in subject 2?

- (a) 65.4 (b) 66.2 (c) 72.6 (d) 70.8 (e) 65.8

20. What is the total of marks obtained by the five students in subject 1?

- (a) 250 (b) 240 (c) 245 (d) 255 (e) 260

Directions: (Qs. 21-25): In each of these questions, there are three statements. Study the statements and decide which one/which ones of these are necessary to answer the questions.

21. What is the speed of the train?

- I. The train crosses a pole in 18 secs.
II. It crosses a platform of equal length in 36 seconds.
III. The length of the train is 360 metre.
(a) I and II only (b) II and III only
(c) III and I only (d) III and either I or II only
(e) Any two statements

22. What is the capacity of a cylindrical tank?

- I. The radius is half its height.
 - II. The area of base is 20 m^2 .
 - III. The height of the tank is 14 m.
- (a) I and II only (b) II and III only
(c) III and I only (d) All three statements
(e) Any two statements

23. How many employees are there in the company 'C'?

- I. Ratio of males and females is 2 : 3.
 - II. 80% officers are males.
 - III. Total officers are 132.
- (a) I and II only (b) II and III only
(c) Any 2 statements (d) All the three statements
(e) Data insufficient

24. What is the number of goods sold?

- I. Cost price per article is Rs 224.
 - II. Selling price per article is Rs 300.
 - III. Total profit is Rs 1520.
- (a) All the three statements (b) Statements I and II
(c) Any 2 of 3 statements (d) Statements II and III
(e) Data insufficient

25. What is the two-digit number?

- I. The difference of digits is 1.
 - II. The sum of digits is 5.
 - III. The number obtained on interchanging the digits is less than the original number by 9.
- (a) Any 2 statements (b) All the three statements
(c) I and II only (d) II and III only
(e) Data insufficient

26. A man walks 2 km in the first hour and then two-thirds of this distance in the second hour and then two-thirds of distance covered in previous hour in the third hour ... and so on. What is his maximum distance walked? (in km)

- (a) $2\frac{2}{3}$ (b) 4 (c) 5 (d) 6 (e) $\frac{3}{2}$

27. Out of the following five parts, one part is not equal to the others. Mark your answer as the part that is different.

$$35 \times 12 \div 14 + 14 \times 5 = 2^5 + \sqrt{256} + 20 = 115 \times 8 \div 10 + 8$$

(a) (b) (c) (d) (e)

$$= 36 \times 5 \div 6 + 17 \times 4 + 2 = 115 \times 8 \div 10 + 8$$

(d) (e)

28. Abhishek started a business with an investment of Rs 50,000. After one year, he invested another Rs 30,000 and now Sunil joined him with Rs 70,000. If the total profit earned during the three years from the beginning is Rs 84,000, how much will Sunil get out of it?

- (a) 36,000 (b) 34,680 (c) 33,600
(d) 35,800 (e) 32,260

Directions (Qs. 29-33): These questions are based on equation and inequalities. Solve the two equations and mark your answers as:

- (a) if $A < B$ (b) if $A > B$ (c) if $A \leq B$
(d) if $A \geq B$ (e) if $A = B$

29. I. $4A^2 - 8A + 3 = 0$

II. $2B^2 - 13B + 15 = 0$

30. (I) $20A^2 - 17A + 3 = 0$

(II) $20B^2 - 9B + 1 = 0$

31. (I) $A^2 + 3A - 4 = 0$

(II) $3B^2 - 10B + 8 = 0$

32. (I) $20A^2 + 31A + 12 = 0$

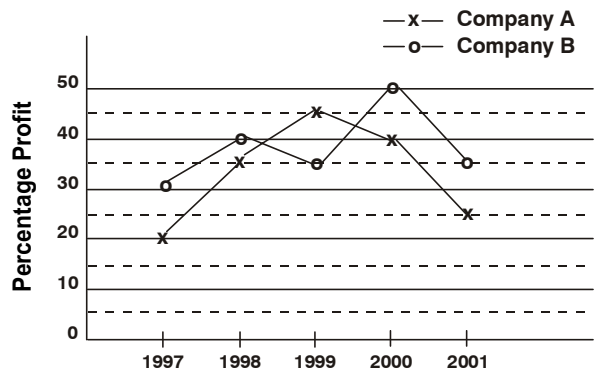
(II) $21B^2 + 23B + 6 = 0$

33. (I) $3A^2 + 10A + 7 = 0$

(II) $15B^2 - 22B + 8 = 0$

Directions (Qs. 34-38): Study the following graph and answer the questions based on it.

Profit earned by two companies



$$\text{Let \% Profit} = \frac{\text{Income} - \text{Expenditure}}{\text{Expenditure}} \times 100$$

34. If the total expenditure of the two companies was Rs 9 lakh in the year 1999 and the expenditures of A and B were in the ratio 2 : 1, what was the income of Company A in that year?

- (a) Rs 9.2 lakh (b) Rs 8.1 lakh (c) Rs 7.2 lakh
(d) Rs 6 lakh (e) Rs 4 lakh

35. If the income of Company A was equal to the expenditure of Company B in 2001, what was the ratio of their incomes?

- (a) 1 : 1 (b) 1 : 2 (c) 2 : 1
(d) Cannot be determined (e) None of these

36. If the income of Company A in 1998 was equal to its expenditure in 2000, what was the ratio between the Company's expenditures in 1997 and 2000?

- (a) 2 : 3 (b) 3 : 1 (c) 4 : 3
(d) Cannot be determined (e) None of these

37. If the income of Company B in 2000 was Rs 20 lakh and the ratio of incomes of A and B in 1999 was 2 : 3, what was the expenditure of Company A in 1999?

- (a) Rs 12 lakh (b) Rs 14 lakh (c) Rs 15 lakh
(d) Cannot be determined (e) None of these

38. What is the average percentage profit earned by the Company B?

- (a) 35% (b) 44% (c) 42% (d) 38% (e) 40%

39. The sales of a company increased for two years by 10% each year and in the third year it decreased by 5%. Again, it increased by 10% each year for two years and then it decreased by 5% in the third year. What will be the effect from 1997-2001? (Give approximate answer)

- (a) 20% decrease (b) 30% decrease (c) 26% increase
(d) 28% increase (e) 25% decrease

40. In how many different ways can we arrange the letters of the word LEADING, so that the vowels are always together?

- (a) 2880 (b) 1440 (c) 60 (d) 120 (e) 720

Directions (Qs. 41-45): Study the following table very carefully and then answer the questions that follow it.

Production of 5 units of company ABC Ltd from 1997-2001 (in crore Rs)

Year Unit	1997	1998	1999	2000	2001	Total
P	122	115	128	139	145	649
Q	16	18	20	15	34	103
R	142	143	156	216	200	857
S	102	118	129	130	150	629
T	72	58	57	70	88	345
Total	454	452	490	570	617	2583

41. In which year was the production of Company P minimum percentage of total production of all the companies?

- (a) 2001 (b) 2000 (c) 1997 (d) 1999 (e) 1998

42. In the year 2001, which company had the maximum percentage of the total production of all the years?

- (a) P (b) Q (c) R (d) S (e) T

43. How much is the percentage increase in the production of Company P from 1997 to 2001? (in rounded figures)

- (a) 14 (b) 24 (c) 25 (d) 29 (e) 33

44. How is the sum of productions of companies P and Q in the year 1999 related to their production in 1998?

- (a) +11.2% (b) -11.2% (c) + 11.3%
(d) -11.3% (e) None of these

45. What is the ratio of production of the companies P and Q in 1999 and the companies S and T in 2001?

- (a) $\frac{71}{121}$ (b) $\frac{74}{119}$ (c) $\frac{63}{119}$ (d) $\frac{146}{238}$ (e) $\frac{147}{238}$

Directions (Qs. 46-50): Study the following graph very carefully and answer the following questions:

(Imports and exports of a garment company)



46. In which year was the percentage change in imports (over the previous year) the lowest?

- (a) 1996-97 (b) 1997-98 (c) 1998-1999
(d) 1999-2000 (e) 2000-2001

47. What is the ratio of total exports to total imports?

- (a) 39 : 42 (b) 45 : 47 (c) 43 : 42 (d) 40 : 41 (e) 41 : 42

48. In which two years is the total import equal to total export?

- (a) 1996-1997 (b) 1996-1998 (c) 1998-1999
(d) 1999-2000 (e) None of these

49. What is the ratio of total exports to the total imports for the years 2000 and 2001?

- (a) 13 : 14 (b) 14 : 15 (c) 15 : 16 (d) 16 : 17 (e) 17 : 18

50. Which of the following matchings of year and the percentage increase in exports (over previous year) is not correct?

- (a) 1997 → 16.7 (b) 1998 → 0 (c) 1999 → -14.3
(d) 2000 → 16.7 (e) 2001 → -14.3

HINTS AND SOLUTIONS

1. (d) The question cannot be solved, as both statements lead to the same indecisive conclusion.

Let Amit's and Sumit's ages be x and y years

Then, we have: $\frac{x}{y} = \frac{5}{6}$... (1)

and $\frac{\frac{x}{3}}{\frac{y}{2}} = \frac{5}{9}$ i.e. $\frac{x}{y} = \frac{5}{6}$... (2)

Since eqn. 1 = eqn. 2 \Rightarrow only 1 equation is available

* (To solve for 2 variables, we need at least 2 equations)

2. (b) You can substitute *approximate values

Use rule of BODMAS. We have $(\frac{99}{11}) + (7 \times 16) \equiv x^2$

$9 + 112 \equiv x^2$ i.e. $x = \sqrt{121} = \pm 11$

3. (c) Let the speeds of boat and stream be x and $\frac{x}{2}$ (km/hr)

* Now, since there is only one variable, we need only 1 equation to solve the problem

Use $t = \frac{D}{S}$ directly $\Rightarrow 2 = \frac{30}{x + \frac{x}{2}}$

or $x = 10$ and $\frac{x}{2} = 5$

4. (b) You can solve this problem even verbally

The new ratio will be $3 + 20\% : 5 + 40\% : 8 + 25\%$
i.e. $3.6 : 7 : 10$

i.e. $\frac{36}{10} : 7 : 10$ or $18 : 35 : 50$

5. (e) Since $\frac{3x}{2y} = \frac{21}{22} \rightarrow \frac{x}{y} = \frac{7}{11}$

Let the value of x and $y = 7k$ and $11k$
 Putting in other equation $\rightarrow 4(7k) + 5(11k) = 83$
i.e. $83k = 83$, *i.e.* $k = 1$
 $\therefore x = 7 \times 1 = 7$
 and $y = 11 \times 1 = 11 \rightarrow y - x = 11 - 7 = 4$

6. (d) The series is: $-16, -8, -4, -2, -1, -\frac{1}{2}$
7. (c) The series is: $\times 1.5, \times 2, \times 2.5, \times 3$, etc.
8. (b) The series is:
 $2 \times 1 + 1^2, 3 \times 2 + 2^2, 10 \times 3 + 3^2, 39 \times 4 + 4^2 \dots$
9. (a) There are two series: $1^2, 2^2, 3^2, 4^2$ and $2^3, 3^3, 4^3, 5^3$
10. (d) The series is $4^2 + 3, 5^2 + 3, 6^2 + 3$ and so on.
11. (b) For such questions, it is always better to go systematically. Thus, we have:
 Ratio of Males, females and children = $11 : 10 : 9$

Males ($\frac{11}{20}$)

- (1) Since literates = 5500 $\rightarrow 50\% x = 5500$ *i.e.* $x = 11,000$
 (Here x = number of males)
- (2) Now, males = $\frac{11}{20}$ parts of total
 $\therefore \frac{11}{20}$ (Total) = 11,000 \rightarrow Total = 20,000

Females ($\frac{10}{20}$)

- (1) Females = $\frac{10}{20}$ parts = $\frac{10}{20} \times 20,000 = 10,000$
- (2) Illiterates = $30\% = 3000$ \therefore Literates = 7,000

Children above 10 ($\frac{9}{20}$)

- (1) Children (above 10) = $\frac{9}{20}$ parts
 $= \frac{9}{20} \times 20,000 = 9,000$
- (2) Illiterates = $20\% = 1800$ \therefore Literates = 7,200

Children below 10

- (1) Children (below 10) = 10% of females = 1,000
 Total = 20,000 (Males + Females + Children)
 $+ 1,000$ (Children below 10)
 Poor people = 5% of total = 5% of 21,000 = 1050
 Poor illiterates = 80% of 1050 = 840 and literates = 210
 From The above data, we see that poor illiterates = 840

12. (a) Total population = 20,000 + 1000 = 21,000 (see above)
13. (c) As above
14. (e) % women = $\frac{10,000}{21,000} \times 100 \cong 48\%$
15. (d) The data about male literates is not provided

16. (e) $(80\% \text{ of } 80 + 72\% \text{ of } 75 + \dots 65\% \text{ of } 150) \times 100 / (80+75+100 + \dots 150)$
17. (d) A has $(76\% \text{ of } 100 + 80\% \text{ of } 120)$
 and B has $(68\% \text{ of } 100 + 60\% \text{ of } 120)$
 \therefore Difference = $76 + 96 - 68 - 72 = 32$
18. (a) * Since total is same (150), just average the percentages
 Thus, we have $\frac{(65+72+82+70+66)}{5} = 71\%$
19. (a) Same as above (see question 18) = 65.4 %
20. (b) Total marks are 80% of 80 + 60% of 80 + ... 65% of 80
i.e. $64 + 48 + 36 + 40 + 52$ *i.e.* 240
21. (d) III and either I or II
 * (For more details on TRAIN problems, refer June issue of CM).
22. (e) From I and II, $A = \pi r^2 = 20 \rightarrow r$
 $= \sqrt{\frac{20}{\pi}}$ and $h = 2r = 2 \sqrt{\frac{20}{\pi}}$
 $\therefore V = \pi r^2 h$ can be found from the values of h and r
 From II and III, $A = \pi r^2 \rightarrow r = \sqrt{\frac{20}{\pi}}$ and $h = 14$
 $\therefore V = \pi r^2 h$ can be found from r and h values
 From I and III, $h = 14 \rightarrow r = \frac{h}{2} = 7$
 $\therefore V = \pi r^2 h$ can be found out easily
23. (e) Statements II and III talk about the officers only.
 Statement I gives ratio of all males and females.
 It is not possible to connect the statements and get result.
24. (a) No. of goods = $\frac{\text{Total Profit}}{\text{Profit on one article}}$
 $= \frac{1520}{300 - 224} = 20$
25. (c) From I $\rightarrow x - y = 1$
 From II $\rightarrow x + y = 5$
 From III \rightarrow Original no. = $10x + y$
 New no. = $10y + x$
 and $(10x + y) - (10y + x) = 9$
i.e. $9x - 9y = 9$ *i.e.* $x - y = 1$
 Thus I and III are same.
 You can combine II with either I or III.
 Thus, $x = 3$, $y = 2$ and number is 32.
26. (d) Since there is a constant ratio, this is a geometric progression.
 Using formula $S_n = \frac{a(1 - r^n)}{1 - r}$
 Here $n = \infty$ and $r = \frac{2}{3}$

$$\rightarrow S_{\infty} = \frac{a}{1-r} = \frac{2}{1-\frac{2}{3}} = \frac{2}{\frac{1}{3}} = 6 \text{ km}$$

27. (b) Apply rule of BODMAS.

All parts except (b) are equal to 100; (b) = 68.

28. (c) Abhishek invested Rs 50,000 for 36 months (3 years) and Rs 30,000 for 24 months (2 years)

Sunil invested Rs 70,000 for 24 months (2 years)

Thus, ratio of division is:

$$(50000 \times 36 + 30000 \times 24) : (70,000 \times 24) \text{ i.e. } 63 : 42$$

$$\text{Thus, Sunil's share} = \frac{42}{63+42} \times 84000 = 33600$$

29. (c) $A \leq B$ (Refer previous issues of Competition Master)

Solving the two quadratic equations we get

$$A = \frac{3}{2}, \frac{1}{2} \text{ and } B = \frac{3}{2}, 5$$

30. (d) $A \geq B$. Equation 1 gives us $A = \frac{1}{4}, \frac{3}{5}$

$$\text{and equation 2 gives us } B = \frac{1}{4}, \frac{1}{5}$$

31. (a) $A < B$. Equation 1 gives us $A = 1, -4$

$$\text{Equation 2 gives us } B = \frac{4}{3}, 2$$

Both the values of A are less than B

32. (a) $A < B$. $A = -\frac{3}{4}, -\frac{4}{5}$ Clearly $B > A$

$$B = \frac{-2}{3}, \frac{-3}{7} \text{ i.e. } A < B$$

33. (a) $A < B$. $A = \frac{-7}{3}, -1$ and $B = \frac{2}{3}$ and $\frac{4}{5}$

* Consider $\frac{-7}{3}, -1$. Then $A < B$ ($\because B = \text{positive}$)

34. (b) (8.1 lakh). Expenditures are $\frac{2}{2+1} \times 9 = 6$ lakh and

$$\frac{1}{2+1} \times 9 = 3 \text{ lakh}$$

$$\text{Since } \%P = \frac{\text{Income} - \text{Expenditure}}{\text{Expenditure}} \times 100$$

(Let income = x)

$$\rightarrow 35 = \frac{x-6}{6} \times 100 \text{ i.e. } x = 8.1 \text{ lakh}$$

35. (c) Let income (A) = Expenditure (B) = x

Using formula for % Profit, we get,

$$25 = \frac{x-E}{E} \times 100 \text{ and } 35 = \frac{I-x}{x} \times 100$$

Since there are only 2 equations and 3 unknowns, answer can't be determined.

36. (c) Same as in Q. 35

37. (e) The different years can't be inter-related to solve the problem.

$$38. (d) \text{ Required average} = \frac{30+40+35+50+35}{5} = \frac{190}{5} = 38\%$$

39. (c) *You can use the method of ratios directly

Thus, we have

$$\frac{110 \times 110 \times 95 \times 110}{100 \times 100 \times 100 \times 100} \cong 1.26 \text{ i.e. } 26\% \text{ increase}$$

40. (e) (*Refer previous issues for more details on this topic)

Keeping the vowels together, we have 5 entities:

(EAI)L D NG

\therefore No. of ways = $\angle 5 \times \angle 3 = 720$ (The 3 vowels can be arranged among themselves in $\angle 3$ ways).

