Q 1. There are three runners Aadit, Badal and Chahel at the same point. Aadit starts running at a speed of 6 m/s from a point. After 10 seconds, Badal starts running behind Aadit at a speed of 8 m/s. After 5 more seconds, Chahel also starts running behind Badal at a speed of 10 m/s. What is the distance (in m) between Chahel and Badal when Chahel catches Aadit if all of them are running along a straight line?

1) 45

2) 5

3) 10

4) 15

Q 2. Three circles C1, C2 and C3 are tangent to the same straight line and to each other. If the larger circles C1 and C2 have equal radii of 8 cm, then what is the diameter (in cm) of the smaller circle C3?

1) 2

2) 8

3) 6

4) 4

Q 3. Four friends bought certain number of candies in the ratio 2 : 3 : 5 : 6. If one of the friends bought exactly 30 candies, then which of the following CAN be sum of the total number of candies bought by any three of the friends?

1) 85

2) 120

3) 78

4) 160

Q 4. The students in class X of a school are divided into three sections A, B and C. They wrote a Talent Search Test. The average scores of A, B and C in that test were 67, 83 and 95 respectively. If the average score of the students of sections A and B together is 73 and that of sections B and C together is 89, then find the average score of the students of sections A and C together.

1) 72.5

2) 67.5

3) 77.5

4) 83.5

Q 5. If a cube of edge 8 cm is cut into as many 1 cm cubes as possible, then the surface area of the lager cube will be what percent more or less than the sum of the surface areas of the smaller cubes?

1) 2.5%

2) 87.5%

3) 25%

4) 75%

Q 6. What is the value of x, if $\log_x (\log_{108} (\sqrt{3} + \sqrt{75})) = -1/2$?

Q 7. A saree is marked at 100% above the cost price. What is the maximum number of successive discounts of 20% each, which can be offered, before selling the saree such that a loss is not incurred?

Q 8. If in rectangle ABCD, AD = 2√3 cm, point P is on AB, and DB and DP trisect ∠ADC, then the perimeter (in cm) of ΔBDP is

1) 4(1 + 2√3)

2) 2(1 + 2√3)

3) 4(2 + √3)

4) 2(4 + √3)

Q 9.

For how many integral values of x, such that |x| < 5, the inequality $\left(\dfrac{1}{3}\right)^{\sqrt{x+4}} > \left(\dfrac{1}{3}\right)^{\sqrt{x^2+3x+4}}$ is satisfied?

1) 8

2) 7

3) 6

4) 5

Q 10. A swimming pool can be filled by two pipes A and B in 4 hours and 6 hours respectively. Both pipes are opened together for a certain time but due to some clogging in the pipes, only 7/12th of the full quantity of water flows through pipe A and only 5/8th through pipe B. The clogs are detected and removed. The remaining part of the pool is filled in one hour after repair. How long was it before the clogs were removed?

1) 2 hours 40 minutes

2) 1 hour 40 minutes

3) 1 hour 20 minutes

4) 2 hours 20 minutes

Q 11.

Let m and n be the roots of equation $ax^2 + bx + c = 0$, $a \neq 0$. If a, b, c are in AP and $\dfrac{1}{m} + \dfrac{1}{n} = 2$, then $|m - n|$ is equal to

1) $\dfrac{\sqrt{3}}{5}$

2) $\dfrac{2\sqrt{6}}{5}$

3) $\dfrac{2\sqrt{3}}{5}$

4) $\dfrac{\sqrt{6}}{5}$

Q 12. In a test, there are 100 questions divided into three sections I, II and III each containing at least one question. Each question in section I, II and III carries 1 mark, 2 marks, and 3 marks respectively. If questions in section I together carry at least 60% of the total marks and section II contains 23 questions, then how many question(s) is/are there in section III?

1) 1

2) 2

3) 3

4) More than 3

Q 13. A trader spends Rs.1,680 to purchase two varieties of rice. If the selling price of each variety of rice was Rs.20 per kg more than the cost price, then the profit would be Rs.1,120. If the cost price of the first variety is Rs.8 less than the second one and the quantities purchased are in the ratio 3 : 1, what is the cost price (in Rs.) of 4 kg of the second variety of rice?

1) 80

2) 112

3) 144

4) 160

Q 14.

If $\sqrt{1+\dfrac{1}{1^2}+\dfrac{1}{2^2}} + \sqrt{1+\dfrac{1}{2^2}+\dfrac{1}{3^2}} + \sqrt{1+\dfrac{1}{3^2}+\dfrac{1}{4^2}} + \ldots + \sqrt{1+\dfrac{1}{19^2}+\dfrac{1}{20^2}} = k - \dfrac{1}{k}$ where k is a natural number, then the value of k is

Q 15. If 3 < x < 200, find the sum of all possible values of x such that x/3 is the square of a prime number.

1) 114

2) 261

3) 453

4) 195

Q 16. A man rows 15 km in 1 hour in still water and in 90 minutes against the current. Find the time (in hours) taken by him to row 40 km with the current and return to the starting point.

Q 17. In how many ways can 12 different chocolates be divided equally among three identical boxes?

1) $12!/(4!)^3$

2) $12!/3 \times 4!$

3) $12! \times 4!/3$

4) $12! \times (4!)^3$

Q 18. For k ≠ 1, $(1 - k)(1 + 2x + 4x^2 + 8x^3 + 16x^4 + 32x^5) = 1 - k^6$, then what is the value of k/x?

Q 19. A alone can complete a job in 18 days and B alone in 27 days. If C takes five-sixth the time that A and B together take to complete the job, how long (in days) will A and C together take to complete the same work?

Q 20. How many natural numbers not exceeding 2022 are multiples of 3 or 5 but not 7?

Q 21.

For $0 < x < 1$, $f(x) = \dfrac{4^x}{4^x + 2}$, then the value of $f\left(\dfrac{1}{40}\right) + f\left(\dfrac{2}{40}\right) + f\left(\dfrac{3}{40}\right) + \ldots + f\left(\dfrac{39}{40}\right) - f\left(\dfrac{1}{2}\right)$ is:

1) 16

2) 21

3) 19

4) 25

Q 22. A money lender lends money under Scheme I at the rate of 30% per annum, where interest is compounded every four months and under Scheme II at the rate of 25% per annum compounded annually. If Ishan borrows Rs.50,000 each under Schemes I and II, then find the total interest (in Rs.) accrued at the end of one year.