1. A and B can do a job alone in 12 days and 15 days respectively. A starts the work and after 6 days B also joins to finish the work together. For how many days B actually worked on the job ?

   (A) $3\frac{1}{3}$ (B) $9\frac{1}{3}$

   (C) $5\frac{2}{3}$ (D) $6\frac{3}{8}$

2. Two pipes can fill a cistern separately in 24 minutes and 40 minutes respectively. A waste pipe can drain off 30 litres per minute. If all the three pipes are opened, the cistern fills in one hour. The capacity (in litres) of the cistern is—

   (A) 800   (B) 400
   (C) 600   (D) 500

3. A solid sphere of radius 1 cm is melted to convert into a wire of length 100 cm. The radius of the wire (using $\sqrt{3} = 1.732$) is—

   (A) 0.08 cm   (B) 0.09 cm
   (C) 0.16 cm   (D) 0.11 cm

4. A field is in the form of a rectangle of length 18 m and width 15 m. A pit, 7.5 m long, 6 m broad and 0.8 m deep, is dug in a corner of the field and the earth taken out is evenly spread over the remaining area of the field. The level of the field raised is—

   (A) 12 cm   (B) 14 cm
   (C) 16 cm   (D) 18 cm

5. Given : $\sqrt[3]{4}$, $\sqrt{3}, \sqrt[6]{25}$ and $\sqrt[12]{289}$, the greatest and least of them are respectively—

   (A) $\sqrt[12]{289}$ and $\sqrt[3]{4}$

   (B) $\sqrt{3}$ and $\sqrt[3]{4}$

   (C) $\sqrt[6]{25}$ and $\sqrt{3}$

   (D) $\sqrt[3]{4}$ and $\sqrt[6]{25}$

6. The last digit, that is, the digit in the unit's place of the number $[(57)^{25} - 1]$ is—

   (A) 6   (B) 8
   (C) 0   (D) 5

7. The sum of five consecutive integers is a and the sum of next five consecutive integers is b. Then $\frac{(b-a)}{100}$ is equal to—

   (A) $\frac{1}{4}$ (B) $\frac{1}{2}$

   (C) 4   (D) 2

8. $\frac{3\sqrt{2}}{\sqrt{6}-\sqrt{3}} - \frac{4\sqrt{3}}{\sqrt{6}-\sqrt{2}} - \frac{6}{\sqrt{8}+\sqrt{12}} = ?$

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

9. A number N is a positive three-digit number. If x is in its hundred's place and y is in its unit's place, then the number $N - 100x - y$ is always divisible by—

   (A) 8   (B) 9
   (C) 10   (D) 11

10. A discount of 40% on the marked price of a trouser enables Ajit to purchase a shirt also which costs him ₹ 320. How much did Ajit pay for the trouser ?

    (A) ₹ 480   (B) ₹ 540
    (C) ₹ 800   (D) ₹ 400

11. The ratio of alcohol and water in 40 litres of mixture is 5 : 3. 8 litres of the mixture is removed and replaced with water. How, the ratio of the alcohol and water in the resultant mixture is—

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

12. Rama's expenditure and savings are in the ratio 3 : 2. His income increases by 10 per cent. His expenditure also increases by 12%. His savings increases by—

    (A) 7%   (B) 10%
    (C) 9%   (D) 13%

13. Ten years ago, the average age of P and Q was 20 years. Average age of P, Q and R is 30 years now. After 10 years, the age of R will be—

    (A) 35 years   (B) 40 years
    (C) 30 years   (D) 45 years

14. The average value of the numbers 15, 21, 32, 35, 46, x, 59, 65, 72 should be greater than or equal to 43 but less than or equal to 44. Then the value of x should be—

    (A) $42 \leqslant x \leqslant 51$
    (B) $43 \leqslant x \leqslant 50$
    (C) $42 < x \leqslant 49$
    (D) $43 < x < 50$