41. (c) Comparing the production by P in various years, we observe the following ratios

$$\frac{122}{454}, \frac{115}{452}, \frac{128}{490}, \frac{139}{570}, \frac{145}{617}. \text{ Here } \frac{122}{454} \text{ is highest}$$

42. (b) Again, we have $\frac{145}{649}, \frac{34}{103}, \frac{200}{857}, \frac{150}{629}, \frac{88}{345}$

Here $\frac{34}{103}$ is highest

$$43. (d) \% \text{ increase} = \frac{145-122}{122} \times 100 \cong 29$$

44. (a) In 1998, production is $115 + 18 = 133$ and

In 1999, production is $128 + 20 = 148$

$$\therefore \% \text{ Increase} = \frac{148-133}{133} \times 110 = +11.2\%$$

45. (b) P and Q (1999) = $128 + 20 = 148$

S and T (2001) = $150 + 88 = 238$

$$\text{Ratio} = \frac{148}{238} = \frac{74}{119}$$

46. (c) The import figures are: 50, 40, 80, 90, 60 and 100

Clearly, the change is lowest from 80 \rightarrow 90

$$\text{i.e. } \frac{10}{80} \times 100 = 12.5\%$$

47. (e) The export figures are: 60, 70, 70, 60, 70 and 70

Sum = 410 and sum of imports = 420

\therefore Ratio = 41 : 42

48. (b) Imports (1996, 1998) = $(50 + 80) = 130$

= Exports $(60 + 70)$

49. (c) Exports = $70 + 80 = 150$, Imports = $60 + 100 = 160$

$$\therefore \text{Required ratio} = \frac{15}{16}$$

50. (e) The % increase is as follows

$$\frac{10}{60} \times 100, 0, \frac{-10}{70} \times 100, \frac{10}{60} \times 100, \frac{10}{70} \times 100$$

i.e. 16.7%, 0, -14.3%, 16.7% and 14.3%

Quantitative Aptitude

CDS Examination held on 24th February 2002

1. A hemispherical bowl B_1 and a hollow right circular cylinder B_2 (having length equal to its radius) have the same diameter equal to the length of a side of a hollow cubical box B_3 . Water is filled in all these vessels up to the same level and such that hemispherical bowl is full of water and the volumes of filled water are V_1 , V_2 and V_3 , respectively, in B_1 , B_2 and B_3 , then:

- (A) $V_1 < V_2 < V_3$ (B) $V_2 < V_3 < V_1$
(C) $V_3 < V_2 < V_1$ (D) $V_3 < V_1 < V_2$

2. It is required to construct a big rectangular hall to accommodate 500 persons, allowing 22.5 m^3 space per person. The height of the hall is to be kept at 7.5 m while the total inner surface area of the walls must be 1200 sq. m. The length and breadth of the hall must, respectively, be:

- (A) 60 m and 20 m (B) 40 m and 30 m
(C) 45 m and 35 m (D) 50 m and 30 m

3. If the height of a cone is increased by 200%, then its volume will increase by:

- (A) 100% (B) 200%
(C) 250% (D) 300%

4. If a cube of maximum possible volume is cut off from a solid sphere of diameter d , then the volume of the remaining waste material of the sphere would be equal to:

- (A) $\frac{d^3}{4} \cdot \pi$ (B) $\frac{d^3}{3} \cdot \pi$
(C) $\frac{d^3}{3} \cdot (\pi - 1)$ (D) $\frac{d^3}{3} \cdot (\frac{\pi}{2} - \frac{1}{\sqrt{3}})$

5. A cylindrical vessel 80 cm in diameter is partly filled with water. If a heavy sphere of 60 cm diameter is gently dropped into the vessel, then the water level will rise by another:

- (A) 30.5 cm (B) 35.2 cm
(C) 32.5 cm (D) 22.5 cm

6. A circus tent is cylindrical to a height of 3 m and conical above it. If its diameter is 105 m and slanting height of the cone is 53 m, then the area of the canvas used is equal to:

- (A) 9435 sq. cm (B) 9535 sq. cm
(C) 9635 sq. cm (D) 9735 sq. cm

7. A cylindrical drum of radius 50 cm and height 30 cm is completely filled under a running tap of water in 2 minutes. If the radius of the circular tap is 1 cm, then the velocity of the water flowing through the tap is equal to:

- (A) 325 cm/s (B) 425 cm/s
(C) 525 cm/s (D) 625 cm/s

8. If $x^{\frac{1}{3}} + y^{\frac{1}{3}} + z^{\frac{1}{3}} = 0$, then the value of $(x+y+z)^3$ will be:

- (A) $3x^{\frac{1}{3}} \cdot y^{\frac{1}{3}} \cdot z^{\frac{1}{3}}$ (B) $9x^{\frac{2}{3}} \cdot y^{\frac{2}{3}} \cdot z^{\frac{2}{3}}$

- (C) $27x \cdot y \cdot z$ (D) 0

9. $3^x = 5^y = 45^z$, then

- (A) $x + y + z = 0$ (B) $\frac{2}{x} = \frac{1}{z} - \frac{1}{y}$

- (C) $\frac{2}{y} = \frac{1}{x} - \frac{1}{z}$ (D) $\frac{2}{z} = \frac{1}{y} - \frac{1}{x}$

10. If $3^x - 3^{x-1} = 18$, then the value of x^x is equal to:

- (A) 3 (B) 8
(C) 27 (D) 216

11. If $x = 3 - \sqrt{5}$, then the value of $x^2 + \frac{16}{x^2}$ is equal to:

- (A) 10 (B) 24
(C) 26 (D) 28

12. The factors of $a^3 + 4a^2 - 11a - 30$ are:

- (A) $(a - 2)(a + 3)(a + 5)$
(B) $(a + 2)(a + 3)(a - 5)$
(C) $(a + 2)(a - 3)(a - 5)$
(D) $(a + 2)(a - 3)(a + 5)$

13. If $2x - ky + z = 0$ is a factor of

$9y^2 - z^2 - 2xz + 6xy$, then the value of k is equal to:

- (A) -3 (B) -1
(C) 1 (D) 3

14. When $x^5 - 5x^4 + 9x^3 - 6x^2 - 16x + 13$ is divided by $x^2 - 3x + a$, the quotient and the remainder are $x^3 - 2x^2 + x + 1$ and $-15x + 11$, respectively. The value of a is equal to:

- (A) 1 (B) 2 (C) 3 (D) 4

15. If $Ax^3 + 31x^2 - Bx - 10$ is exactly divisible by $2x^2 + 9x - 5$, then the values of A and B , respectively, are:

- (A) -1 and 5 (B) 6 and -3
(C) 3 and -6 (D) -3 and 6

16. The sum and the difference of two expressions is $5x^2 - x - 4$ and $x^2 + 9x - 10$, respectively, then their L.C.M. would be equal to:

- (A) $(x - 1)$ (B) $(2x - 3)(3x + 7)$
(C) $(2x + 3)(3x + 7)$ (D) $(x - 1)(2x - 3)(3x + 7)$

17. H.C.F. of two polynomials is $a + 5$ and their L.C.M. is $(a + 5)(a + 4)(a - 1)$. If one of the polynomial is $a^2 + 4a - 5$, then the other polynomial is:

- (A) $a^2 + 9a - 20$ (B) $a^2 - 9a + 20$
(C) $a^2 + 9a + 20$ (D) $a^2 - 9a - 20$

18. If $a^2 = (b + c)$, $b^2 = (c + a)$, $c^2 = (a + b)$; then the value of $\frac{1}{a+1} + \frac{1}{b+1} + \frac{1}{c+1}$ is equal to:

- (A) 1 (B) -1
(C) 0 (D) $\left(\frac{1}{a} + \frac{1}{b} + \frac{1}{c}\right)$

19. If $ab + bc + ca = 0$, then

$$\frac{a^2}{(a^2 - bc)} + \frac{b^2}{(b^2 - ca)} + \frac{c^2}{(c^2 - ab)} \text{ is equal to:}$$

- (A) 0 (B) 1
(C) -1 (D) $-\left[\frac{1}{bc} + \frac{1}{ca} + \frac{1}{ab}\right]$

20. If p and q are real numbers; $p \neq 0$, then the equation

$3x - 5 + q = px + 1$ has no solution, if:

- (A) $p = -3$ (B) $p = 0$
(C) $p = 3$ (D) $p = 6$

21. The length of a room is 3 metres more than its breadth.

If the area of the floor of the room is 154 m^2 , then the length of the room is equal to:

- (A) 14 m (B) 17 m
(C) 11 m (D) 15 m

22. A certain two-digit number is equal to five times the sum of its digits. If nine were added to the number, its digits would be reversed. The sum of the digits of the number is:

- (A) 6 (B) 7 (C) 8 (D) 9

23. The sum of two numbers added to the sum of their squares is 42. If the product of the number is 15, then the numbers are:

- (A) -3 and -5 (B) 1 and 15
(C) -1 and -15 (D) 3 and 5

24. The system of equations $x + 2y = 3$ and $2x + 4y = 3$, has:

- (A) a unique solution
(B) infinitely many solutions
(C) has no solution
(D) has exactly two solutions

25. If α, β and γ are the roots of the cubic equation

$(x - 1)(x^2 + x + 3) = 0$, then the value of $\alpha^3 + \beta^3 + \gamma^3$ is equal

to:

- (A) -1 (B) 9 (C) 0 (D) 3

26. If the equation

$$\sqrt{(2x^2 + 7x + 15)} + \sqrt{(2x^2 + 7x - 6)} = 7, \text{ is satisfied}$$

by values x_1, x_2 of x , then the value of $x_1 x_2$ is equal to:

- (A) -5 (B) 5 (C) $\frac{7}{2}$ (D) $\frac{7}{2}$

27. If $3^{12} \times (2^x)^2 = 6^{12}$, then the value of x is equal to:

- (A) -6 (B) -3 (C) 3 (D) 6

28. If $a^x \cdot b = b^y \cdot c = c^z \cdot a = 1$, then $(xyz)^3$ is equal to:

- (A) 8 (B) $\frac{1}{8}$ (C) 1 (D) -1

29. If $a + b + c = 0$, then the value of $(x^a)^{a^2 - bc} \cdot (x^b)^{b^2 - ca} \cdot (x^c)^{c^2 - ab}$ is equal to:

- (A) -2 (B) -1 (C) 0 (D) 1

30. If A, B, C are three sets and if

$$|A \cup B \cup C| = 100, |A| = 60, |B| = 50,$$

$$|C| = 50, |A \cap B| = 10, |B \cap C| = 15,$$

$$|C \cap A| = 50, \text{ then } |A \cap B \cap C| \text{ is equal to:}$$

- (A) 5 (B) 10 (C) 15 (D) 20

31. In an examination 70% students passed both in Mathematics and Physics, 85% passed in Mathematics and 80% passed in Physics. If 30 students have failed in both the subjects, then the total number of students who appeared in the examination is equal to:

- (A) 900 (B) 600
(C) 150 (D) 100

32. The proper subsets of the set $P = \{a, b, c\}$ are:

- (A) $\{a\}, \{b\}, \{c\}, \{a, b\}, \{b, c\}, \{c, a\}$
(B) $\phi, \{a\}, \{b\}, \{c\}, \{a, b\}, \{b, c\}, \{c, a\}, \{a, b, c\}$
(C) $\phi, \{a\}, \{b\}, \{c\}, \{a, b\}, \{b, c\}, \{c, a\}$
(D) $\{a\}, \{b\}, \{c\}, \{a, b\}, \{b, c\}, \{c, a\}, \{a, b, c\}$

33. Which one of the following statements is correct for collecting primary data by direct personal interviews?

- (A) It is very cheap method of collecting the data
(B) It is very costly when the number of persons to be interviewed is large
(C) The chances of personal prejudice and bias are very less
(D) Even poorly trained people can collect this data

34. Match List I with List II and select the correct answer using the codes given below the Lists:

List I

List II

- | | |
|--|-------------------|
| A. Cumulative frequency | 1. Class interval |
| B. Relative frequency | 2. Class mark |
| C. Differences between the actual class boundaries | 3. Ogive |
| D. Mid values of the class | 4. Percentage |

Codes:

- (A) A B C D
2 1 4 3
(B) A B C D
3 4 1 2
(C) A B C D
2 4 1 3
(D) A B C D
3 1 4 2

35. Consider the following statement:

Pie chart is a k -dimensional diagram.

The above statement is correct for the value of k equal to:

- (A) 1 (B) 2 (C) 3 (D) 4

Directions:

The following five items consist of two statements, one

labelled the 'Assertion A' and the other labelled the 'Reason R'. You are to examine these two statements carefully and decide if the 'Assertion A' and 'Reason R' are individually true and if so, whether the Reason is a correct explanation of the Assertion. Select your answer to these items using the codes given below and mark your Answer Sheet accordingly.

Codes:

- (A) Both A and R are true and R is the correct explanation of A
 (B) Both A and R are true but R is NOT a correct explanation of A
 (C) A is true but R is false
 (D) A is false but R is true

36. *Assertion (A)* : If a transversal intersects two parallel lines, then the sum of the interior angles on the same side of the transversal is 180° .

Reason (R) : Opposite angles of the two intersecting lines are equal.

37. *Assertion (A)* : The number 5375922 is divisible by both 2 and 3.

Reason (R) : Even number is always divisible by 2 and 6 ($= 2 \times 3$) is also an even number.

38. *Assertion (A)* : Two real numbers are given in their decimal expansion. We cannot distinguish them as distinct just from the fact that their expansions differ at least at one place.

Reason (R) : Every real number has a unique decimal expansion.

39. *Assertion (A)* : Two poles of heights 6 m and 11 m stand vertically on the ground. If the distance between their feet is 12 m, then difference between their tops is 13 m.

Reason (R) : Square of hypotenuse of a right-angled triangle is equal to the sum of squares of the other two sides.

40. *Assertion (A)* : The classification and tabulation make the analysis and interpretation of the data easier.

Reason (R) : The original form of the collected data is often very complex and voluminous.

41. Consider the following statements:

The real number π can be defined as

1. rational number $\frac{22}{7}$

2. ratio of the perimeter of a circle to its diameter

3. area of the unit circle

Which of these is/are correct?

- (A) 2 and 3 (B) 1 and 2
 (C) 1 and 3 (D) 1 alone

42. The next term in the sequence 0, 1, 4, 25 is equal to:

- (A) 36 (B) 49 (C) 64 (D) 676

43. The square root of $(7 + 2\sqrt{10})$ is equal to:

- (A) $\sqrt{3} + \sqrt{4}$ (B) $\sqrt{6} + 1$
 (C) $2 + \sqrt{5}$ (D) $\sqrt{5} + \sqrt{2}$

44. The least number needed to be added to the number

7602 to make it a perfect square is:

- (A) 33 (B) 87
 (C) 132 (D) 142

45. $\frac{(0.534 \times 0.534 - 0.466 \times 0.466)}{(0.534 - 0.466)}$ is equal to:

- (A) 1 (B) 0.068
 (C) 0.466 (D) 0.534

ANSWERS AND EXPLANATIONS

1. (A) $V_1 = \frac{2}{3}\pi r^3$, $V_2 = \pi r^2 \times r = \pi r^3$, $V_3 = (2r)^3 = 8r^3$

Clearly $V_1 < V_2 < V_3$

2. (D) Area of four walls $= 2(l + b) \times h = 1200 \Rightarrow l + b = \frac{1200}{2 \times 7.5} = 80 \dots (i)$

$V = lbh = 500 \times 22.5 \Rightarrow lb = 1500 \dots (ii)$

[$\because h = 7.5$]

Solving (i) & (ii), $l = 50$, $b = 30$

3. (B) %increase in vol. $= \frac{\frac{1}{3}\pi r^2(3h) - \frac{1}{3}\pi r^2 h}{\frac{1}{3}\pi r^2 h} \times 100 = 200$

$V \propto h$, %Increase in vol = % Increase in height

4. (D) Diagonal of a cube of max. possible vol. must be equal to $d \therefore \sqrt{3}l = d \Rightarrow l$ (side of a cube) $= \frac{d}{\sqrt{3}}$

Vol. of a cube $= \left(\frac{d}{\sqrt{3}}\right)^3 = \frac{d^3}{3\sqrt{3}}$

Vol. of a sphere $= \frac{4}{3}\pi\left(\frac{d}{2}\right)^3 = \frac{\pi d^3}{6}$

Vol. of remaining waste $= \frac{\pi d^3}{6} - \frac{d^3}{3\sqrt{3}} = \frac{d^3}{3} \left(\frac{\pi}{2} - \frac{1}{\sqrt{3}} \right)$

5. (D) Increase in vol. of water = vol. of a sphere

$\pi \left(\frac{80}{2} \right)^2 \times \text{rise in level of water} = \frac{4}{3}\pi \left(\frac{60}{2} \right)^3 \Rightarrow h = 22.5 \text{ cm}$

6. (D) Area of canvas C.S.A. of cone + C.S.A. of cylindrical part $= \pi r l + 2\pi r h = \pi r(l + 2h)$

$= \frac{22}{7} \times \frac{105}{2} (53 + 2 \times 3) = 9735 \text{ sq. cm}$

7. (D) Vol. of water $= \pi (50)^2 \times 30 \text{ cm}^3$

$$\text{Water flowing in 2 min} = \frac{\pi(50)^2 \times 30}{\pi(1)^2} = 75000 \text{ cm}$$

$$\text{Velocity of water (in cm/sec)} = \frac{75000}{2 \times 60} = 625$$

8. (C) Let $x^{\frac{1}{3}} = a, y^{\frac{1}{3}} = b, z^{\frac{1}{3}} = c \therefore a + b + c = 0$ (given)

$$\therefore a^3 + b^3 + c^3 = 3abc \Rightarrow x + y + z = 3x^{\frac{1}{3}}y^{\frac{1}{3}}z^{\frac{1}{3}}$$

$$(x + y + z)^3 = 27xyz$$

9. (B) $3^x = 5^y = 45^z = k$ (say) $\therefore 3 = k^{\frac{1}{x}}, 5 = k^{\frac{1}{y}}$

$$45^z = (3^2 \times 5)^z = k \Rightarrow (k^{\frac{2}{x}} \cdot k^{\frac{1}{y}})^z$$

$$= k \Rightarrow k^{\frac{2}{x} + \frac{1}{y}} = k^{\frac{1}{z}} \Rightarrow \frac{2}{x} + \frac{1}{y} = \frac{1}{z}$$

$$\therefore \frac{2}{x} = \frac{1}{z} - \frac{1}{y}$$

10. (C) $3^x - 3^{x-1} = 18 \therefore 3^{x-1}(3 - 1) = 2 \times 3^2$

$$\text{or } 3^{x-1} \times 2 = 2 \times 3^2$$

$$\therefore x - 1 = 2 \Rightarrow x - 3 \therefore x^x = 3^3 = 27$$

11. (D) $\frac{1}{x} = \frac{1}{3 - \sqrt{5}} = \frac{3 + \sqrt{5}}{(3 - \sqrt{5})(3 + \sqrt{5})}$

$$= \frac{3 + \sqrt{5}}{4} \Rightarrow \frac{4}{x} = 3 + \sqrt{5}$$

$$x^2 + \left(\frac{4}{x}\right)^2 = (3 - \sqrt{5})^2 + (3 + \sqrt{5})^2 \Rightarrow x^2 + \frac{16}{x^2} = 28$$

12. (D) By putting $a = -2$ (a factor of 30) in

$$a^3 + 4a^2 - 11a - 30 \text{ we get zero}$$

$$\therefore a + 2 \text{ is a factor of this pol.}$$

$$\text{On dividing the pol. by } a + 2 \text{ we get}$$

$$\text{quotient} = a^2 + 2a - 15$$

$$\therefore a^3 + 4a^2 - 11a - 30 = (a + 2)(a^2 + 2a - 15)$$

$$= (a + 2)(a - 3)(a + 5)$$

13. (A) $2x - ky + z = 0 \therefore 2x = ky - z$

$$\therefore 9y^2 - z^2 - 2xz + 6xy = 9y^2 - z^2 - 2x(z - 3y)$$

$$= (3y - z)(3y + z) + (ky - z)(3y - z)$$

$$= (3y - z)(3y + z + ky - z)$$

$$= y(3y - z)(3 + k) \therefore 2x - ky + z \text{ is a factor of the pol.}$$

$$\therefore y(3y - z)(3 + k) = 0 \Rightarrow k = -3$$

$$[\therefore \text{If } x - 0 \text{ is a factor of } p(x) \text{ then } p(a) = 0]$$