15. The base of a right pyramid is an equilateral triangle of side 4 cm. The height of the pyramid is half of its slant height. Its volume is—

    (A) $\frac{8}{9}\sqrt{2}$ cm^3 (B) $\frac{7}{9}\sqrt{3}$ cm^3

    (C) $\frac{8}{9}\sqrt{3}$ cm^3 (D) $\frac{7}{9}\sqrt{2}$ cm^3

16. Water flows in a tank 150 m × 100 m at the base, through a pipe whose cross-section is 2 dm by 1.5 dm, at the speed of 15 km per hour. In what time will the water be 3 metre deep ?

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

17. A tent is of the shape of a right circular cylinder upto a height of 3 metres and then becomes a right circular cone with maximum height of 13.5 metre above the ground. If the radius of the base is 14 metre, the cost of painting the inner side of the tent at the rate of ₹ 2 per square metre is—

    (A) ₹ 2,050   (B) ₹ 2,060
    (C) ₹ 2,068   (D) ₹ 2,080

18. The sides of a triangle are 50 cm, 78 cm and 112 cm. The smallest altitude is—

(A) 20 cm (B) 30 cm
(C) 40 cm (D) 50 cm

19. Rahim bought a gift item for ₹ 510 after getting a discount of 15%. He then sells it 5% above the marked price. The profit earned in this deal is—

(A) ₹ 150 (B) ₹ 120
(C) ₹ 100 (D) ₹ 90

20. The simple interest on a sum of money is $\frac{1}{9}$th of the principal and the number of years is equal to the rate per cent per annum. The rate per cent per annum is equal to—

(A) 3% (B) $\frac{1}{3}$%
(C) $\frac{1}{10}$% (D) $3\frac{1}{3}$%

21. If $x + y + z = 1$, $xy + yz + zx = -1$, $xyz = -1$, then $x^3 + y^3 + z^3$ is—

(A) −2 (B) −1
(C) 0 (D) 1

22. If $x^2 + y^2 + z^2 = xy + yz + zx$, $(x \neq 0)$, then the value of
$$\frac{4x + 2y - 3z}{2x} \text{ is—}$$

(A) 0 (B) 1
(C) $\frac{3}{2}$ (D) $\frac{1}{2}$

23. If $x\left(3 - \frac{2}{x}\right) = \frac{3}{x}$, $x \neq 0$, then the value of $x^2 + \frac{1}{x^2}$ is—

(A) $2\frac{1}{3}$ (B) $2\frac{2}{3}$
(C) $2\frac{4}{9}$ (D) $2\frac{5}{9}$

24. The area of the triangle formed by the graph of $ax + by = c$ (where a, b are two positive real numbers) and the coordinate axes, is—

(A) $\frac{c^2}{ab}$ sq unit

(B) $\frac{a^2}{2bc}$ sq unit

(C) $\frac{c^2}{2ab}$ sq unit

(D) $\frac{a^2}{bc}$ sq unit

25. A shopkeeper marks his goods at 40% above the cost price. He is able to sell $\frac{3}{4}$th of his goods at this price, and the remaining at 40% discount. Assuming that the shopkeeper is able to sell all the goods he buys, find his loss or gain as % on the whole transaction—

(A) 20% loss (B) 23% loss
(C) 26% gain (D) 30% gain

26. A fruit seller bought 240 bananas at the rate of ₹ 48 per dozen. He sells $\frac{1}{2}$ of them at the rate of ₹ 5 per banana. $\frac{1}{6}$ th of the remaining are found to be rotten. The price per banana at which he has to sell the remaining bananas to get a profit of 25% on his entire investment is—

(A) ₹ 5·5 (B) ₹ 6·0
(C) ₹ 5·0 (D) ₹ 6·5

27. Two numbers are 30% and 40% more than the third number respectively. The first number is x% of the second. Then x—

(A) $105\frac{2}{13}$ (B) 140
(C) $105\frac{5}{7}$ (D) $92\frac{6}{7}$

28. The price of cooking oil has increased by 25%. The percentage of reduction that a family should effect in the use of cooking oil, so as not to increase the expenditure on this account, is—