14. (B) $x^5 - 5x^4 + 9x^3 - 6x^2 - 16x + 13$

$$= (x^2 - 3x + a)(x^3 - 2x^2 + x + 1) + (-15x + 11)$$

$$\text{Comparing constant terms, } a + 11 = 13 \therefore a = 2$$

15. (B) Let $p(x) = Ax^3 + 31x^2 - Bx - 10$

$$2x^2 + 9x - 5 = (2x - 1)(x + 5)$$

$$\text{As } p(x) \text{ is divisible by } 2x^2 + 9x - 5$$

$$\therefore 2x - 1 \text{ and } x + 5 \text{ are factors of } p(x)$$

$$\therefore p\left(\frac{1}{2}\right) = 0 \text{ and } p(-5) = 0$$

$$\therefore p\left(\frac{1}{2}\right) = A\left(\frac{1}{2}\right)^3 + 31\left(\frac{1}{2}\right)^2 - B \times \frac{1}{2} - 10 = 0$$

$$\Rightarrow A - 4B - 18 = 0 \quad \dots(i)$$

$$p(-5) = A(-5)^3 + 31(-5)^2 - B(-5) - 10 = 0$$

$$\Rightarrow 25A - B - 153 = 0 \quad \dots(ii)$$

$$\text{Solving (i) and (ii), we get } A = 6, B = -3$$

16. (D) $A + B = 5x^2 - x - 4 \quad \dots(i)$

$$A - B = x^2 + 9x - 10 \quad \dots(ii)$$

$$\text{Solving (i) and (ii),}$$

$$A = 3x^2 + 4x - 7 \text{ and } B = 2x^2 - 5x + 3$$

$$A = 3x^2 + 4x - 7 = (3x + 7)(x - 1)$$

$$B = (2x - 3)(x - 1)$$

$$\therefore \text{LCM of } A \text{ and } B = (2x - 3)(3x + 7)(x - 1)$$

17. (C) $q(x) = \frac{\text{HCF} \times \text{LCM}}{p(x)}$

18. (D) $a^2 = b + c, b^2 = c + a, c^2 = a + b$

$$\therefore a^2 - b^2 = b - a$$

$$(a + b)(a - b) = -(a - b) \Rightarrow a + b = -1$$

$$\therefore a + 1 = -b$$

$$\frac{1}{a+1} = -\frac{1}{b} \text{ Sly } \frac{1}{b+1} = \frac{-1}{c}, \frac{1}{c+1} = -\frac{1}{a}$$

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

19. (B) $ab + bc + ca = 0 \Rightarrow ab = -bc - ca = -c(b + a)$

$$\therefore c^2 - ab = c^2 + c(b + a) = c(c + b + a)$$

$$\therefore \frac{c^2}{c^2 - ab} = \frac{c^2}{c(a + b + c)} = \frac{c}{a + b + c}$$

$$\text{Sly } \frac{a^2}{a^2 - bc} = \frac{a}{a + b + c}, \frac{b^2}{b^2 - ca} = \frac{b}{a + b + c}$$

$$\therefore \text{Reqd sum} = \frac{a}{a + b + c} + \frac{b}{a + b + c} + \frac{c}{a + b + c}$$

$$= \frac{a + b + c}{a + b + c} = 1$$

20. (C) $3x - 5 + q = px + 1 \Rightarrow (3 - p)x$

$$= 6 - q \Rightarrow x = \frac{6 - q}{3 - p}$$

$$\text{For no sol. } 3 - p = 0 \Rightarrow p = 3$$

21. (A) Let breadth = $xm \therefore L = x + 3 \therefore (x + 3)x = 154$

$$\text{or } x^2 + 3x - 154 = 0 \Rightarrow x = 11 \quad (\because x \neq -14)$$

$$\therefore L = x + 3 = 11 + 3 = 14m$$

22. (D) Let the digits at unit's and ten's places be x and y resp.

$$\therefore \text{No.} = 10y + x$$

$$\therefore \text{No. formed by reversing the digits} = 10x + y$$

$$\text{A.T.S. } 10y + x = 5(x + y) \Rightarrow 4x - 5y = 0 \quad \dots(i)$$

$$10y + x + 9 = 10x + y \Rightarrow 9x - 9y = 9$$

$$\Rightarrow x - y = 1 \quad \dots(ii)$$

$$\text{Solving (i) \& (ii) } x = 5, y = 4$$

$$\text{Sum of digits} = 5 + 4 = 9$$

23. (D) $xy = 15$, $x^2 + y^2 + x + y = 42 \quad \dots(i)$
 $= 3 \times 5$ Nos. can be 3 and 5 or -3 and -5
 But 3 and 5 satisfy (i)

24. (C) $\frac{a_1}{a_2} = \frac{1}{2}$, $\frac{b_1}{b_2} = \frac{2}{4} = \frac{1}{2}$, $\frac{c_1}{c_2} = \frac{3}{3} = 1$

$$\therefore \frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2} \therefore \text{The system has no sol.}$$

25. (B) $(x-1)(x^2+x+3)=0$
 $\therefore x-1=0 \quad x^2+x+3=0$
 $x=1 \quad x = \frac{-1 \pm \sqrt{1-12}}{2}$

$$\alpha=1 \quad = \frac{-1 \pm \sqrt{11}i}{2}$$

$$\beta = \frac{-1 + \sqrt{11}i}{2}, \gamma = \frac{-1 - \sqrt{11}i}{2}$$

$$\therefore \alpha + \beta + \gamma = 0 \therefore \alpha^3 + \beta^3 + \gamma^3 = 3\alpha\beta\gamma$$

$$= 3 \times 1 \times \left(\frac{-1 + \sqrt{11}i}{2} \right) \left(\frac{-1 - \sqrt{11}i}{2} \right) = 9$$

26. (A) Let $A = \sqrt{2x^2 + 7x + 15}$ and $B = \sqrt{2x^2 + 7x - 6}$

$$\therefore A + B = 7$$

$$\therefore A^2 - B^2 = 2x^2 + 7x + 15 - (2x^2 + 7x - 6) = 21$$

$$\frac{A^2 - B^2}{A + B} = \frac{21}{7} \Rightarrow A - B = 3$$

$$A + B + A - B = 7 + 3 \Rightarrow A = 5 \therefore A^2 = 25$$

$$\therefore 2x^2 + 7x + 15 = 25 \text{ or } 2x^2 + 7x - 10 = 0$$

$$x_1 x_2 = -\frac{10}{2} = -5 \quad (\text{Product of roots} = \frac{c}{a})$$

27. (D) $3^{12} \times 2^{2x} = (3 \times 2)^{12} = 3^{12} \times 2^{12}$

$$\therefore 2x = 12 \Rightarrow x = 6$$

28. (D) $a^x b = 1$

$$\therefore \log a^x b = \log 1 \Rightarrow \log a^x + \log b = 0$$

$$\Rightarrow x \log a = -\log b$$

$$\therefore x = -\frac{\log b}{\log a}, y = -\frac{\log c}{\log b}, z = -\frac{\log a}{\log c}$$

$$\therefore xyz = -1 \quad (xyz)^3 = (-1)^3 = -1$$

29. (D) If $a + b + c = 0$

$$\therefore a^3 + b^3 + c^3 = 3abc$$

$$\therefore a^3 + b^3 + c^3 - 3abc = 0$$

$$x^a(a^2-bc) \cdot x^b(b^2-ca) \cdot x^c(c^2-ab)$$

$$= x^{a(a^2-bc)+b(b^2-ca)+c(c^2-ab)}$$

$$= x^{a^3+b^3+c^3-3abc}$$

$$= x^0 = 1$$

30. (C) $|A \cup B \cup C| = |A| + |B| + |C| - |A \cap B| - |B \cap C| - |C \cap A| + |A \cap B \cap C|$

$$100 = 60 + 50 + 50 - 10 - 15 - 50 + |A \cap B \cap C| \Rightarrow |A \cap B \cap C| = 15$$

31. (B) Students passed in at least one subject

$$= n(P \cup M) = n(P) + n(M) - n(P \cap M)$$

$$= 85 + 80 - 70 = 95$$

$$\therefore 5\% \text{ failed in both subjects}$$

$$\therefore 5\% \text{ of total students} = 30$$

$$\therefore \text{Total students} = 30 \times \frac{100}{5} = 600$$

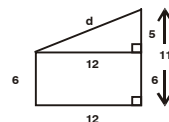
32. (C) 33. (B) 34. (B) 35. (A) 36. (B)

37. (B) A no. is divisible by 3 if sum of digits is divisible by 3.

38. (D)

39. (A) $d = \sqrt{5^2 + 12^2} = 13$

$$= \text{distance between their tops}$$



40. (A) 41. (B)

42. (D) 0, 1, 4, 25, ...

$$0, (0+1)^2, (1+1)^2, (25+1)^2, \dots$$

$$\therefore \text{Next term} = 676$$

43. (D) $7 + 2\sqrt{10} = 5 + 2 + 2\sqrt{5} \cdot \sqrt{2}$

$$= (\sqrt{5})^2 + (\sqrt{2})^2 + 2\sqrt{5} \cdot \sqrt{2} = (\sqrt{5} + \sqrt{2})^2$$

$$\therefore \text{The square root} = \sqrt{5} + \sqrt{2}$$

44. (D)

$$\begin{array}{r} 88 \\ 8 \overline{) 76,02} \\ \underline{64} \\ 1202 \\ 168 \overline{) 1202} \\ \underline{1344} \end{array}$$

$$\therefore \text{The reqd no. to be added} = 1344 - 1202 = 142$$

45. (A) $\frac{a^2 - b^2}{a - b} = a + b = 0.534 + 0.466 = 1$

(Balance questions alongwith answers will appear in October issue.)

Quantitative Aptitude

Solved paper of SSC Combined Prelims (Graduate Level) Exam held in March 2002

1. A car goes 10 metres in a second. Find its speed in km/hour.

- (A) 40 (B) 32 (C) 48 (D) 36

2. A man can reach a certain place in 30 hours. If he reduces his speed by $\frac{1}{15}$ th, he goes 10 km less in that time.

Find his speed per hour.

- (A) 6 km/hr (B) $5\frac{1}{2}$ km/hr

- (C) 4 km/hr (D) 5 km/hr

3. A 120 m long train takes 10 seconds to cross a man standing on a platform. What is the speed of the train?

- (A) 12 m/sec (B) 10 m/sec
(C) 15 m/sec (D) 20 m/sec

4. A train passes a man standing on a platform in 8 seconds and also crosses the platform which is 264 metres long in 20 seconds. The length of the train (in metres) is:

- (A) 188 (B) 176 (C) 175 (D) 96

5. If cost price is Rs 80, overhead is Rs 20 and selling price is Rs 120, then the profit per cent is:

- (A) 20% (B) 50% (C) 40% (D) 30%

6. If selling price of an article is $\frac{8}{5}$ times its cost price, the profit per cent on it is:

- (A) 120% (B) 160% (C) 40% (D) 60%

7. A man sells two articles at Rs 99 each. In one he gains 10% and on the other he loses 10%. What is his gain or loss per cent on the whole transaction?

- (A) Loss, 1% (B) Loss, 1.5%
(C) Profit, 1% (D) Profit, 1.5%

8. The cost price of 18 articles is equal to the selling price of 15 articles. The gain per cent is:

- (A) 15% (B) 20% (C) 25% (D) 18%

9. The diagonal of a square is $4\sqrt{2}$ cm. The diagonal of another square whose area is double that of the first square is:

- (A) $8\sqrt{2}$ cm (B) 16 cm (C) $\sqrt{32}$ cm (D) 8 cm

10. The areas of a square and a rectangle are equal. The length of the rectangle is greater than the length of any side of the square by 5 cm and the breadth is less by 3 cm. Find the perimeter of the rectangle.

- (A) 17 cm (B) 26 cm (C) 30 cm (D) 34 cm

11. In two triangles, the ratio of the areas is 4 : 3 and ratio of their heights is 3 : 4. Find the ratio of their bases.

- (A) 16 : 9 (B) 9 : 16 (C) 9 : 12 (D) 16 : 12

12. The diagonals of a rhombus are 24 cm and 10 cm. The perimeter of the rhombus (in cm) is:

- (A) 68 (B) 65 (C) 54 (D) 52

13. Find the length of the longest rod that can be placed in a hall of 10 m length, 6 m breadth and 4 m height.

- (A) $2\sqrt{38}$ m (B) $4\sqrt{38}$ m (C) $2\sqrt{19}$ m (D) 19 m

14. If a wire is bent into the shape of a square, the area of the square is 81 sq. cm. When the wire is bent into a semicircular shape, the area of the semicircle (taking $\pi = \frac{22}{7}$)

is:

- (A) 154 cm² (B) 77 cm² (C) 44 cm² (D) 22 cm²

15. The volume of a cuboid is twice the volume of a cube. If the dimensions of the cuboid are 9 cm, 8 cm and 6 cm, the total surface area of the cube is:

- (A) 72 cm² (B) 216 cm² (C) 432 cm² (D) 108 cm²

16. The curved surface of a cylindrical pillar is 264 m² and its volume is 924 m³. Taking $\pi = \frac{22}{7}$, find the ratio of its diameter to its height.

- (A) 7 : 6 (B) 6 : 7 (C) 3 : 7 (D) 7 : 3

17. The value of $\frac{\sqrt{0.441}}{\sqrt{0.625}}$ is equal to:

- (A) 0.048 (B) 0.84 (C) 0.48 (D) 0.084

18. The square root of $\frac{0.342 \times 0.684}{0.000342 \times 0.000171}$ is:

- (A) 250 (B) 2500 (C) 2000 (D) 4000

19. The sum of $\sqrt{0.01} + \sqrt{0.81} + \sqrt{1.21} + \sqrt{0.0009}$ is:

- (A) 2.1 (B) 2.13 (C) 2.03 (D) 2.11

20. Express 45 minutes as the fraction of one day.

- (A) $\frac{1}{40}$ (B) $\frac{1}{32}$ (C) $\frac{1}{60}$ (D) $\frac{1}{24}$

21. $9 - 1\frac{2}{9}$ of $3\frac{3}{11} \div 5\frac{1}{7}$ of $\frac{7}{9}$ is equal to:

- (A) 8 (B) 9 (C) $8\frac{32}{81}$ (D) $\frac{5}{4}$

22. Arrange $\frac{4}{5}, \frac{7}{8}, \frac{6}{7}, \frac{5}{6}$ in the ascending order.

- (A) $\frac{4}{5}, \frac{7}{8}, \frac{6}{7}, \frac{5}{6}$ (B) $\frac{5}{6}, \frac{6}{7}, \frac{7}{8}, \frac{4}{5}$

- (C) $\frac{4}{5}, \frac{5}{6}, \frac{6}{7}, \frac{7}{8}$ (D) $\frac{7}{8}, \frac{6}{7}, \frac{5}{6}, \frac{4}{5}$

23. $\frac{1}{20} + \frac{1}{30} + \frac{1}{42} + \frac{1}{56} + \frac{1}{72} + \frac{1}{90} + \frac{1}{110} + \frac{1}{132}$ is equal

to:

- (A) $\frac{1}{8}$ (B) $\frac{1}{7}$ (C) $\frac{1}{6}$ (D) $\frac{1}{10}$

24. If

$$x = 1 + \frac{1}{1 + \frac{1}{1 + \frac{1}{1 + \frac{1}{2}}}}$$

then the value of $2x + \frac{7}{4}$ is:

- (A) 3 (B) 4 (C) 5 (D) 6

25. The marked price of an article is Rs 200. A discount of $12\frac{1}{2}\%$ is allowed on the marked price and a profit of 25%

is made. The cost price of the article is:

- (A) Rs 200 (B) Rs 175 (C) Rs 120 (D) Rs 140

26. Successive discounts of 10% and 20% are equivalent to a single discount of:

- (A) 30% (B) 15% (C) 28% (D) 12%

27. A fan is listed at Rs 1,500 and a discount of 20% is offered on the list price. What additional discount must be offered to the customer now to bring the net price to Rs 1,104?

- (A) 8% (B) 10% (C) 15% (D) 12%

28. The average of marks obtained by 120 candidates in a certain examination is 35. If the average marks obtained by passed candidates are 39 and those of the failed candidates are 15, what is the number of candidates who passed the examination?

- (A) 100 (B) 120 (C) 150 (D) 140

29. Of the three numbers, second is twice the first and is also thrice the third. If the average of the three numbers is 44, the largest number is:

- (A) 24 (B) 72 (C) 36 (D) 108

30. The average age of 8 men is increased by 2 years when two of them whose ages are 21 and 23 years are replaced by two new men. The average age of the two new men is:

- (A) 22 years (B) 24 years (C) 28 years (D) 30 years

31. What is 20% of 25% of 300?

- (A) 150 (B) 60 (C) 45 (D) 15

32. If $x\%$ of $\frac{25}{2}$ is 150, then the value of x is:

- (A) 1000 (B) 1200 (C) 1400 (D) 1500

33. If 50% of $(x - y) = 30\%$ of $(x + y)$, then what per cent of x is y ?

- (A) 25% (B) $33\frac{1}{3}\%$ (C) 40% (D) 400%

34. If the sales tax be reduced from $3\frac{1}{2}\%$ to $3\frac{1}{3}\%$, what

difference does it make to a person who purchases an article whose marked price is Rs 8,400?

- (A) Rs 20 (B) Rs 15 (C) Rs 14 (D) Rs 10

35. Two numbers are respectively 25% and 20% less than a third number. What per cent is the first number of the second?

- (A) 5% (B) 75% (C) 80% (D) 93.75%

36. A pump can fill a tank with water in 2 hours. Because of a leak in the tank it was taking $2\frac{1}{3}$ hours to fill the tank.

The leak can drain all the water off the tank in:

- (A) 8 hours (B) 7 hours (C) $4\frac{1}{3}$ hours (D) 14 hours

37. A can do a piece of work in 4 hours; B and C can do it in 3 hours; A and C can do it in 2 hours. How long will B alone take to do it?

- (A) 10 hours (B) 12 hours
(C) 8 hours (D) 24 hours

38. A does $\frac{4}{5}$ of a piece of work in 20 days; he then calls

in B and they finish the remaining work in 3 days. How long B alone will take to do the whole work?

- (A) $37\frac{1}{2}$ days (B) 37 days

- (C) 40 days (D) 23 days

39. A can finish a work in 18 days and B can do the same work in half the time taken by A. Then working together what part of the same work they can finish in a day?

- (A) $\frac{1}{6}$ (B) $\frac{2}{5}$ (C) $\frac{1}{9}$ (D) $\frac{2}{7}$

40. The difference between the simple and compound interest on a certain sum of money at 5% rate of interest per annum for 2 years is Rs 15. Then the sum is:

- (A) Rs 6,500 (B) Rs 5,500 (C) Rs 6,000 (D) Rs 7,000

41. A sum borrowed under compound interest doubles itself in 10 years. When will it become fourfold of itself at the same rate of interest?

- (A) 15 years (B) 20 years (C) 24 years (D) 40 years

42. A sum of money invested at compound interest amounts in 3 years to Rs 2,400 and in 4 years to Rs 2,520. The interest rate per annum is:

- (A) 5% (B) 6% (C) 10% (D) 12%

43. The value of

$$25 - 5[2 + 3\{2 - 2(5 - 3) + 5\} - 10] \div 4 \text{ is:}$$

- (A) 5 (B) 23.25 (C) 23.75 (D) 25

44. The value of

$$\frac{1}{\sqrt{(12 - \sqrt{140})}} - \frac{1}{\sqrt{(8 - \sqrt{60})}} - \frac{2}{\sqrt{(10 + \sqrt{84})}} \text{ is:}$$

- (A) 0 (B) 1 (C) 2 (D) 3
 45. If cube root of 175616 is 56, then the value of $\sqrt[3]{175.616} + \sqrt[3]{0.175616} + \sqrt[3]{0.000175616}$ is equal to:
 (A) 0.168 (B) 62.16 (C) 6.216 (D) 6.116
 46. The value of $(0.34\overline{67} + 0.133\overline{3})$ is:
 (A) 0.48 (B) $0.48\overline{01}$ (C) $0.\overline{48}$ (D) $0.4\overline{8}$
 47. The value of $(256)^{0.16} \times (16)^{0.18}$ is:
 (A) 4 (B) -4 (C) 16 (D) 256
 48. The value of $\sqrt{\frac{(0.03)^2 + (0.21)^2 + (0.065)^2}{(0.003)^2 + (0.021)^2 + (0.0065)^2}}$ is:
 (A) 0.1 (B) 10 (C) 10^2 (D) 10^3
 49. If $a = 4.965$, $b = 2.343$ and $c = 2.622$, then the value of $a^3 - b^3 - c^3 - 3abc$ is:
 (A) -2 (B) -1 (C) 0 (D) 9.93
 50. If $a * b = a + b + ab$, then $3 * 4 - 2 * 3$ is equal to:
 (A) 6 (B) 8 (C) 10 (D) 12

Directions: (Question Nos. 51 to 55) Refer to the following table. Read the table and answer the questions.