(A) 15% (B) 20%
(C) 25% (D) 30%

29. If a train runs at 40 km/hr, it reaches its destination late by 11 minute, but if it runs at 50 km/hr, it is late by 5 minutes only. Find the correct time for the train to complete its journey—

(A) 19 minute
(B) 20 minute
(C) 21 minute
(D) 18 minute

30. If $x = r \cos \theta \cos \varphi$, $y = r \cos \theta \sin \varphi$ and $z = r \sin \theta$, then the value of $x^2 + y^2 + z^2$ is—

(A) r^2 (B) r
(C) $\frac{1}{r^2}$ (D) $\frac{1}{r}$

31. If $5 \cos \theta + 12 \sin \theta = 13$, then tan $\theta =$

(A) $\frac{13}{12}$ (B) $\frac{12}{13}$
(C) $\frac{12}{5}$ (D) $\frac{5}{12}$

32. The value of $\sec^2 12° - \frac{1}{\tan^2 78°}$ is—

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

33. If $\tan \theta \cdot \cos 60° = \frac{\sqrt{3}}{2}$, then the value of $\sin (\theta - 15°)$ is—

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

34. A man from the top of a 100 metre high tower sees a car moving towards the tower at an angle of depression of 30°. After some time, the angle of depression becomes 60°. The distance (in metres) travelled by the car during this time is—

(A) $100\sqrt{3}$ (B) $\frac{200\sqrt{3}}{3}$
(C) $\frac{100\sqrt{3}}{3}$ (D) $200\sqrt{3}$

35. If the diameter of a sphere is decreased by 25%, its curved surface area will be decreased by—

(A) 43·25% (B) 43·50%
(C) 43·75% (D) 44·25%

36. If $x^2 + y^2 + z^2 + 2 = 2 (y - x)$, then value of $x^3 + y^3 + z^3$ is equal to—

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

37. O is the circumcentre of $\triangle ABC$. If $\angle BAC = 85°$, $\angle BCA = 75°$, then $\angle OAC$ is equal to—

(A) 70° (B) 60°
(C) 80° (D) 100°

38. The distance between the centres of the two circles with radii 4 cm and 9 cm is 13 cm. The length of the direct common tangent (between two points of contact) is—

(A) 13 cm (B) $\sqrt{153}$ cm
(C) 12 cm (D) 18 cm

39. The external bisector of $\angle ABC$ of $\triangle ABC$ intersects the straight line through A and parallel to BC at the point D. If $\angle ABC = 50°$, then measure of $\angle ADB$ is—

(A) 65° (B) 55°
(C) 40° (D) 20°

40. AB is a diameter of a circle with centre at O. DC is a chord of it such that DC || AB. If ∠BAC = 20°, then ∠ADC is equal to—

(A) 120° (B) 110°

(C) 115° (D) 100°

41. The tangents drawn at P and Q on the circumference of a circle intersect at A. If ∠PAQ = 68°, then the measure of the ∠APQ is—

(A) 56° (B) 68°

(C) 28° (D) 34°

Directions—Study the following table and answer the question 42–45.

Number of Students from Various Schools Playing Various Games

(one student plays one game only)

Games	Schools				
	A	B	C	D	E
Cricket	150	200	250	230	200
Football	250	125	175	100	250
Basketball	200	195	245	200	225
Badminton	100	130	60	40	65
Tennis	120	180	150	130	165

42. The difference between the total number of students playing Basketball from all the schools and the total number of students playing Cricket from all the schools is—

(A) 27 (B) 35

(C) 28 (D) 26

43. The number of students playing Football from School C is x per cent of the total number of students playing Football from all the schools x equals—