Food Grain Production in a Country in 1999
 (in lakh tons)

State	Rice	Wheat	Jowar	Pulses	Others
P	45	103	—	27	29
Q	48	86	73	19	15
R	59	32	67	14	31
S	41	37	59	21	15
T	37	22	41	13	11
U	68	15	12	—	18
V	57	8	7	12	10
W	38	28	31	22	45

51. Which State had the highest grain production?
 (A) P (B) Q (C) R (D) S
 52. What was the proportion of rice production to wheat production in the country?
 (A) 1 : 1 (B) 0.8 : 1 (C) 1.2 : 1 (D) 2 : 1
 53. Jowar was the most important food grain in the State/
 States:
 (A) Q, R, S (B) Q (C) R, S (D) R, S, T
 54. State P alone accounted for approximately what percentage of wheat production in the country?
 (A) 73% (B) 50% (C) 41% (D) 30%
 55. If the average per hectare yield of rice in the country was 30 tons, then the area (approx.) under rice cultivation during the year was approx. (in lakh hectares):
 (A) 1.5 (B) 8 (C) 13 (D) 40
 56. If $x : y = 3 : 2$, then the ratio $2x^2 + 3y^2 : 3x^2 - 2y^2$ is equal to:
 (A) 12 : 5 (B) 6 : 5 (C) 30 : 19 (D) 5 : 3
 57. If $A : B : C = 2 : 3 : 4$, then $\frac{A}{B} : \frac{B}{C} : \frac{C}{A}$ is equal to:

- (A) 8 : 9 : 16 (B) 8 : 9 : 12
 (C) 8 : 9 : 24 (D) 4 : 9 : 16
 58. If $A : B = 1 : 2$, $B : C = 3 : 4$ and $C : D = 5 : 6$, find $D : C : B : A$.
 (A) 6 : 5 : 4 : 2 (B) 6 : 3 : 2 : 1
 (C) 6 : 4 : 2 : 1 (D) 48 : 40 : 30 : 15
 59. The numbers are in the ratio $1\frac{1}{2} : 2\frac{2}{3}$. When each of

these is increased by 15, they become in the ratio $1\frac{2}{3} : 2\frac{1}{2}$.

The greater of the numbers is:

- (A) 27 (B) 36 (C) 48 (D) 64
 60. The students in three classes are in the ratio 2 : 3 : 5. If 40 students are increased in each class, the ratio changes to 4 : 5 : 7. Originally the total number of students was:
 (A) 100 (B) 180 (C) 200 (D) 400
 61. The ratio of incomes of two persons is 5 : 3 and that of their expenditures is 9 : 5. Find the income of each person, if they save Rs 1,300 and Rs 900 respectively.
 (A) Rs 4,000, Rs 2,400 (B) Rs 3,000, Rs 1,800
 (C) Rs 5,000, Rs 3,000 (D) Rs 4,500, Rs 2,700
 62. A fort has provision for 50 days. If after 10 days, they are strengthened by 500 men and the remaining food lasts 35 days, how many men were there in the fort initially?
 (A) 3500 (B) 3000 (C) 2500 (D) 4000
 63. The sum of the numbers of boys and girls in a school is 150. If the number of boys is x , the number of girls becomes $x\%$ of the total number of students. The number of boys is:
 (A) 90 (B) 50 (C) 40 (D) 60
 64. X's income is 20% more than that of Y. What per cent is Y's income less than X?

- (A) $83\frac{1}{3}\%$ (B) $16\frac{2}{3}\%$ (C) $83\frac{2}{3}\%$ (D) $16\frac{1}{3}\%$

65. A number is increased by 20% and then it is decreased by 10%. Find the net increase or decrease per cent.
 (A) 10% increase (B) 10% decrease
 (C) 8% increase (D) 8% decrease
 66. If 70% of the students in a school are boys and the number of girls be 504, the number of boys is:
 (A) 1176 (B) 1008 (C) 1208 (D) 3024
 67. In the new budget, the price of kerosene oil rose by 25%. By how much per cent must a person reduce his consumption of kerosene oil so that his expenditure on it does not increase?
 (A) 20% (B) 25% (C) 50% (D) 40%
 68. If $1^3 + 2^3 + \dots + 10^3 = 3025$, then $4 + 32 + 108 + \dots + 4000$ is equal to:

- (A) 12000 (B) 12100 (C) 12200 (D) 12400

69. The greatest of the numbers

$$(2.89)^{0.5}, 2 - (.5)^2, 1 + \frac{0.5}{1 - \frac{1}{2}}, \sqrt{3} \text{ is:}$$

- (A) $(2.89)^{0.5}$ (B) $2 - (.5)^2$
 (C) $1 + \frac{0.5}{1 - \frac{1}{2}}$ (D) $\sqrt{3}$
70. $\sqrt{1 + \sqrt{1 + \sqrt{1 + \dots}}}$
 (A) equals 1 (B) lies between 0 and 1
 (C) lies between 1 and 2 (D) is greater than 2
71. Among $\sqrt{2}, \sqrt[3]{3}, \sqrt{5}, \sqrt[3]{2}$
 which one is the greatest?
 (A) $\sqrt[4]{5}$ (B) $\sqrt{2}$ (C) $\sqrt[3]{3}$ (D) $\sqrt[3]{2}$
72. Simplify:

$$\frac{0.41 \times 0.41 \times 0.41 + 0.69 \times 0.69 \times 0.69}{0.41 \times 0.41 - 0.41 \times 0.69 + 0.69 \times 0.69}$$

 (A) 0.28 (B) 1.1 (C) 11 (D) 2.8
73. The product of two positive numbers is 11520 and their quotient is $\frac{9}{5}$. Find the difference of two numbers.
 (A) 60 (B) 64 (C) 74 (D) 70
74. The product of two positive numbers is 2500. If one number is four times the other, the sum of the two numbers is:
 (A) 25 (B) 125 (C) 225 (D) 250
75. The LCM of two numbers is 1920 and their HCF is 16. If one of the numbers is 128, find the other number.
 (A) 204 (B) 240 (C) 260 (D) 320
76. Two numbers, both greater than 29, have HCF 29 and LCM 4147. The sum of the numbers is:
 (A) 966 (B) 696 (C) 669 (D) 666
77. When a number is divided by 56, the remainder obtained is 29. What will be the remainder when the number is divided by 8?
 (A) 4 (B) 5 (C) 3 (D) 7
78. A person buys some pencils at 5 for a rupee and sells them at 3 for a rupee. His gain per cent will be:
 (A) $62\frac{2}{3}\%$ (B) $76\frac{2}{3}\%$ (C) $56\frac{2}{3}\%$ (D) $46\frac{2}{3}\%$
79. If an article is sold for Rs 178 at a loss of 11%, what should be its selling price in order to earn a profit of 11%?
 (A) Rs 222.50 (B) Rs 267 (C) Rs 222 (D) Rs 220
80. By selling a table for Rs 350 instead of Rs 400, loss per cent increases by 5%. The cost price of table is:
 (A) Rs 1,050 (B) Rs 417.50 (C) Rs 435 (D) Rs 1,000
81. A person lent Rs 5,000 partly at the rate of 4 per cent and partly at the rate of 5 per cent per annum simple interest. The total interest after 2 years is Rs 440. To find the sum of money lent at each of the above rates, Rs 5,000 is to be divided in the ratio:
 (A) 4 : 5 (B) 3 : 2 (C) 5 : 4 (D) 2 : 3

82. At what rate per cent per annum will the simple interest on a sum of money be $\frac{2}{5}$ of the amount in 10 years?

- (A) 4% (B) 6% (C) $5\frac{2}{3}\%$ (D) $6\frac{2}{3}\%$

83. The least multiple of 13, which on dividing by 4, 5, 6, 7 and 8 leaves remainder 2 in each case is:

- (A) 2520 (B) 842
 (C) 2522 (D) 840

84. Find the value of * in the following:

$$1\frac{2}{3} \div \frac{2}{7} \times \frac{*}{7} = 1\frac{1}{4} \times \frac{2}{3} \div \frac{1}{6}$$

- (A) $\frac{1}{6}$ (B) .6 (C) .006 (D) 6

85. If $(a - b)$ is 6 more than $(c + d)$ and $(a + b)$ is 3 less than $(c - d)$, then value of $(a - c)$ is:

- (A) 0.5 (B) 1.0 (C) 1.5 (D) 2.0

86. The greatest number, which when divides 989 and 1327 leaves remainders 5 and 7 respectively, is:

- (A) 8 (B) 16 (C) 24 (D) 32

87. A certain amount of money is distributed among A, B and C. A gets $\frac{3}{16}$ and B gets $\frac{1}{4}$ of the whole amount. If C gets Rs 81, then B gets:

- (A) Rs 30 (B) Rs 36 (C) Rs 32 (D) Rs 40

88. The least number that must be subtracted from 63520 to make the result a perfect square, is:

- (A) 16 (B) 20 (C) 24 (D) 30

89. The ratio of present ages of two brothers is 1 : 2 and 5 years back the ratio was 1 : 3. What will be the ratio of their ages after 5 years?

- (A) 1 : 4 (B) 2 : 3 (C) 3 : 5 (D) 5 : 6

90. Divide Rs 7,500 among A, B and C such that A's share is to B's share as in the ratio 5 : 2 and B's share is to C's share as in the ratio 7 : 13. How much will B receive?

- (A) Rs 1,400 (B) Rs 3,500
 (C) Rs 2,600 (D) Rs 7,000

91. The ratio of copper and zinc in brass is 13 : 7. How much zinc will be there in 100 kg of brass?

- (A) 20 kg (B) 55 kg (C) 35 kg (D) 40 kg

92. Sum of three consecutive even integers is 54. Find the least among them.

- (A) 18 (B) 15 (C) 14 (D) 16

93. A TV and a VCR together cost Rs 35,000. If TV is $1\frac{1}{2}$ times costlier than VCR, then the cost of VCR is:

- (A) Rs 12,000 (B) Rs 14,000
 (C) Rs 13,000 (D) Rs 15,000

94. If one-third of one-fourth of a number is 15, then three-tenth of the number is:

- (A) 35 (B) 36 (C) 45 (D) 54

95. A milkman has 75 litres milk in one can and 45 litres in another. The maximum capacity of container which can measure milk of either container exact number of times, is:

- (A) 1 litre (B) 5 litres
(C) 15 litres (D) 25 litres

96. A student was asked to multiply a number by $\frac{3}{2}$ but

he divided that number by $\frac{3}{2}$. His result was 10 less than the

correct answer. The number was:

- (A) 10 (B) 12 (C) 15 (D) 20

97. A and B together have Rs 158, C has Rs 101 less than what A and B together have, and B has Rs 23 more than C. Then amount of A is:

- (A) Rs 80 (B) Rs 78 (C) Rs 57 (D) Rs 88

98. The base of a conical tent is 19.2 metres in diameter and the height of its vertex is 2.8 metres. The area of the canvas required to put up such a tent (in square metres)

(taking $\pi = \frac{22}{7}$) is nearly:

- (A) 3017.1 (B) 3170 (C) 301.7 (D) 30.17

99. A cone of height 7 cm and base radius 1 cm is carved from a cuboidal block of wood 10 cm \times 5 cm \times 2 cm. Assuming

$\pi = \frac{22}{7}$ the percentage wood wasted in the process is:

- (A) $92\frac{2}{3}\%$ (B) $46\frac{1}{3}\%$ (C) $53\frac{2}{3}\%$ (D) $7\frac{1}{3}\%$

100. Three solid metallic balls of radii 3 cm, 4 cm and 5 cm are melted and moulded into a single solid ball. The radius of the new ball is:

- (A) 2 cm (B) 3 cm (C) 4 cm (D) 6 cm

ANSWERS AND EXPLANATIONS

1. (D) Speed = $10 \times \frac{18}{5} = 36$ km/hr.

2. (D) Due to $\frac{1}{15}$ th reduction in speed, he goes 10 km less

$$\therefore \frac{1}{15} \times (\text{speed}) \times 30 = 10 \quad (D = s \times t)$$

$$\therefore \text{Speed} = 5 \text{ km/hr}$$

3. (A) Speed = $\frac{120}{10} = 12$ m/sec ($S = \frac{\text{Length of train}}{\text{Time taken}}$)

4. (B) $\frac{x(\text{Length of train})}{y(\text{speed})} = 8 \quad (i)$

$\frac{x+264}{y} = 20 \quad (ii)$

Solving (i) & (ii), $x = 176$ m

5. (A) C.P. = $80 + 20 = \text{Rs } 100$, SP = 120

$$P = 120 - 100 = \text{Rs } 20 \text{ on Rs } 100$$

$$\therefore P\% = 20$$

6. (B) Let CP = Rs x

$$\therefore \text{S.P.} = \text{Rs } \frac{8}{5}x, \quad P = \frac{8}{5}x - x = \text{Rs } \frac{3x}{5}$$

$$P\% = \frac{\frac{3x}{5}}{x} \times 100 = 60$$

7. (A) When S.Ps of both articles are same, then there is always a loss = $x\%$ of $x = 10\%$ of 10 = $\frac{10}{100} \times 10 = 1$

8. (B) Let C.P. of 1 article = Re 1 \therefore C.P. of 15 articles = Rs 15
S.P. of 15 articles = C.P. of 18 articles = Rs 18

$$\text{Gain}\% = \frac{18-15}{15} \times 100 = 20$$

9. (D) $d_1 = \sqrt{2}a_1$

$$\therefore a_1 = \frac{d_1}{\sqrt{2}} = \frac{4\sqrt{2}}{\sqrt{2}} = 4 \text{ cm}$$

$$A_1 = 4 \times 4 = 16$$

$$\text{Area of another square} = 2 \times 16$$

$$\therefore \text{Side } a_2 = \sqrt{2 \times 16} = 4\sqrt{2}$$

$$d_2 = \sqrt{2}a_2 = \sqrt{2} \times 4\sqrt{2} = 8 \text{ cm}$$

10. (D) Let the side of the square be a \therefore Area = a^2

$$\text{A.T.S. } a^2 = (a + 5)(a - 3)$$

$$\text{Area of a rectangle} = L \times B$$

$$\therefore a = \frac{15}{2} \quad \text{Perimeter of a rectangle} = 2(L + B)$$

$$= 2\left(\frac{15}{2} + 5 + \frac{15}{2} - 3\right) = 34 \text{ cm}$$

11. (A) $\frac{\frac{1}{2}b_1 \times h_1}{\frac{1}{2}b_2 \times h_2} = \frac{4}{3} \Rightarrow \frac{b_1}{b_2} = \frac{4}{3} \times \frac{h_2}{h_1} = \frac{4}{3} \times \frac{4}{3} = \frac{16}{9}$

12. (D) $P = 4a = 4\sqrt{\left(\frac{d_1}{2}\right)^2 + \left(\frac{d_2}{2}\right)^2}$
 $= 4\sqrt{\left(\frac{24}{2}\right)^2 + \left(\frac{10}{2}\right)^2} = 52 \text{ cm}$

13. (A) Length of the longest rod = $\sqrt{l^2 + b^2 + h^2}$
 $= \sqrt{10^2 + 6^2 + 4^2} = 2\sqrt{38} \text{ m}$

14. (B) Side of a square = $\sqrt{81} = 9 \text{ cm}$

$$P = 4 \times 9 = 36 \text{ cm} = \text{length of wire} = 2r + \pi r$$

Quantitative Aptitude

Solved Paper of Combined Defence Services Exam held in February 2001

1. The roots of the equation

$$x^2 + 2x + 1 + \cos \theta = 0, 0 < \theta < 90^\circ \text{ are:}$$

- (a) real and distinct (b) equal
(c) imaginary (d) real and positive

2. If $A = \sin 57^\circ - \sin 1^\circ$, then:

- (a) $A < 0$ (b) $A = 0$
(c) $A > 0$ (d) $A = 1$

3. If $\sin 2\left(\frac{2}{1} \cdot \frac{3}{2} \cdot \frac{4}{3} \dots \frac{x-1}{x-2}\right)^\circ = 1$, $0 < x < 100$, then

the value of x is equal to:

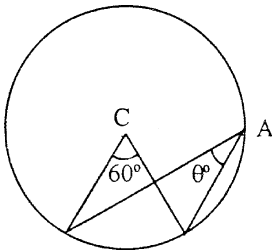
- (a) 91 (b) 89
(c) 49 (d) 46

4. If $\frac{\tan 26^\circ + \tan 19^\circ}{x(1 - \tan 26^\circ \tan 19^\circ)} = \cos 60^\circ$, then the value of x

is equal to:

- (a) 1 (b) $\sqrt{2}$ (c) 2 (d) $\sqrt{3}$

5. C is the centre of a circle of radius 3 units, and θ is the angle as shown in the given figure:



If $\sin \theta + \cos^2 \theta = \frac{x^2 + 1}{x^2}$, then the value of x is:

- (a) 2 (b) 4 (c) 6 (d) 8

6. PQ is a tower standing on a horizontal plane, Q being foot of the tower. A and B are two points on the plane such that $\angle QAB$ is 90° . AB is 4 metre. If $\cot PAQ = \frac{3}{10}$ and

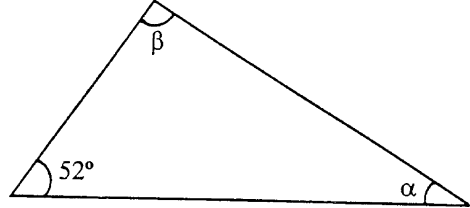
$\cot PBQ = \frac{1}{2}$, then the height of the tower is:

- (a) 10 m (b) 15 m
(c) 18 m (d) 20 m

7. The value of $(\tan 37^\circ \times \tan 53^\circ)$ is equal to:

- (a) 0 (b) 1
(c) 2 (d) ∞

8. If in the given figure $\sin 52^\circ = \cos 2\alpha = x$, then $\cos 2\beta$ is:



- (a) $2x$ (b) x (c) x^2 (d) $-x$

9. If $\sin \theta + \cos \theta = x$, then the value of $\cos^6 \theta + \sin^6 \theta$ is equal to:

- (a) $\frac{1}{4}$ (b) $\frac{1}{4}(1+6x^2)$

- (c) $\frac{1}{4}(1+6x^2-3x^4)$ (d) $\frac{1}{2}(5-3x^2)$

10. Which one of the following equations is an identity?

(a) $\cot^2 \theta + \cos \theta = \sin^2 \theta$

(b) $\sin^2 \theta + \sin \theta = 1$

(c) $\tan^2 \theta + 3 = 3 \sec \theta$, where $0^\circ < \theta < 90^\circ$

(d) $\frac{\tan \theta + \sin \theta}{\tan \theta - \sin \theta} = \frac{\sec \theta + 1}{\sec \theta - 1}$

11. If $(1 + \tan A)(1 + \tan B) = 2$, then $(A + B)$ is equal to:

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

12. The upper part of a tree broken by the wind in two parts, makes an angle of 60° with the ground. If the top of the tree touches the ground at a distance of $2\sqrt{3}$ m from the foot of the tree, then the height of the tree is equal to:

(a) 14 m (b) $(6+2\sqrt{3})$ m

(c) $(6-4\sqrt{3})$ m (d) $(6+4\sqrt{3})$ m

13. A round balloon of radius r subtends an angle α at the eye of an observer, while the angle of elevation of its centre is β . The height of the centre of the balloon is given by:

(a) $r \sin \frac{\alpha}{2} \cdot \operatorname{cosec} \beta$ (b) $r \operatorname{cosec} \frac{\alpha}{2} \cdot \cos \beta$

(c) $r \cos \frac{\alpha}{2} \operatorname{cosec} \beta$ (d) $r \operatorname{cosec} \frac{\alpha}{2} \cdot \sin \beta$

14. A camel rider looked for the geo-stationary satellite while travelling at night in the desert. His line of sight of the satellite made an angle of 45° with the horizontal, at time t_1 minutes. After riding further northwards at time t_2 minutes,

he found that his line of sight of the satellite made an angle of 75° with the horizontal. If the satellite is at a distance x from the ground, then the distance travelled in $(t_2 - t_1)$ minutes is:

- (a) $\left(\frac{\sqrt{3}-1}{2}\right)x$ units (b) $\frac{2x}{\sqrt{3}+1}$ units
(c) $\frac{2x}{\sqrt{3}-1}$ units (d) $\left(\frac{\sqrt{3}+1}{2}\right)x$ units

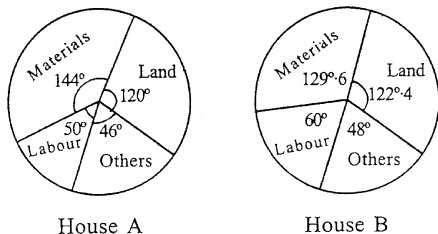
15. If a frequency distribution for the number of persons x in a household is prepared with class intervals as $(1-4)$, $(5-8)$, $(9-12)$, etc., then the number of persons x belonging to class interval $(5-8)$ satisfies:

- (a) $5 < x < 8$ (b) $5 \leq x < 8$
(c) $5 < x \leq 8$ (d) $5 \leq x \leq 8$

16. If a set of data has zero as an observation, then which one of the following is NOT an appropriate measure of central tendency?

- (a) Arithmetic mean (b) Geometric mean
(c) Median (d) Mode

17. Two houses A and B are constructed at total costs of Rs 1,00,000 and Rs 2,50,000 respectively. The expenditure on various items are distributed as shown in the pie diagrams below:



The expenditure on materials for B exceeds than that for A by:

- (a) Rs 40,000 (b) Rs 50,000
(c) Rs 60,000 (d) Rs 80,000

18. The following table shows the distribution of households according to the number of male and female children they have:

No. of female children	No. of male children					Total No. of households
	0	1	2	3	4	
0	5	2	8	3	0	18
1	2	7	3	6	1	19
2	2	4	5	0	3	14
3	1	0	2	0	1	4
4	2	1	0	1	1	5
Total	12	14	18	10	6	60

The average number of male children in households having only male child is:

- (a) 0.20 (b) 0.30 (c) 1.4 (d) 1.5

The following 5 (Five) items consists of two statements, one labelled the 'Assertion (A)' and the other labelled the 'Reason (R)'. You are to examine these two statements carefully and decide if the Assertion (A) and the Reason (R) are individually true and if so, whether the Reason is a correct explanation of the Assertion. Select your answer to these items using the codes given below and mark your answer sheet accordingly:

Codes:

- (a) Both A and R true and R is the correct explanation of A
(b) Both A and R are true and R is NOT a correct explanation of A
(c) A is true, but R is false
(d) A is false, but R is true

19. Assertion (A) : The number 90356294 is divisible by 4.

Reason (R) : A number with an even digit in the unit place is always divisible by 2.

20. If in a quadrilateral ABCD, the diagonals AC and BD bisect each other at O, then:

Assertion (A) : ABCD is necessarily a square.

Reason (R) : Triangles AOD and BOC are congruent.

21. Assertion (A) : In an isosceles triangle, the median which bisects the unequal side, divides the original triangle into two congruent triangles.

Reason (R) : Besides the equality of some corresponding sides, the two triangles are of equal area.

22. Assertion (A) : A sample-enquiry makes feasible, the collection of much more detailed information than census-enquiry.

Reason (R) : The population involved in sample-enquiry is less as compared to the census-enquiry.

23. Assertion (A) : We can find θ such that $0^\circ \leq \theta \leq 90^\circ$ and $\frac{\sin 45^\circ}{1+2\cos 30^\circ} = \sin \theta$, $\frac{\cos 45^\circ}{1-2\cos 30^\circ} = \cos \theta$.

Reason (R) : $\frac{\sin^2 45^\circ}{(1+2\cos 30^\circ)^2} + \frac{\cos^2 45^\circ}{(1-2\cos 30^\circ)^2} = 1$.

24. Arrangement of $-\frac{3}{7}$, $\frac{2}{3}$ and $-\frac{1}{3}$ in the ascending order is:

- (a) $-\frac{3}{7}, -\frac{1}{3}, \frac{2}{3}$ (b) $\frac{2}{3}, -\frac{1}{3}, -\frac{3}{7}$
(c) $-\frac{1}{3}, -\frac{3}{7}, \frac{2}{3}$ (d) $\frac{3}{7}, \frac{2}{3}, \frac{1}{3}$

25. The numerator of a non-zero rational number is five less than the denominator. If the denominator is increased by eight and the numerator is doubled, then again we get the same rational number. The required rational number is:

(a) $\frac{4}{9}$ (b) $-\frac{9}{4}$ (c) $-\frac{4}{9}$ (d) $\frac{3}{8}$

26. Consider the following values of the three given numbers:

$\sqrt{103}, \sqrt{99.35}, \sqrt{102.20}$

1. 10.1489 (Approx)
2. 10.109 (Approx)
3. 9.967 (Approx)

The correct sequence of these values matching with the above numbers is:

- (a) 1, 2, 3 (b) 1, 3, 2 (c) 2, 3, 1 (d) 3, 1, 2

27. The expression

$$\sqrt{\frac{.85 \times (.105 + .024 \cdot .008)}{.022 \times .25 \times 1.7}}$$

simplifies to:

- (a) $\sqrt{11}$ (b) $\sqrt{1.1}$ (c) 11 (d) $\sqrt{.011}$

28. The value of

$$\frac{(0.01)^2 + (0.22)^2 + (0.333)^2}{(0.001)^2 + (0.022)^2 + (0.0333)^2} \text{ is:}$$

- (a) $\frac{1}{10}$ (b) 10 (c) 100 (d) 1000

29. A large water tank gets filled from two pipes P_1 and P_2 . P_1 alone can fill it in 50 minutes, while P_2 alone can fill it in one hour. If on any day P_2 starts working only after P_1 has been used for filling half the tank, then the time taken to fill the tank will be:

(a) $\frac{50+60}{2}$ minutes

(b) $25 + \frac{1}{50} + \frac{1}{60}$ minutes

(c) $\frac{1}{2} \left(\frac{1}{50} + \frac{1}{60} \right)$ minutes

(d) $\frac{1}{2 \left(\frac{1}{50} + \frac{1}{60} \right)} + 25$ minutes

30. Two trains, each 100 metre long, moving in opposite directions, cross each other in 8 seconds. If one is moving twice as fast as the other, then the speed of the faster train is:

- (a) 30 km/h (b) 45 km/hr
(c) 60 km/hr (d) 75 km/hr

31. Person A can do a work in 6 days, while persons B and C can do the same work in 12 and 18 days respectively. If they start together to do the work on the same day and C stops working after 3 days, then the time required by A and B together to finish the rest of the work will be:

- (a) 1 day and 12 hours (b) 16 hours
(c) 8 hours (d) 1 day and 6 hours

32. Due to the increase in the price of edible oil in the market by 25%, the consumption of this oil in a certain family

is decreased by 12%. The expenditure of the family on edible oil is increased by:

- (a) 13% (b) 10% (c) 37% (d) 30%

33. A sum of money invested at a certain rate of simple interest doubles itself in 12 years and 6 months. It will treble itself at the same rate of interest in:

- (a) 18 years and 9 months
(b) 20 years and 8 months
(c) 22 years
(d) 25 years

34. A shopkeeper sells an item at a loss of $12\frac{1}{2}\%$. In order to gain 6% profit, he must increase the selling price by Rs 92.50. The cost price of the item is:

- (a) Rs 500 (b) Rs 450
(c) Rs 550 (d) Rs 600

35. The population of a village is 7986. During the last three years, the population increased at the rate of 10% per year. The population before three years was:

- (a) 5000 (b) 5500 (c) 6000 (d) 6600

36. A person divided Rs 10,800 among his 3 sons in the ratio 3 : 4 : 5. Second son kept Rs 1000 for himself, gave Rs 600 to his wife; and divided the remaining money among his 2 daughters in the ratio 11 : 9. Then one of his daughters received:

- (a) Rs 1000 (b) Rs 1050
(c) Rs 1100 (d) Rs 1150

37. If the monthly electricity bill in a hostel for lighting 22 bulbs, each of 100 watt for 6 hours daily is Rs 3,520. Then the amount of the bill when 30 bulbs each of 100 watt are lighted for 8 hours daily is:

- (a) Rs 3,200 (b) Rs 4,800
(c) Rs 5,800 (d) Rs 6,400

38. If the income of A is 10% more than that of B and the income of B is 20% less than that of C, then the incomes of A, B and C are, respectively, in the ratio:

- (a) 22 : 20 : 25 (b) 10 : 9 : 7
(c) 11 : 10 : 8 (d) 22 : 18 : 25

39. If a four-digit perfect square number is such that the number formed by the first two digits and the number formed by the last two digits are also perfect squares, then the four-digit number is:

- (a) 6416 (b) 3616 (c) 1681 (d) 1664

40. If $x^9 - 3$ is divided by $x^3 - 1$, then the remainder will be:

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

41. The prime numbers dividing 109 and leaving a remainder of 4 in each case are:

- (a) 5 and 7 (b) 2 and 11
(c) 3 and 7 (d) 11 and 13

42. Which one of the following numbers is divisible by 11?

- (a) 4823718 (b) 8423718
(c) 8432718 (d) 4832718

43. The average age of 30 students in a class is 15 years. If 6 students of this class have the average age of 16 years, then the average age of the remaining 24 students would be:

- (a) 14 years
(b) 14 years and 6 months
(c) 14 years and 9 months
(d) 15 years and 3 months
44. If the L.C.M. of three numbers is 9570, then their H.C.F. will be:
(a) 11 (b) 12 (c) 19 (d) 21
45. $\log_{10} \frac{26}{51} + \log_{10} \frac{119}{91} - \log_{10} \frac{13}{32} - \log_{10} \frac{64}{39}$ is equal to:
(a) 0 (b) 1 (c) 2 (d) 3
46. If $\log_{10} 2 = 0.3010$, then the number of digits in 2^{100} are:
(a) 30 (b) 31 (c) 301 (d) 302
47. $\log_{10} \log_{10} \log_{10} (10^{10^{10}})$ is equal to:
(a) 100 (b) 10 (c) 1 (d) 0
48. If $a - b = 1$, then the value of $a^3 - b^3 - 3ab$ will be:
(a) -3 (b) -1 (c) 1 (d) 3
49. If $x - 3$ is a factor of $x^2 + kx + 9$, then the value of k is:
(a) 6 (b) -6 (c) 3 (d) -3
50. Factors of $ab(c^2 + 1) + c(a^2 + b^2)$ are:
(a) $(a + bc)$ and $(b + ca)$
(b) $(ca + b)$ and $(ab + c)$
(c) $(ab + c)$ and $(bc + a)$
(d) $(ab - c)$ and $(bc - a)$
51. Factors of $(2x - 3y)^3 + (3y - 5z)^3 + (5z - 2x)^3$ are:
(a) $3(2x - 3y)(3y - 5z)(5z - 2x)$
(b) $3(3x - 2y)(3y - 5z)(5z - 2x)$
(c) $3(2x - 3y)(5y - 3z)(5z - 2x)$
(d) $3(2x - 3y)(3y - 5z)(2z - 5x)$
52. If the polynomial $x^3 + x^5 + x^7 + x^{11} + x^{13}$ is divided by $x^2 + 1$, then the remainder will be:
(a) $x - 1$ (b) $x + 1$ (c) $-x$ (d) x
53. If $x^3 + x^2 + x + a$ is divisible by $x - 1$, then the value of a is:
(a) 3 (b) 1
(c) -1 (d) -3
54. The L.C.M. of $a(a + b)$, $a^2(a^2 - b^2)$ and $ab^2(a + b)^2$ is:
(a) $ab(a - b)(a + b)^2$
(b) $a^2b^2(a + b)(a - b)^2$
(c) $a^2b^2(a - b)(a + b)^2$
(d) $ab(a - b)(a - b)^2$
55. L.C.M. of $x^3 - 1$ and $x^4 + x^2 + 1$ will be:
(a) $(x - 1)(x^2 + x + 1)(x^2 - x + 1)$
(b) $(x - 1)(x^2 + x + 1)(x^2 - x - 1)$
(c) $(x - 1)(x^2 + x - 1)(x^2 - x + 1)$
(d) $(x + 1)(x^2 + x + 1)(x^2 - x + 1)$
56. If $a + b + c = 11$ and $ab + bc + ca = 20$, then the value of the expression $a^3 + b^3 + c^3 - 3abc$ will be:
(a) 121 (b) 341
(c) 671 (d) 781

57. If $x + \frac{1}{x} = 2$, then the value of $x^3 + \frac{1}{x^3}$ is:
(a) 8 (b) 6 (c) 4 (d) 2
58. The value of k for which the equations:
 $9x + 4y = 9$ and $7x + ky = 5$
have no solution is:
(a) $\frac{9}{5}$ (b) $\frac{9}{7}$ (c) $\frac{9}{28}$ (d) $\frac{28}{9}$
59. If $\frac{x}{4} + \frac{y}{3} = \frac{5}{12}$, $\frac{x}{2} + y = 1$, then the value of $x + y$ is:
(a) $\frac{1}{2}$ (b) 1 (c) $\frac{3}{2}$ (d) 2
60. If the cost of 3 chairs and 1 table is Rs 900 and that of 5 chairs and 3 tables is Rs 2100, then the cost of 4 chairs and one table is:
(a) Rs 1000 (b) Rs 1050
(c) Rs 1100 (d) Rs 1150
61. The sum of two numbers is 80. If three times one number is equal to five times the other number, then the numbers are:
(a) 20, 60 (b) 50, 30
(c) 10, 70 (d) 25, 55
62. The solution set of the system of equations
 $\frac{4}{x} + 5y = 7$; $\frac{3}{x} + 4y = 5$ is:
(a) $\left(\frac{1}{3}, -1\right)$ (b) $\left(-\frac{1}{3}, 1\right)$
(c) $\left(-\frac{1}{3}, -1\right)$ (d) $\left(\frac{1}{3}, 1\right)$
63. When one is added to each of two given numbers, their ratio becomes 3 : 4 and when 5 is subtracted from each, the ratio becomes 7 : 10. The numbers are:
(a) 8, 11 (b) 11, 15
(c) 26, 35 (d) 27, 36
64. Amar, Akbar and Anthony solve a given quadratic equation. Amar commits a mistake in the constant term and finds the roots as 8 and 2. Akbar commits a mistake in the coefficient of x and finds the roots as -9 and -1. If Anthony solves the equation without making any mistakes, then he finds the correct roots as:
(a) -8, -2 (b) 9, 1 (c) 8, -1 (d) -9, 2
65. If one root of a quadratic equation is $2 + \sqrt{5}$, then the quadratic equation is:
(a) $x^2 - 4x - 1$
(b) $x^2 + 4x - 1$
(c) $x^2 - 4x + 1$
(d) $x^2 + 4x + 1$
66. If one root of the quadratic equation $x^2 + bx + c = 0$ is square of the other, then $b^3 + c^2 + c$ equals to:
(a) bc (b) $2bc$
(c) $3bc$ (d) $6bc$

67. If $a^b = b^a$, then $\left(\frac{a}{b}\right)^{\frac{a}{b}}$ equals:

- (a) $a^{\left(\frac{b}{a}-1\right)}$ (b) $a^{\left(\frac{a}{b}-1\right)}$
(c) $a^{\frac{a}{b}}$ (d) $a^{\frac{b}{a}}$

68. If $x^y = y^x$ and $x = 2y$, then y is:

- (a) 1 (b) 2 (c) 3 (d) 4

69. The value of

$$\sqrt{\frac{1}{4}} + (0.0001)^{\frac{1}{2}} - (1000)^{-\frac{2}{3}}$$
 is:

- (a) $\frac{1}{2}$ (b) $\frac{1}{4}$ (c) $\frac{1}{8}$ (d) 0

70. If A consists of numbers of the form $4n + 2$ and B consists of numbers of the form $3n$ for any integer n , then $A \cap B$ consists of the numbers of the form:

- (a) $4n + 2 + 3n$ (b) $12n + 6$
(c) $n + 2$ (d) $\frac{(4n + 2)}{3n}$

71. Which one of the following is a null set?

- (a) $\{x : x + 1 = 1\}$
(b) $\{\phi\}$
(c) $\{x : x > 1 \text{ and } x < 1\}$
(d) $\{x : x \geq 1 \text{ and } x \leq 1\}$

72. If $f(x) = kx + 1$ and $g(x) = 3x + 2$ and $f \circ g = g \circ f$, then the value of k is:

- (a) 1 (b) 2
(c) 3 (d) 4

73. The straight lines AB and CD intersect at E. If EF and EG are bisectors of $\angle DEA$ and $\angle AEC$ respectively and if $\angle AEF = x$ and $\angle AEG = y$, then:

- (a) $x + y > 90^\circ$
(b) $x + y < 90^\circ$
(c) $x + y = 90^\circ$
(d) $x + y = 180^\circ$

74. If one angle of a triangle is greater than each of the two remaining angles by 30° , then the angles of the triangle are:

- (a) $40^\circ, 40^\circ, 100^\circ$
(b) $50^\circ, 50^\circ, 80^\circ$
(c) $30^\circ, 30^\circ, 120^\circ$
(d) $35^\circ, 35^\circ, 110^\circ$

75. If for a regular pentagon ABCDE, the lines AD and BE intersect at point P, then $\angle BAD$ and $\angle APE$, respectively, are:

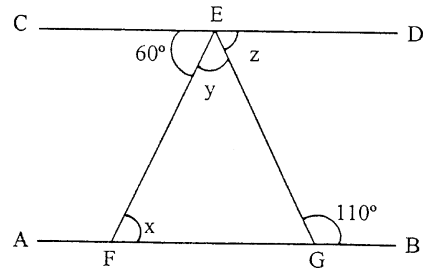
- (a) 36° and 72°
(b) 36° and 108°
(c) 72° and 108°
(d) 54° and 108°

76. ABCD is a square with centre O. If X is on the side CD such that $DX = DO$, then:

$\frac{\angle DOX}{\angle XOC}$ is equal to:

- (a) $\frac{3}{2}$ (b) 3 (c) $\frac{7}{2}$ (d) 4

77.



If AB is parallel to CD in the given figure, then $\angle x, \angle y$ and $\angle z$ respectively are:

- (a) $60^\circ, 50^\circ, 70^\circ$ (b) $50^\circ, 60^\circ, 70^\circ$
(c) $60^\circ, 60^\circ, 60^\circ$ (d) $70^\circ, 50^\circ, 60^\circ$

78. ABCD is a parallelogram with $AB \neq AD$. If the sides AB and AD are produced to E and F respectively so that $AB = BE$ and $AD = DF$, then which one of the following is NOT correct?

- (a) $CE = CF$
(b) $\triangle DCF$ and $\triangle BEC$ are identical
(c) $DF = BC$ and $DC = BE$
(d) $DC = BC$ and $DF = BE$

79. A line parallel to BC in $\triangle ABC$ meets AB, AC in D and E respectively. If $AD = (4x - 3)$ cm, $DB = (3x - 1)$ cm, $AE = (8x - 7)$ cm and $EC = (5x - 3)$ cm, then the admissible value of x is:

- (a) 0 (b) 1 (c) 2 (d) 3

80. ABCD is a parallelogram and E is the mid-point of DC, F is the mid-point of AB. If BE and DF meet AC in M and L respectively, then LM is equal to:

- (a) $\frac{AC}{4}$ (b) $\frac{AC}{3}$
(c) $\frac{AC}{2}$ (d) $\frac{2AC}{3}$

81. If E, F, G and H are the mid-points of the sides AB, BC, CD and AD of any quadrilateral ABCD, then which one of the following is NOT correct?