(A) $19\frac{7}{9}$ (B) $19\frac{4}{9}$

(C) 18 (D) $20\frac{2}{9}$

44. Which school has the maximum number of players ?

(A) A (B) B

(C) C (D) E

45. The number of students playing Badminton from School E is $x\%$ of the students playing Badminton from School B. Then x equals—

(A) 40 (B) 50

(C) 42 (D) 41

Directions—The following bar graph depicts the result for B.Sc. students of a college for three years. Read the graph and answer questions 46–50 based on this graph.
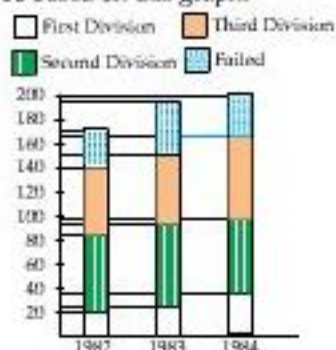
46. The number of students passed in 3rd division in 1984 was—

(A) 165 (B) 75

(C) 70 (D) 65

47. The percentage of students failed in 1984 was—

(A) $18\frac{1}{2}\%$ (B) $17\frac{3}{4}\%$

(C) $17\frac{1}{2}\%$ (D) 17%

48. The aggregate pass percentage during the three years was—

(A) $82\frac{44}{113}\%$ (B) $82\frac{55}{113}\%$

(C) $80\frac{60}{113}\%$ (D) $77\frac{29}{113}\%$

49. The percentage of students passed in 1st division in 1982 was—

(A) 20% (B) 34%

(C) $14\frac{2}{7}\%$ (D) $11\frac{13}{17}\%$

50. The percentage of students passed in 1982 was—

(A) 65% (B) 70%

(C) $74\frac{2}{17}\%$ (D) $82\frac{6}{17}\%$

For V. H. Candidates Only

42. The income from a bus in every trip is ₹ 1,000. If the bus fare increases by 40% and the number of passengers decreases by 20%, then the income in each trip will be—

(A) ₹ 1,680 (B) ₹ 720

(C) ₹ 1,120 (D) ₹ 1,000

43. A boat travelled from A to B and back to A from B in 5 hours. If the speed of the boat in still water and speed of the stream be 7·5 km/hr and 1·5 km/hr respec-

tively, then the distance between A and B is—

(A) 6 km (B) 9 km

(C) 18 km (D) 12 km

44. The value of $\dfrac{(625)^{0.25} \times (25)^{2-6}}{(625)^{0.75} \times (5)^{1.2}}$ is—

(A) 25 (B) 30

(C) 50 (D) 45

45. 5184 has to be divided by n to make it a perfect cube number greater than 1. The largest possible value of n is—

(A) 648 (B) 81

(C) 64 (D) 243

46. A and B enter into a partnership with capital as 4 : 5. At the end of 9 months, A withdraws. If the share of annual profits be in the ratio 9 : 10, then money of B remained invested for—

(A) 10 month

(B) 8 month

(C) 7 month

(D) 6 month

47. If $\sin 19° = a$, $\sin 71° = b$, then the value of $a^2 + b^2$ is—

(A) 0 (B) 1

(C) 2 (D) 3

48. The difference between simple interest and compound interest, at the same rate, for ₹ 5,000 for 2 years is ₹ 72. The rate of interest per cent per annum is—

(A) 10 (B) 12

(C) 6 (D) 8

49. Ravi bought a TV with 20% discount on labelled price. Had he bought it with 25% discount he would have saved ₹ 500. At what price did he buy the TV ?

(A) ₹ 5,000 (B) ₹ 10,000

(C) ₹ 12,000 (D) ₹ 16,000

50. The length of a hall is 20 m and the width is 16 m. The sum of areas of the floor and the roof is equal to the sum of the areas of four walls. The volume of the hall is approximately—

(A) 2840·4 m³

(B) 2846·2 m³

(C) 2844·4 m³

(D) 2845·3 m³