- (a) EF and GH are parallel
(b) the area of EFGH is half of the area of the original quadrilateral
(c) the sum of the areas of BEF and DGH is one fourth of the area of the original quadrilateral
(d) EG and FH intersect each other at right-angles

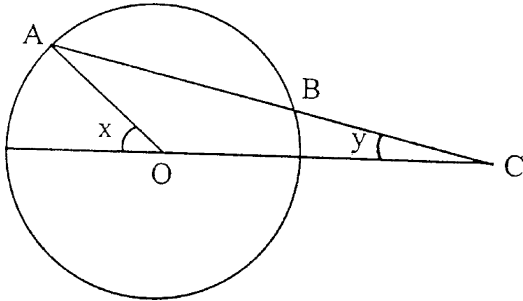
82. ABCD is parallelogram and E is the middle point of side AD. EC meets BD in O. If the area of the parallelogram is 24 units, then the area of $\triangle EOD$ is:

- (a) 4 units (b) 3 units
(c) 2 units (d) 1 unit

83. Three circles with centres A, B, C touch each other externally. If $AB = 4$ cm, $BC = 6$ cm and $CA = 7$ cm, then the radii of the circles are:

- (a) 2 cm, 1 cm, 4 cm
(b) 2.5 cm, 1.5 cm, 4.5 cm
(c) 2 cm, 3 cm, 2 cm
(d) 2.5 cm, 3.5 cm, 1.5 cm

84. If O is the centre of the given circle and $BC = AO$, then:



- (a) $2x = y$
(c) $3x = y$

- (b) $x = 3y$
(d) $x = 2y$

85. The locus of centres of all circles of given radius in the same plane, passing through a fixed point is:

- (a) a point circle
(c) two parallel lines

- (b) a straight line
(d) a circle

86. If in a circle of radius 21 cm, an arc subtends an angle of 56° at the centre, then the length of the arc is:

- (a) 15.53 cm
(c) 18.53 cm

- (b) 16.53 cm
(d) 20.53 cm

87. If the length of hypotenuse of a right-angled triangle is 5 cm and its area is 6 sq. cm., then the length of the remaining sides are:

- (a) 1 cm and 3 cm
(c) 3 cm and 4 cm

- (b) 3 cm and 2 cm
(d) 4 cm and 2 cm

88. If a circle is inscribed in an equilateral triangle of side 5 cm, then the radius of the circle will be:

- (a) $\frac{5\sqrt{3}}{6}$ cm
(c) $\frac{5}{6}$ cm

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

89. A hall whose length is 16 m and breadth is twice its height, takes 168 m of paper with 2 m as its width to cover its four walls. The area of the floor is:

- (a) 96 m^2
(c) 192 m^2

- (b) 190 m^2
(d) 216 m^2

90. A paper is in the form of a rectangle ABCD, where $AB = 14$ cm and $BC = 7$ cm. If a semi-circular portion with BC as diameter is cut-off, then the area of the remaining paper is:

- (a) 78.45 sq. cm.
(c) 78.65 sq. cm.

- (b) 78.55 sq. cm.
(d) 78.75 sq. cm.

91. A diagonal of a rhombus is 6 cm. If its area is 24 cm^2 , then the length of each side of the rhombus is:

- (a) 5 cm
(b) 6 cm

(c) 7 cm
92. The readings in the field book are given below:

To	
B in meters	
	96
24 to E	48
	24
	12
	6
From	
A	
	12 to D
	6 to C

The area is:

- (a) 968 sq.m.
(c) 1444 sq.m.

- (b) 1012 sq.m.
(d) 1728 sq.m.

93. The surface area of a cone, with a base of radius r cm and the slant height of l cm, is:

- (a) $\pi r(r+l)$
(c) $\pi(r^2+l)$

- (b) $\pi r(r-l)$
(d) $\pi r^2 l$

94. A double cone is formed by a complete revolution of the triangle ABC about the side AB whose sides $BC = 6.5$ cm, $CA = 2$ cm and the perpendicular from C on AB is 1.6 cm. The volume of the double cone is, approximately:

- (a) 25 cm^3
(c) 22 cm^3

- (b) 24 cm^3
(d) 20 cm^3

95. A cube has its edge 9 cm. If a right-circular cone having maximum volume has been cut out of the cube, then the volume of the cone is, approximately:

- (a) 190.0 cm^3
(c) 192.0 cm^3

- (b) 190.9 cm^3
(d) 192.9 cm^3

96. A right-circular cone is divided into two portions by a plane parallel to the base and passing through a point which is $\frac{1}{3}$ of the height from the top. The ratio of the volume of the

smaller cone to that of the remaining frustrum of the cone is:

- (a) 1 : 3
(c) 1 : 26

- (b) 1 : 9
(d) 1 : 27

97. A right-circular cylinder and a sphere are of the equal volumes and their radii are also equal. If h is the height of the cylinder and d , the diameter of the sphere, then:

- (a) $h = d$
(c) $\frac{h}{3} = \frac{d}{2}$

- (b) $2h = d$
(d) $\frac{h}{2} = \frac{d}{3}$

98. A curved surface of a cylindrical pillar is 264 m^2 and its volume is 924 m^3 . The diameter of the pillar is:

- (a) 5 m
(c) 10 m

- (b) 9 m
(d) 14 m

99. If the radii of two spheres are in the ratio 1 : 4, then their surface areas will be in the ratio:

- (a) 1 : 4
(b) 1 : 8
(c) 1 : 16
(d) 1 : 32

100. A hemispherical bowl of internal radius 12 cm contains liquid. This liquid is to be filled into cylindrical container of diameter 4 cm and height 3 cm. The number of containers that is necessary to empty the bowl is:

- (a) 80
(b) 96
(c) 112
(d) 100

Quantitative Aptitude

1. In an organisation average salary of employee is Rs 12,000. If the average salary of 15 employees is increased by 15% and the average salary of remaining 10 employees is increased by 10%, what is the overall percentage increase in average salary of all the 25 employees together?

- (a) 13% (b) 12.5%
(c) 12% (d) 13.5%
(e) None of these

2. If $xy = 96$ and $3y = 2x$, then what is the value of x ?

- (a) 8 (b) 10
(c) 12 (d) 9
(e) None of these

3. Richa purchased 25 articles for Rs 1,125 and sold them with a profit of 11%. What is the approximate selling price of each article?

- (a) Rs 45 (b) Rs 47
(c) Rs 52 (d) Rs 55
(e) Rs 50

4. Five sixth of a number is more than 30% of another number by 25. What is the ratio of the first number to the second number?

- (a) 46 : 35 (b) 35 : 46
(c) 23 : 15 (d) Data inadequate
(e) None of these

5. Atul and Mukul invested amounts in a business in the ratio of 5 : 8 respectively. If the total profit earned was Rs 31,200, which is 20% of the total amount invested by them. What was the amount invested by Mukul?

- (a) Rs 156,000 (b) Rs 60,000
(c) Rs 96,000 (d) Rs 37,440
(e) None of these

6. What value should come in place of the question mark (?) in the following equation?

$$\frac{1}{2} \text{ of } \frac{1}{3} \text{ of } \frac{1}{4} \text{ of ? of } 576 = 4$$

- (a) $\frac{1}{3}$ (b) $\frac{1}{4}$
(c) $\frac{1}{5}$ (d) $\frac{1}{6}$
(e) None of these

7. By working six hours daily five workers complete a certain job in 28 days. If seven workers work eight hours daily, how many days will they take to complete the same job?

- (a) 20 (b) 15 (c) 38 (d) 27

(e) None of these

8. Latika borrowed Rs 5000 on a simple interest rate of 11% per annum for two years. However, Tanvi borrowed the same amount for the same period on a compound interest rate of 10% per annum. Who returned more and by how much amount?

- (a) Latika Rs 50 (b) Tanvi Rs 250
(c) Latika Rs 100 (d) Tanvi Rs 100
(e) None of these

9. In a certain month Mr Mukesh's call charges were Rs 124.8. If in addition to the telephone rent of Rs 380 he has to pay 5% tax on the total amount, what is his net telephone bill for that month?

- (a) Rs 529.30 (b) Rs 530.24
(c) Rs 530.04 (d) Rs 529.20
(e) None of these

10. Rajesh Chandra desires to raise 1200 chickens. If his records show that he usually raises 84% of the baby chicks that he buys, approximately how many babe chicks must he buy in order to raise the desired number?

- (a) 1400 (b) 1430 (c) 1240
(d) 1000 (e) 1320

11. A container has 10 litres of a 10% solution of sulphuric acid. How much more acid must be added to obtain a 25% solution?

- (a) 2 litres (b) 1 litre
(c) 4 litres (d) Cannot be determined
(e) None of these

12. If two digits of a two number are interchanged and the number thus obtained is subtracted from the original number, the difference is 18, what could be the difference between the two digits?

- (a) 3 (b) 9
(c) 1 (d) Data inadequate
(e) None of these

13. What should come in place of question mark (?) in the following equation?

$$33.18 + 3.081 + 20.002 + 14.014 = ?$$

- (a) 70.277 (b) 70.077 (c) 70.177
(d) 71.006 (e) None of these

14-18: In each of the following questions a number series is established if the position of two out of the five marked numbers are interchanged. The position of the first unmarked number remains the same and it is the beginning of the series. The earlier of two marked numbers whose positions are interchanged is the answer. For example if an interchange of

number marked 1 and the number marked 4 is required to establish the series, your answer is 1. If it is not necessary to interchange the position of the numbers to establish the series, give 5 as your answer. Remember that when the series is established, the numbers change from left to right (i.e. from the unmarked number to the last marked number) in a specific order.

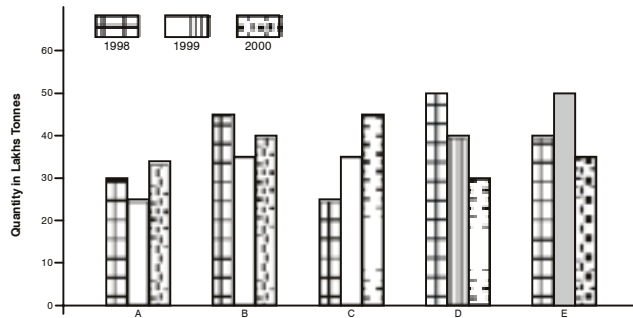
14. 19 20 38 464 117 2325
 (a) (b) (c) (d) (e)
15. 8 36 12 162 972 7290
 (a) (b) (c) (d) (e)
16. 183 472 987 866 697 1068
 (a) (b) (c) (d) (e)
17. 140 18 120 38 90 68
 (a) (b) (c) (d) (e)
18. 2 4 71 19 5 361
 (a) (b) (c) (d) (e)

19. A boat takes 3 hours to travel from Prayag to Fafamau downstream and back from Fafamau to Prayag upstream. If the speed of a boat in still water is 4 km/hr, what is the distance between the two places?

- (a) 12 kms (b) 6 kms (c) 8 kms
 (d) Data inadequate (e) None of these

20-25: Study the following graph carefully to answer these questions.

The production of fertilizer in lakh tonnes by different companies for three years 1998, 1999 and 2000.



20. The total production by five companies in 2000 is what per cent of the total production by companies B and D in 1998?

- (a) 100% (b) 150% (c) 95%
 (d) 200% (e) None of these

21. What is the ratio between average production by company B in three years to the average production by company C in three years?

- (a) 6 : 7 (b) 8 : 7 (c) 7 : 8
 (d) 7 : 6 (e) None of these

22. For which of the following companies the rise or fall in production of fertilizer from 1998 to 1999 was the maximum?

- (a) A (b) B (c) C (d) D (e) E

23. What is the per cent drop in production by company D from 1998 to 2000?

(a) 30 (b) 43 (c) 50 (d) 35 (e) None of these
 24. The average production for three years was maximum for which of the following companies?

- (a) B only (b) D only (c) E only
 (d) B and D both (e) D and E both

25. The average production for three years was minimum for which of the following companies?

- (a) A (b) B (c) D (d) C (e) E

26-30. Study the following table carefully and answer the questions given below it:

Marks obtained in six subjects by six students

Students	Subject	H	S	G	E	Hn	M	Total
	Total marks	150	200	150	200	100	200	1000
A		75	110	90	140	75	170	660
B		105	130	75	130	80	140	660
C		95	105	80	150	90	160	680
D		85	115	95	125	65	135	620
E		115	135	110	145	70	125	700
F		120	160	96	110	55	145	686

H: History G: Geography E: English S: Science

Hn: Hindi M: Maths

26. What was the difference between the percentage of marks obtained by student B in History and the percentage of marks obtained by student C in Hindi?

- (a) 25 (b) 20 (c) 35
 (d) 30 (e) None of these

27. The marks obtained by student A in Maths was how many times the percentage of marks obtained by student F in Science?

- (a) 2.5 (b) 4.125 (c) 1.125
 (d) 2.125 (e) None of these

28. What was the difference between the percentage of marks obtained by student C in English and average percentage of marks of all the six subjects?

- (a) 82 (b) $38\frac{1}{3}$ (c) 7

- (d) 14 (e) None of these

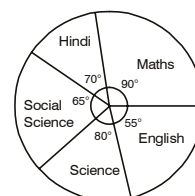
29. In how many of the given subjects did student D get marks more than seventy per cent?

- (a) none (b) one (c) two
 (d) three (e) None of these

30. Approximately, what was the average percentage of marks obtained by the six students in English?

- (a) 67 (b) 72 (c) 80
 (d) Data inadequate (e) None of these

31-35: Answer the questions on the basis of facts given in pie chart:



Total marks scored in examination = 540

31. What is the percentage of total marks scored in maths:
 (a) 20% (b) 30% (c) 35%
 (d) 25% (e) 40%
32. Marks scored in English, Science and Social Science is ____% of total marks:
 (a) 45 (b) $44\frac{4}{9}$ (c) 55
 (d) $55\frac{5}{9}$ (e) None of these
33. Student has scored 22.2% in ____ (subject)
 (a) Hindi (b) Science
 (c) Social Science (d) English
 (e) None of these
34. Student has scored 105 marks in ____ (subject):
 (a) Maths (b) Science
 (c) Hindi (d) English
 (e) None of these
35. Marks scored in Hindi and Maths are more than the marks scored in English and Social Science by:
 (a) 60 (b) 75 (c) 40
 (d) 30 (e) 50
36. Babita sells her goods 20% cheaper than Shewatang and 20% dearer than Debashish. A man buys goods worth Rs 9600 from Babita. Would it have been more profitable or less profitable and by how much to have bought half the goods from Shewatang and Debashish?
 (a) Rs 400 gain (b) Rs 400 loss
 (c) Rs 800 loss (d) Rs 800 gain
 (e) None of these
37. Two men begin to work together on a job, but after some days, four of them leave. As a result, which could have been completed in 40 days is completed in 50 days. How many days after the commencement of the work did the four men leave?
 (a) 30 (b) 18 (c) 24
 (d) 25 (e) None of these
38. A rectangular field of 60 metres length and 40 metres side is to be surrounded by a road 5 metre wide. If the cost of making one square metre road is Rs 500, what should be the cost of the entire road?
 (a) Rs 500000 (b) Rs 450000
 (c) Rs 600000 (d) Rs 550000
 (e) None of these
39. Anuradha purchased 30 kg of rice at the rate of Rs 11.50 per kg and 20 kg of rice at the rate of Rs 14.25 per kg. She mixed the two and sold the mixture. Approximately at what price per kg should she sell the mixture to make 30 per cent profit?
 (a) Rs 16.30/kg (b) Rs 15.40/kg
 (c) Rs 15.60/kg (d) Rs 14.00/kg
 (e) Rs 18.20/kg
40. A shopkeeper sells some toys at Rs 250 each. To find out what per cent profit he makes, which of the following information given in statements A and B is/are necessary?

- A. Number of toys sold.
 B. Cost price of each toy.
 (a) only A is necessary
 (b) only B is necessary
 (c) either A or B is necessary
 (d) neither A nor B is necessary
 (e) both A and B together are necessary
41. Ten years ago Aseet was half of Pradeep in age. If the ratio of their present age is 3 : 4, what will be the total of their present ages?
 (a) 8 years (b) 20 years
 (c) 30 years (d) 45 years
 (e) None of these
42. A train running at certain speed crosses a stationary engine in 20 seconds. To find out the speed of the train, which of the following information in statements A and B is/are necessary?
 A: The length of the engine.
 B: The length of the train.
 (a) only A is necessary
 (b) only B is necessary
 (c) neither A nor B is necessary
 (d) either A or B is necessary
 (e) both A and B are necessary
43. 12 children take 16 days to complete a work which can be completed by eight adults in twelve days. 16 adults started working and after three days ten adults left and four children joined them. How many days will they take to complete the remaining work?
 (a) 6 (b) 8 (c) 4
 (d) 3 (e) None of these
44. A number exceeds its four seventh by 18. What is the number?
 (a) 36 (b) 49 (c) 32.5
 (d) 63 (e) None of these
45. When Rs 1074 is divided among Anumeha, Shobha and Sanghmitra so that if their shares are diminished by Rs 6, Rs 8 and Rs 10 respectively, the remainder shall be in the ratio 4 : 5 : 6. Find the share of Shobha?
 (a) Rs 286 (b) Rs 358
 (c) Rs 430 (d) Data inadequate
 (e) None of these

ANSWERS

- | | | | | |
|---------|---------|---------|---------|---------|
| 1. (a) | 2. (c) | 3. (e) | 4. (d) | 5. (c) |
| 6. (d) | 7. (b) | 8. (a) | 9. (c) | 10. (b) |
| 11. (a) | 12. (d) | 13. (a) | 14. (c) | 15. (a) |
| 16. (b) | 17. (e) | 18. (b) | 19. (d) | 20. (d) |
| 21. (b) | 22. (c) | 23. (a) | 24. (e) | 25. (a) |
| 26. (b) | 27. (d) | 28. (c) | 29. (a) | 30. (a) |
| 31. (d) | 32. (d) | 33. (b) | 34. (c) | 35. (a) |
| 36. (b) | 37. (d) | 38. (d) | 39. (a) | 40. (b) |
| 41. (b) | 42. (e) | 43. (e) | 44. (e) | 45. (b) |

Quantitative Aptitude

Solved Paper of Cooperative Bank Exam, 2000

1. Find the sum of prime factors of 561.
(a) 31 (b) 12
(c) 40 (d) 41
2. 4 men prepares 5 mats in 4 days. How many mats can be prepared by 200 men in 200 days?
(a) 200 (b) 10000
(c) 1000 (d) 5000
3. Product of two numbers is 1575 and their quotient is 7. What are the numbers?
(a) 205 and 15 (b) 15 and 105
(c) 225 and 15 (d) 25 and 135
4. A person purchased a T.V. 20% less than the market price and sells it at 20% more than the market price. What is his percentage profit?
(a) 50% (b) 40%
(c) 0% (d) 20%
5. A bucket half filled with water weighs 70 kg. When its $\frac{1}{4}$ th is empty, it weighs 80 kg. Find the weight of the bucket when its $\frac{2}{5}$ th is filled with water.
(a) 16 kg (b) 100 kg
(c) 66 kg (d) 48 kg
6. Rs 5625 is divided among A, B and C in such a way that A gets half of B and C while B gets $\frac{1}{4}$ th of A and C. How much A gets more than B?
(a) Rs 750 (b) Rs 850
(c) Rs 650 (d) Rs 500
7. 10 years before father's age was $4\frac{1}{3}$ time his son's age. 10 years after father's age will be $2\frac{3}{7}$ time son's age. Find the sum of the age of the father and the son at present.
(a) 65 years (b) 100 years
(c) 75 years (d) 90 years
8. Find the sum of $5.\dot{3} + 3.\dot{2}\dot{5} + 12.\dot{1}$
(a) $20.\dot{0}6\dot{9}$ (b) $20.\dot{6}\dot{5}$
(c) $20.\dot{6}\dot{9}$ (d) $20.\dot{6}0\dot{9}$
9. A man deposited Rs 2400 in a Bank at a simple interest of 5% per annum. If he wants to purchase an article of price Rs 3000, how many years he is to wait?
(a) 2 years (b) $2\frac{1}{2}$ years
(c) $3\frac{1}{2}$ years (d) 5 years
10. A tank is filled up by a pipe A in 5 minutes while it is emptied by a pipe B in 10 minutes. When the tank is half-filled up two pipes are opened simultaneously. Find the time required so that $\frac{3}{4}$ th of the tank is filled up.
(a) 2 minutes 30 seconds (b) 5 minutes
(c) 10 minutes (d) $4\frac{3}{4}$ minutes
11. Simplify:
 $\frac{2}{3} \div \frac{4}{9}$ of $7\frac{1}{2} + 999\frac{494}{495} \times 99$
(a) 98902 (b) 10000
(c) 99000 (d) 11111
12. Find the ratio of purchase price and the sell price so that there is $16\frac{2}{3}\%$ profit.
(a) 6 : 7 (b) 5 : 9
(c) 3 : 5 (d) 4 : 7
13. Find the number between 400 and 500 which is divisible by 12, 16 and 24.
(a) 420 (b) 430
(c) 410 (d) 480
14. The ratio of two numbers is 5 : 7 and their difference is 60, find the numbers.
(a) 150, 210 (b) 500, 700
(c) 50, 110 (d) 55, 115
15. Find the H.C.F. and L.C.M. of $1\frac{1}{2}$, $\frac{3}{4}$ and $\frac{9}{16}$.
(a) $\frac{9}{4}$, $\frac{3}{16}$ (b) $\frac{3}{16}$, $\frac{9}{2}$
(c) $\frac{27}{64}$, $\frac{1}{2}$ (d) $\frac{1}{2}$, $\frac{27}{64}$
16. Average age of A and B is 9 years 4 months and that of B and C is 4 years 8 months. How many years A is older than C?
(a) $9\frac{1}{3}$ years (b) 9.2 years

(c) $9\frac{1}{2}$ years

(d) 9.4 years

17. A train moving with a speed of 54 km/hr crosses 270 metre bridge in 30 seconds. Find the length of the train.

(a) 100 m

(b) 150 m

(c) 180 m

(d) 200 m

18. A and B together complete a work in 3 days. After two days of their work B leaves and the work is completed in next two days. In how many days B alone completes the work?

(a) 5 days

(b) 6 days

(c) 7 days

(d) 8 days

19. Simplify: $\frac{.8\dot{3} \div 7.5}{2.3\dot{2}\dot{1} - .09\dot{8}}$

(a) .5

(b) $\dot{.5}$

(c) .05

(d) 5.05

20. The ratio of boys and girls of a school with 504 students is 13 : 11. What will be the new ratio if 12 girls leave?

(a) 91 : 73

(b) 91 : 81

(c) 73 : 91

(d) 81 : 91

21. Divide Rs 350 among A, B and C so that A's share : B's share = 2 : 3 and B's share : C's share = 4 : 5.

(a) A Rs 80, B Rs 120, C Rs 150

(b) A Rs 40, B Rs 60, C Rs 75

(c) A Rs 160, B Rs 240, C Rs 300

(d) A Rs 16, B Rs 24, C Rs 30

22. The mixture of water and sugar in a glass has a ratio sugar : water = 2 : 7 and the ratio in another glass of same mixture is 3 : 11. Which is sweeter?

(a) First mixture

(b) Second mixture

(c) Both the same

(d) Is not clear

23. A number when decreased by 10% becomes 30. Find the number.

(a) 300

(b) 3

(c) $33\frac{1}{3}$

(d) 305

24. The simplified value of $1.1 + (1.1)^2 + (1.1)^3$ is:

(a) 3.431

(b) 3.641

(c) 3.111

(d) 4.641

25. Find the greatest prime factor of 2431.

(a) 29

(b) 23

(c) 37

(d) 17

26. The sum and difference of two numbers are respectively $9\frac{5}{8}$ and $4\frac{3}{8}$. Find their product.

(a) 18

(b) $18\frac{3}{8}$

(c) $15\frac{3}{8}$

(d) $17\frac{3}{8}$

27. 50 men do a work in 12 days working 6 hours per day.

If 60 men want to complete the double of the above work in 8 days, how many hours per day is to be worked by each man?

(a) 15

(b) $6\frac{2}{3}$

(c) $21\frac{3}{5}$

(d) $9\frac{3}{5}$

28. A, B and C started a partnership business paying the capital amounts of Rs 6500, Rs 9100 and Rs 5200 respectively. They equally distributed amongst themselves the two-third of the total sum of profit Rs 14400 and each took the share of the remaining amount of profit in the ratio of the capital amount each had paid. What was the sum of money each partner received?

(a) A—Rs 4700, B—Rs 5300, C—Rs 4400

(b) A—Rs 5300, B—Rs 4700, C—Rs 4400

(c) A—Rs 4400, B—Rs 4700, C—Rs 5300

(d) A—Rs 4700, B—Rs 5300, C—Rs 2400

29. Find the greatest and least of

$\sqrt{6} + \sqrt{5}, \sqrt{3} + 2\sqrt{2}, \sqrt{2} + 3$

(a) Greatest— $\sqrt{6} + \sqrt{5}$, Least— $\sqrt{2} + 3$

(b) Greatest— $\sqrt{3} + 2\sqrt{2}$, Least— $\sqrt{2} + 3$

(c) Greatest— $\sqrt{2} + 3$, Least— $\sqrt{3} + 2\sqrt{2}$

(d) Greatest— $\sqrt{2} + 3$, Least— $\sqrt{6} + \sqrt{5}$

30. Find the least integer when added to 512 makes it a perfect square.

(a) 511 (b) 31 (c) 17 (d) 28

31. The ratio of the sides of a triangle is 3 : 4 : 5 and its perimeter is 96 metres. Find the area of the triangle in sq metres.

(a) 384

(b) 640

(c) 300

(d) 500

32. Find the square root of $\frac{5}{80}$:

(a) .5 (b) .05 (c) $\frac{1}{6}$ (d) .25

33. The value of 0.12% of Rs 180 is:

(a) 18 paise

(b) 22 paise

(c) 24 paise

(d) None of the above

34. The ratio of the purchase price and selling price is 4 : 5. The net profit is:

(a) 20%

(b) 5%

(c) 25%

(d) None of these

35. The volume is increased by 10% when water is frozen to ice. If ice is melted, then its volume is decreased by:

(a) $9\frac{1}{11}\%$

(b) 10%

(c) $9\frac{10}{11}\%$

(d) 11%

36. The greatest prime number of two digit is:
 (a) 89 (b) 97
 (c) 99 (d) 10
37. The greatest of the numbers 0.16 , $\sqrt{0.16}$, $(0.16)^2$ and $0.1\dot{6}$ is:
 (a) 0.16 (b) $\sqrt{0.16}$
 (c) $(0.16)^2$ (d) $0.1\dot{6}$
38. If $A : B = 2 : 3$, $B : C = 5 : 4$ and $C : D = 7 : 8$, then $A : D$ is:
 (a) $35 : 48$ (b) $48 : 35$
 (c) $7 : 8$ (d) $8 : 7$
39. The simplest value of $\frac{2+\sqrt{3}}{2-\sqrt{3}} + \frac{2-\sqrt{3}}{2+\sqrt{3}}$ is:
 (a) 7 (b) 1 (c) 10 (d) 14
40. 30% of $A = .25$ of $B = \frac{1}{5}$ th of C , then $A : B : C$ is:
 (a) $3 : 6 : 5$ (b) $6 : 3 : 5$
 (c) $3 : 5 : 6$ (d) none of the above
41. A man joined in his service at the age of 24 years and died during his service period. If he served for $\frac{4}{7}$ th of his life time, then he lived:
 (a) 32 years (b) 42 years
 (c) 56 years (d) None of the above
42. If $\frac{a}{2} = \frac{b}{5} = \frac{c}{8}$ then the value of $\frac{a}{b} \cdot \frac{b+c}{b}$ is:
 (a) 1 (b) 0 (c) 5 (d) 15
43. If n is an integer, then $(n-3)^2 - n^2$ is always divisible by:
 (a) $3 - 2n$ (b) $3 + 2n$
 (c) $n + 3$ (d) None of the above
44. The value of $(1 + \sqrt{2} + \sqrt{3})^2 - 2\sqrt{3} - 2\sqrt{6} - 2\sqrt{2}$ is:
 (a) 1 (b) 6 (c) 2 (d) 3
45. Ram, Rahim and Ratan invested Rs 5000, Rs 4000 and Rs 3000 respectively in a business. Ratan earns Rs 200 p.m. for its supervision. If the total profit is Rs 8400, then the total income of Ratan is:
 (a) Rs 4500 (b) Rs 3900
 (c) Rs 9300 (d) Rs 5400
46. The square root of the square root of 0.00000001 is:
 (a) 0.01 (b) 0.001
 (c) 0.0001 (d) 0.00001
47. 42 oranges are distributed among some boys and girls. If each boy gets 3 then each girl gets 6 while each boy gets 5 then each girl gets 3. The number of girls is:
 (a) 2 (b) 4 (c) 6 (d) 8
48. An alloy contains zinc and copper in the ratio 5 : 3. The quantity of zinc to be mixed with 16 kg of the alloy so that

the ratio will be 2 : 1 is:

- (a) 2 kg (b) 3 kg
 (c) 5 kg (d) 8 kg
49. A bag contains some 5 Re coins and 10 Re coins. If the total number of coins is 80 and the total value is Rs 600, the number of 10 Re coins is:
 (a) 80 (b) 50
 (c) 40 (d) 10
50. A railway train travels 66 km in $1\frac{1}{2}$ hrs. Its speed in metre/min is:
 (a) $733\frac{1}{3}$ (b) $703\frac{1}{3}$
 (c) $710\frac{1}{3}$ (d) $337\frac{1}{3}$
51. The missing number marked as ___ in the series 5, 13, 9, 17, 13, 21, ___ is:
 (a) 29 (b) 25
 (c) 13 (d) 17
52. The compound interest for two years on a capital is Rs two more than the simple interest for the same period. If the rate of interest is 5% per year, then the capital would be:
 (a) Rs 800 (b) Rs 840
 (c) Rs 880 (d) Rs 882
53. An amount on compound interest becomes double in four years. It will become eight times in:
 (a) 8 years (b) 12 years
 (c) 16 years (d) 20 years
54. Twenty litres of a mixture contains milk and water in the ratio of 5 : 3. If four litres of this mixture is replaced by four litres of milk, then the ratio of milk to water in the new mixture will be:
 (a) 5 : 3 (b) 4 : 3
 (c) 7 : 3 (d) 2 : 3

ANSWERS AND EXPLANATIONS

- (a) $561 = 3 \times 11 \times 17$ Sum = 31
- (b)

Men	Mats	Days
4	4	4
200	x	200

More men more mats } : : 4 : x
 More days more mats }
 4 : 200
 $\therefore x \times 4 \times 4 = 4 \times 200 \times 200$
 $x = 10000$
- (b) $\frac{x}{y} = 7 \therefore x = 7y$ $P = xy = 7y \times y = 1575 \Rightarrow y = 15$
 \therefore Nos are y, 7y, 15 and 105
- (a) Let M.P. = Rs 100 \therefore C.P. = Rs 80 S.P. = Rs 120

$$P = 120 - 80 = 40 \quad P\% = \frac{40}{80} \times 100 = 50$$

5. (c) Let weight of bucket (empty) = x kg (say)
Weight of water when the bucket is full = y kg
A.T.S. $x + \frac{y}{2} = 70$ (i) $x + \frac{3}{4}y = 80$ (ii)

Solving (i) and (ii) we get $x = 50$, $y = 40$

$$\text{Reqd. weight} = x + \frac{2}{5}y = 50 + \frac{2}{5} \times 40 = 66 \text{ kg}$$

6. (a) $A + B + C = 5625$... (i)

$$A = \frac{B + C}{2} \text{ or } B + C = 2A \text{ ... (ii)}$$

$$A + 2A = 5625 \Rightarrow A = 1875$$

$$B = \frac{1}{4}(A + C) \quad 4B = A + C \text{ ... (iii)}$$

Solving these equations we get $B = 125$,

$$A - B = 1875 - 1125 = \text{Rs } 750$$

7. (b) Let the present ages of father and son be x and y respectively

$$\text{A.T.S. } x - 10 = \frac{13}{3}(y - 10) \text{ ... (i)}$$

$$x + 10 = \frac{17}{7}(y + 10) \text{ ... (ii)}$$

Solving (i) and (ii) we get $x = 75$ years, $y = 25$ years

Sum of ages = $75 + 25 = 100$ years

8. (c) $5.333333 \dots$ or $5.\dot{3} + 3.\dot{2}5 + 12.\dot{1}$
 $3.252525 \dots$

$$\frac{12.111111 \dots}{20.696969 \dots} = 20.69 = 5 + \frac{3}{9} + 3 + \frac{25}{99} + 12 + \frac{1}{9}$$

$$= 20 + \frac{69}{99} = 20 + \dot{6}9 = 20.\dot{6}9$$

9. (d) $I = A - P = 3000 - 2400 = \text{Rs } 600$

$$T = \frac{I \times 100}{P \times R} = \frac{600 \times 100}{2400 \times 5} = 5 \text{ years}$$

10. (a) Work done by both pipes in 1 minute

$$= \frac{1}{5} - \frac{1}{10} = \frac{1}{10}$$

\therefore The two pipes together can fill the tank in 10 minutes

$$\therefore \frac{1}{4} \text{ of tank can be filled in } = 10 \times \frac{1}{4} = 2 \text{ min } 30 \text{ sec}$$

$$\frac{3}{4} - \frac{1}{2} = \frac{1}{4} \text{ of tank is to be filled}$$

11. (a) $\frac{2}{3} \div \frac{4}{9}$ of $\frac{15}{2} + (999 + \frac{494}{495}) \times 99$

$$= \frac{2}{3} \div \frac{10}{3} + 999 \times 99 + \frac{494}{5} = \frac{1}{5} + 999 \times 99 + \frac{494}{5}$$

$$= \frac{1}{5} + \frac{494}{5} + 999 \times 99 = 1 + (1000 - 1)99$$

$$= 1 + 99000 - 99 = 98902$$

$$12. (a) \frac{CP}{SP} = \frac{100}{100 + \frac{50}{3}} = 100 \times \frac{3}{350} = \frac{6}{7} = 6 : 7$$

13. (d) L.C.M. of 12, 16, 24 = 48, 480 is divisible by 48.

$$14. (a) 7x - 5x = 60 \Rightarrow x = 30$$

Nos are 150, 210

$$15. (b) \text{H.C.F. of } \frac{3}{2}, \frac{3}{4}, \frac{9}{16} = \frac{\text{HCF of } 3, 3, 9}{\text{LCM of } 2, 4, 16} = \frac{3}{16}$$

$$\text{L.C.M.} = \frac{\text{L.C.M. of } 3, 3, 9}{\text{H.C.F. of } 2, 4, 16} = \frac{9}{2}$$

16. (a) Sum of ages of A and B = (9 years 4 months) \times 2
= 18 years 8 months ... (i)

$$\text{Total age of B and C} = (4 \text{ years } 8 \text{ months}) \times 2 = 9 \text{ years } 4 \text{ months ... (ii)}$$

Subtracting (ii) for (i)

Difference of ages of A and C = 9 years 4 months

A is older than C by $9\frac{1}{3}$ years

$$17. (c) 54 \text{ km/hr} = 54 \times \frac{5}{18} = 15 \text{ m/sec}$$

$$\frac{x + 270}{15} = 30 \quad (T = \frac{D}{S})$$

$$\Rightarrow x = 180 \text{ m, length of the train} = 180 \text{ m}$$

$$18. (b) (A + B)'s 2 \text{ days' work} = \frac{1}{3} \times 2 = \frac{2}{3}$$

$$\text{Remaining work} = 1 - \frac{2}{3} = \frac{1}{3} \text{ which is done by A in}$$

2 days

$$\therefore \text{A can do the whole work in } 2 \times \frac{3}{1} = 6 \text{ days}$$

$$\text{B's one day's work} = \frac{1}{3} - \frac{1}{6} = \frac{1}{6}$$

\therefore B alone can do the work in 6 days

$$19. (c) \frac{.8\dot{3}\dot{2}\dot{1} - .0\dot{9}\dot{8}}{2 + \frac{83 - 8}{90} \div \frac{15}{2}} = \frac{\frac{75}{90} \div \frac{15}{2}}{2 + \frac{220}{990}} = \frac{\frac{75}{90} \div \frac{15}{2}}{2 + \frac{220}{990}}$$

$$= \frac{\frac{1}{9}}{\frac{20}{9}} = \frac{1}{20} = 0.05$$

$$20. (a) \text{Boys} = \frac{13}{13 + 11} \times 504 = 273 \therefore \text{girls} = 231$$

$$\frac{273}{231-12} = \frac{273}{219} = \frac{91}{73}$$

21. (a) A : B : C A's share = $\frac{8}{35} \times 350 = \text{Rs } 80$
 2 : 3
 4 : 5
 8 : 12 : 15 B's share = $\frac{12}{35} \times 350 = \text{Rs } 120$

C's share = Rs 150

22. (a) %age of sugar in Ist glass = $\frac{2}{9} \times 100 = 22.2$

%age of sugar in IInd glass = $\frac{3}{14} \times 100 = 21.4$

1st mixture is sweeter

23. (c) 90% of $x = 30 \Rightarrow x = 33\frac{1}{3}$

24. (b) $1.1 + 1.21 + 1.331 = 3.641$

25. (d) $2431 = 11 \times 13 \times 17$ Greatest prime factor = 17

26. (b) $x + y = \frac{77}{8} \dots (i)$ $x - y = \frac{35}{8} \dots (ii)$

Adding (i) and (ii), $2x = 14$
 $x = 7$

$y = \frac{77}{8} - 7 = \frac{21}{8}$ Product = $7 \times \frac{21}{8} = 18\frac{3}{8}$

or $4xy = (x + y)^2 - (x - y)^2 = \left(\frac{77}{8}\right)^2 - \left(\frac{35}{8}\right)^2$
 $= \left(\frac{77}{8} + \frac{35}{8}\right) \left(\frac{77}{8} - \frac{35}{8}\right)$

$xy = \frac{1}{4} \times \frac{112}{8} \times \frac{42}{8} = 18\frac{3}{8}$

27. (a)

Men	Days	Work	Hours	
50	12	1	6	
60	8	2	x	

 More men less hours 60 : 50
 Less days more hours 8 : 12
 More work more hours 1 : 2
 $\therefore x = \frac{6 \times 50 \times 12 \times 2}{60 \times 8 \times 1} = 15$

28. (a) $\frac{2}{3} \times 14400 = \text{Rs } 9600$

Remaining = Rs 4800

Ratio of profit of A B C
 6500 : 9100 : 5200 = 5 : 7 : 4

A's share = $\frac{5}{16} \times 4800 = \text{Rs } 1500$

B's share = $\frac{7}{16} \times 4800 = \text{Rs } 2100$

C's share = $\frac{4}{16} \times 4800 = \text{Rs } 1200$

A gets = $\frac{9600}{3} + 1500 = \text{Rs } 4700$

B gets $3200 + 2100 = \text{Rs } 5300$

C gets = $3200 + 1200 = \text{Rs } 4400$

29. (a) $\sqrt{2} = 1.414$, $\sqrt{3} = 1.732$, $\sqrt{5} = 2.236$, $\sqrt{6} = 2.449$

30. (c) $529 = 23^2$

31. (a) $3x + 4x + 5x = 96 \Rightarrow x = 8 \therefore$ sides are 24, 32, 40

It is a Pythagorean Triplet, Δ is a rt Δ

\therefore Area of a $\Delta = \frac{1}{2} \times 24 \times 32 = 384 \text{ m}^2$

32. (d) $\sqrt{\frac{5}{80}} = \sqrt{\frac{1}{16}} = \frac{1}{4} = .25$

33. (b) $0.12 = \frac{12-1}{90} = \frac{11}{90}$

$\frac{11}{90} \% \text{ of Rs } 180 = \frac{11}{90} \times \frac{180}{100} = \text{Rs } \frac{22}{100} = 22 \text{ paise}$

34. (c) $P = \text{S.P.} - \text{C.P.} = 5x - 4x = \text{Rs } x$

$P\% = \frac{x}{4x} \times 100 = 25$

35. (a) Let the volume of water be 100 cc

\therefore Vol of ice = 110 cc

When ice melts its volume becomes 100 cc

If vol is 110 cc then decrease in vol = 10 cc

If vol is 100 cc then decrease in vol

$= \frac{10}{110} \times 100 = 9\frac{1}{11}$

36. (b)

37. (b) 0.16 , $\sqrt{0.16} = 0.4$, $(0.16)^2 = 0.0256$, $0.16 = 0.1616 \dots$

Greatest = $\sqrt{0.16}$

38. (a) $\frac{A}{B} \times \frac{B}{C} \times \frac{C}{D} = \frac{A}{D} = \frac{2}{3} \times \frac{5}{4} \times \frac{7}{8} = \frac{35}{48} \therefore A : D = 35 : 48$

39. (d) $\frac{(2+\sqrt{3})^2 + (2-\sqrt{3})^2}{2^2 - (\sqrt{3})^2} = \frac{4+3+4\sqrt{3}+4+3-4\sqrt{3}}{4-3} = 14$

40. (d) $\frac{30}{100}A = \frac{25}{100}B = \frac{C}{5} \Rightarrow \frac{A}{10} = \frac{B}{4} = \frac{C}{5}$

or $A : B : C = \frac{10}{3} : 4 : 5 = 10 : 12 : 15$

41. (c) He served for $\frac{4}{7}$ th of his life time

A.T.S. $\frac{3}{7}$ of his life time = 24

\therefore He lived for $24 \times \frac{7}{3} = 56$ years

42. (a) $\frac{a}{2} = \frac{b}{5} = \frac{c}{8} = k \therefore a = 2k, b = 5k, c = 8k$

$$\frac{a-b+c}{b} = \frac{2k-5k+8k}{5k} = 1$$

43. (a) $(n-3)^2 - n^2 = (n-3-n)(n-3+n) = -3(2n-3)$
 $= 3(3-2n)$ which is divisible by $3-2n$

44. (b) $(1 + \sqrt{2} + \sqrt{3})^2 - 2\sqrt{3} - 2\sqrt{6} - 2\sqrt{2}$
 $= 1+2+3+2\sqrt{2}+2\sqrt{6}+2\sqrt{3}-2\sqrt{3}-2\sqrt{6}-2\sqrt{2} = 6$
 $(a+b+c)^2 = a^2 + b^2 + c^2 + 2ab + 2bc + 2ca$

45. (b) $8400 - 2400 = \text{Rs } 6000$
 Ratio of profits of Ram, Rahim and Ratan
 $= \text{Rs } 5000 : 4000 : 3000 = 5 : 4 : 3$

Ratan's share in profit $= \frac{6000}{5+4+3} \times 3 = \text{Rs } 1500$

Ratan's total income $= 1500 + 2400$ (For supervision)
 $= \text{Rs } 3900$

46. (c)

47. (b) Let the no. of girls and boys be x and y respectively
 $6x + 3y = 42 \dots (i)$ $3x + 5y = 42 \dots (ii)$
 Solving (i) and (ii), we get $x = 4$

48. (a) Zinc $= \frac{5}{8} \times 16 = 10 \text{ kg}$ Copper $= 6 \text{ kg}$

ATS $\frac{10+x}{6} = \frac{2}{1} \Rightarrow x = 2 \text{ kg}$

49. (c) Let the no. of 10 Re coins be x
 $x \times 10 + (80 - x) \times 5 = 600 \Rightarrow x = 40$

50. (a) Speed $= \frac{D}{T} = \frac{66}{\frac{3}{2}} = 44 \text{ km/hr}$

$= 44 \times \frac{1000}{60} = 733\frac{1}{3} \text{ m/min}$

51. (d) There are two series 5, 9, 13, ... and 13, 17, 21, ...
 Each digit is obtained by adding 4 to the preceding term \therefore Reqd no. $= 13 + 4 = 17$

52. (a) $P[(1 + \frac{5}{100})^2 - 1] - \frac{P \times 5 \times 2}{100} = \text{Rs } 2 \Rightarrow P = \text{Rs } 800$

53. (b) $2P = P(1 + \frac{R}{100})^4 \Rightarrow (1 + \frac{R}{100})^4 = 2$

$\Rightarrow 1 + \frac{R}{100} = 2^{\frac{1}{4}}$

$8P = P(1 + \frac{R}{100})^n \Rightarrow 8 = (2^{\frac{1}{4}})^n \Rightarrow 2^3 = 2^{\frac{n}{4}}$

$\therefore \frac{n}{4} = 3 \Rightarrow n = 12$

54. (c) In 16 l of mixture, milk $= 16 \times \frac{5}{8} = 10 \text{ l}$

\therefore Water $= 6 \text{ l}$

New ratio $= \frac{10\text{l} + 4\text{l}}{6\text{l}} = \frac{14}{6} = \frac{7}{3}$

Quantitative Aptitude

1. A certain number of persons agree to subscribe as many rupees each as there are subscribers. The whole subscription is Rs 2582449. Find the number of subscribers:

- (a) 1507 (b) 1607 (c) 1407 (d) 1067

2. A man plants his orchard with 5625 trees and arranges them so that there are as many rows as there are trees in a row. How many rows are there?

- (a) 45 (b) 57 (c) 75 (d) 70

3. At an examination in which full marks were 500, A got 10 per cent of less than B, B got 25% more than C, and C got 20% less than D. If A got 360, what % did D get?

- (a) 90% (b) 85% (c) 75% (d) 80%

4. A contractor estimates that a job will earn him Rs 8400. His estimate covers material, labour and 5% profit. The cost of material and labour is in the ratio of 3 : 7. When the contractor begins his job, however, he discovers that the cost of material has increased by 10% and the labour cost has risen by 15%. Calculate his loss per cent.

- (a) 7.49% (b) 7.59% (c) 7.39% (d) 7.36%

5. A builder borrows Rs 1261 from the bank with compound interest at the rate of 5% per annum by the end of 3 years in 3 equal yearly instalments. Find the value of each instalment.

- (a) Rs 403.05 (b) Rs 436.05
(c) Rs 463.05 (d) Rs 466.05

6. A man buys a house on the condition that he shall pay Rs 500 now, Rs 500 one year hence, and Rs 500 two years hence. What should be the cash value of the house, compound interest being reckoned at $3\frac{1}{2}\%$?

- (a) Rs 1449.95 (b) Rs 1448.95
(c) Rs 1448.00 (d) Rs 1449.85

7. A person who had 45 shares in a gas company sold them at 42 and invested his money in Russian 5 per cent at 105. What income did he then obtain?

- (a) Rs 90 (b) Rs 80 (c) Rs 70 (d) Rs 60

8. Equal sums are invested in 3% stock at 80, 4% at 90 and 5% at 100. The price of each stock rises by Rs 10, so that 1st and 3rd are sold and the proceeds invested in the 2nd. If the rise in income be Rs 1.50, find the whole sum invested.

- (a) Rs 3500 (b) Rs 3506
(c) Rs 3000 (d) Rs 3895

9. Rishu, Ria and Rahul enter into partnership and their shares in the proportion $\frac{1}{3} : \frac{1}{4} : \frac{1}{5}$. Rishu withdraws half his capital at the end of 4 months and after 8 months more, profit

of Rs 1694 is divided. What is A's share?

- (a) Rs 560 (b) Rs 565 (c) Rs 580 (d) Rs 595

10. If a man receives on a fourth of his capital 3 per cent, on two third 5 per cent and on the remainder 11 per cent, what percentage does he receive on the whole.

- (a) 5% (b) 7% (c) 6% (d) 4%

11. A person buys 16 railway tickets for Rs 45. Each first class ticket costs Rs 5 and second class ticket costs Rs 1.50. What will another lot of 16 tickets in which the present number of 15 first class and second class tickets are interchanged cost?

- (a) Rs 58 (b) Rs 59 (c) Rs 56 (d) Rs 4

12. Anshul and Rohit ran a race which lasted a minute and a half. Anshul gave Rohit a start of 10 yds and beat him by 1 yard. Anshul ran 40 yds while Rohit ran 39 yds. Find the length of the course and rates of running of Anshul and Rohit.

- (a) 440 yds; $4\frac{8}{9}, 4\frac{23}{30}$ yds/sec

- (b) 450 yds; $4\frac{9}{8}, 4\frac{30}{23}$ yds/sec

- (c) 436 yds; $4\frac{24}{30}, 4\frac{9}{8}$ yds/sec

- (d) 420 yds; $4\frac{23}{30}, 4\frac{24}{30}$ yds/sec

13. A watch which gains 5 seconds in every 3 minutes is set right at 6 a.m. What is the true time in the afternoon of the same day when the watch indicated a quarter past 3 O'clock?

- (a) 4 p.m. (b) 3 p.m. (c) 6 p.m. (d) 7 p.m.

14. A man is entitled to receive Rs 200 annually for 3 years, the payments being due at the end of 1, 2, 3 years from the present. What immediate payment would be a fair equivalent, compound interest being 4% per annum?

- (a) Rs 565 (b) Rs 555 (c) Rs 575 (d) Rs 405

15. Simplify $\left(\frac{a^{-1}b^2}{a^2b^{-4}}\right)^7 \div \left(\frac{a^3b^{-5}}{a^{-2}b^3}\right)^{-5}$

- (a) a^5b^3 (b) a^4b^2
(c) a^3b^2 (d) a^7b^4

16. $(-a^2b^3c) \div (-a^2c^3)$

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

17. $\frac{2c+3}{12} - \frac{7c+5}{3} + \frac{3c-9}{18}$

(a) $\frac{24c}{12} \frac{23}{12}$

(b) $\frac{24c}{13} \frac{25}{13}$

(c) $\frac{24c}{12} \frac{21}{12}$

(d) $\frac{24c}{12} \frac{20}{12}$

18. A dealer sells 7 horses and buys 9 cows, thus increasing his cash by Rs 88. He then at the same prices buys 9 horses and sells 13 cows, thus decreasing his cash by Rs 91. Find the price of each cow.

(a) Rs 15.70

(b) Rs 15.00

(c) Rs 14.50

(d) Rs 15.50

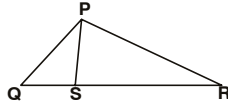
19. $\angle QPR = 90^\circ = \angle PSQ$

PQ = a in

QS = b in

PS = x in

SR = c in



Find 'a' in terms of (i) b, \times (ii) b, c

(a) $a = b \sqrt{b+x^2}$; $a = b^2 + c^2$

(b) $a = b^2 + x^2$; $a = b^2 + bc$

(c) $a = \sqrt{b^2 + x^2}$; $a = \sqrt{b(b+c)}$

(d) $a = \sqrt{b^2 + x^2}$; $a = b(b+c)$

20. If $a = 3$, $b = -2$, $c = 1$ find the value of

$$\frac{a^2 + b^2 + c^2}{a + b + c} - \frac{a^2 - b^2 - c^2}{a - b - c}$$

(a) 6

(b) 5

(c) 3

(d) 7

21. Find the value of:

$$[a - (b - c)]^2 + [b - (c - a)]^2 + [c - (a - b)]^2$$

when $a = -1$,

$b = -2$

$c = -3$

(a) 25

(b) 20

(c) 15

(d) 30

22. Find the minimum value of

$$x + \frac{1}{x}$$

(a) 1

(b) 0

(c) 2

(d) -2

23. From a pack of 52 cards, two are drawn at random. Find the chance that one is a knave and the other a queen.

(a) 8/663

(b) 7/663

(c) 2/663

(d) 4/666

24. A child is asked to pick up two balloons from a box containing 10 blue and 15 red balloons. What is the probability of the child picking at random two balloons of different colours?

(a) $\frac{2}{1}$

(b) $\frac{1}{2}$

(c) $\frac{3}{4}$

(d) $\frac{1}{4}$

25. Solve $6^{3-4x} 4^{x+5} = 8$

(a) 1.44

(b) 1.55

(c) 1.77

(d) 1.66

26. Simplify

$$\frac{1}{2 + \frac{3}{4 + \frac{1}{2}}}$$

(a) $\frac{3}{8}$

(b) $\frac{3}{6}$

(c) $\frac{3}{7}$

(d) $\frac{3}{9}$

27. $\frac{3}{1 + \frac{2}{6 + \frac{1}{5}}}$

(a) $2\frac{12}{42}$

(b) $2\frac{11}{41}$

(c) $2\frac{10}{45}$

(d) $2\frac{11}{45}$

28. $\frac{2 + \frac{1}{3 \frac{3}{5}}}{6 + \frac{7}{8 + \frac{10}{11}}}$

(a) $\frac{205}{570}$

(b) $\frac{203}{570}$

(c) $\frac{207}{507}$

(d) $\frac{205}{705}$

29. $\frac{6 + \frac{1}{6 \frac{1}{6}} \times 10 \frac{8}{9}}{4 \frac{1}{4 \frac{1}{4}}}$

(a) 19

(b) 20

(c) 22

(d) 18

30. $\frac{2 + \frac{1}{3 \frac{4}{5}}}{2 + \frac{1}{3 + \frac{1}{1 + \frac{1}{4}}}}$

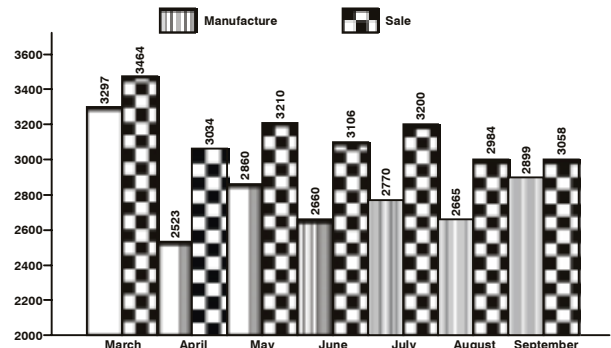
(a) 2

(b) 3

(c) 1

(d) 4

31-37. The graph shows the manufacture and sale in 2001 of Hindustan Boy Ltd in \$ million for the period March 2000 to September 2001.



31. What is the average value of sale between March and September 2001?

- (a) 2810.6 (b) 3150.9
(c) 2980.8 (d) 3150.3

32. What is the average value of manufactured good between April and August 2001?

- (a) 2694.3 (b) 3106.8
(c) 2695.6 (d) 3107.4

33. What is the percentage increase in sale between April and May 2001?

- (a) 5.80 (b) 6.30 (c) 8.04 (d) 7.60

34. The change in manufacture and sale between July and August 2001, was approximately:

- (a) Increase 3.55% (b) Decrease 3.55%
(c) Increase 2.87% (d) Decrease 2.34%

35. What is the difference in manufacture between the periods March to May and June to August (in \$ million)?

- (a) 418 (b) 592 (c) 579 (d) 585

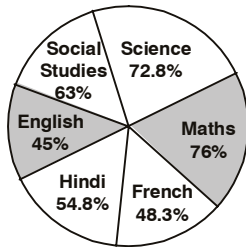
36. If during March 2001 the manufacturing is approximately 24.32% more than that during February 2001 then, what was the approximate manufacturing during February 2001 (in \$ million):

- (a) 2658 (b) 2562 (c) 2652 (d) 2656

37. What is the balance for September 2001?

- (a) 159 (b) -159
(c) -178 (d) None of these

38-41. Nisha scored a total of 440 marks out of 600 in a certain examination. Look at the data and answer the following questions:



38. The marks scored in French, Hindi, English and Social Studies when added together, represent what percentage of the total marks obtained?

- (a) 63.15 (b) 52.62
(c) 58.64 (d) 56.39

39. The marks scored in science and mathematics added together, exceed the marks scored in French and Social Studies, added together, by how many marks?

- (a) 54 (b) 46 (c) 40 (d) 51

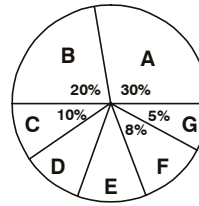
40. The difference of marks between Hindi and English is the same as that between ____

- (a) Social Studies and Maths
(b) Science and Social Studies
(c) Science and Maths
(d) French and Hindi

41. The subject in which the student scored 67 marks in:

- (a) English (b) Hindi
(c) French (d) Science

42-45. Analyse the pie chart and answer the questions:



- A—Food
B—Rent
C—Entertainment
D—Clothing
E—Taxes
F—Transport
G—Miscellaneous

42. If the family spends Rs 6500 per month, how much are its annual taxes?

- (a) Rs 7800 (b) Rs 9360 (c) Rs 9800 (d) Rs 10080

43. How many degrees should there be in the central angle showing clothing, taxes and transportation combined?

- (a) 100 (b) 110 (c) 120 (d) 126

44. How much more money per month is spent by the family on food as compared to rent?

- (a) Rs 650 (b) Rs 700 (c) Rs 750 (d) Rs 800

45. If the expenditure budget of the family is raised to Rs 8000 per month and distribution on various items remain the same, then the monthly expenses on both, the entertainment and the transport, will be:

- (a) Rs 1800 (b) Rs 1600 (c) Rs 1440 (d) Rs 1220

46. If $\frac{x}{4} - \frac{x-3}{6} = 1$ then x is equal to:

- (a) 12 (b) 6 (c) 3 (d) 4

47. If $x + 2 = 0$ then the value of

$$\frac{3(x+3)(x+1)}{x-1} \text{ is:}$$

- (a) 2 (b) 3 (c) 4 (d) 1

48. A rectangular field is 12 m × 16 m. Length of its diagonal is:

- (a) 25 m (b) 30 m (c) 20 m (d) 35 m

49. Find the sum of prime numbers lying between 60 and 75:

- (a) 272 (b) 201 (c) 211 (d) 199

50. Simplify $\left(\sqrt{3} - \frac{1}{\sqrt{3}}\right)^2$

- (a) $\frac{4}{3}$ (b) $\frac{4}{\sqrt{3}}$ (c) $\frac{3}{4}$ (d) None of these

ANSWERS AND EXPLANATIONS

- | | | | | |
|---------|---------|---------|---------|---------|
| 1. (b) | 2. (c) | 3. (d) | 4. (a) | 5. (c) |
| 6. (d) | 7. (a) | 8. (c) | 9. (a) | 10. (a) |
| 11. (b) | 12. (a) | 13. (b) | 14. (b) | 15. (b) |
| 16. (a) | 17. (a) | 18. (d) | 19. (c) | 20. (a) |
| 21. (b) | 22. (c) | 23. (a) | 24. (b) | 25. (c) |
| 26. (a) | 27. (b) | 28. (b) | 29. (d) | 30. (c) |
| 31. (b) | 32. (c) | 33. (a) | 34. (b) | 35. (d) |
| 36. (c) | 37. (b) | 38. (c) | 39. (b) | 40. (b) |
| 41. (b) | 42. (b) | 43. (d) | 44. (a) | 45. (c) |
| 46. (b) | 47. (d) | 48. (c) | 49. (a) | 50. (a) |