SECTION II
Sub-Sections II-A: Number of Questions = 20

Note: Questions 39 to 58 carry one mark each.

Directions for Questions 39 to 55: Answer the questions independently of each other.

39. A father and his son are waiting at a bus stop in the evening. There is a lamp post behind them. The lamp post, the father and his son stand on the same straight line. The father observes that the shadows of his head and his son's head are incident at the same point on the ground. If the heights of the lamp post, the father and his son are 6 metres, 1.8 metres and 0.9 metres respectively, and the father is standing 2.1 metres away from the post, then how far (in metres) is the son standing from his father?

    1. 0.9   2. 0.75   3. 0.6   4. 0.45
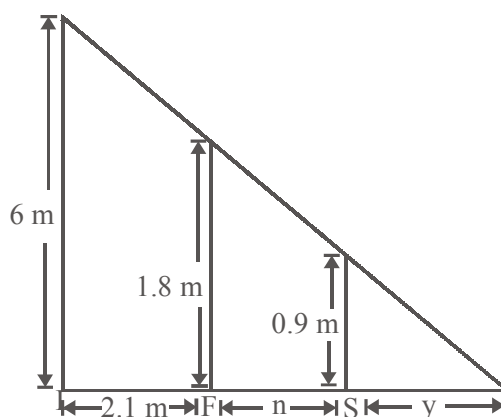
Sol. Let F stands for father and S stands for son.

$$\frac{1.8}{0.9} = \frac{n+y}{y} \Rightarrow n + y = 2y$$

$$\frac{6}{1.8} = \frac{2.1+n+y}{n+y} \Rightarrow \frac{10}{3} = \frac{2.1+2n}{2n}$$

20n = 6.3 + 6n

$\Rightarrow$ 14n = 6.3 $\Rightarrow$ n = 0.45. **Ans.(4).**

A very easy question, lots of similar questions have been solved in PT classrooms.

40. A milkman mixes 20 litres of water with 80 litres of milk. After selling one-fourth of this mixture, he adds water to replenish the quantity that he has sold. What is the current proportion of water to milk?

    1. 2:3   2. 1:2   3. 1:3   4. 3:4

Sol.

	Water	Milk
Initially	20	80
After Selling one-fourth	(20 – 5) = 15	(80 – 20) = 60
After adding water to replenish the quantity	40	60

Required ratio = 2 : 3. **Ans.(1).**

A very easy question, Verbatim question can be found in practice exercise # 01, of Mixtures and alligation chapter in MA theory book # 02.

41. Karan and Arjun run a 100-metre race, where Karan beats Arjun by 10 metres. To do a favour to Arjun, Karan starts 10 metres behind the starting line in a second 100-metre race. They both run at their earlier speeds. Which of the following is true in connection with the second race?

    1. Karan and Arjun reach the finishing line simultaneously.
    2. Arjun beats Karan by 1 metre.
    3. Arjun beats Karan by 11 metres.
    4. Karan beats Arjun by 1 metre.

Sol. If Karan runs 100m then Arjun runs 90 metres. So, their speeds are in the ratio of 10 : 9.

Now, if Karan runs 110 m then Arjun runs 99m. **Ans.(4)**

A very easy question, should have been done . Many questions of similar type are provided in PT 's study material

42. *N* persons stand on the circumference of a circle at distinct points. Each possible pair of persons, not standing next to each other, sings a two-minute song one pair after the other. If the total time taken for singing is 28 minutes, what is *N*?

    1. 5   2. 7   3. 9   4. None of the above

Sol. Total time for singing is 28 min. Each pair sings the song for two min.

i.e. number of pairs = 14

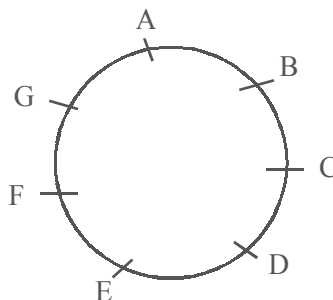Now going with options : option (2) – 7

Possible pairs are

AC, BD, CE, DF, EG

AD, BE, CF, DG

AE, BF, CG

AF, BG

Total value of N is 7. **Ans.(2)**

43. If the sum of the first 11 terms of an arithmetic progression equals that of the first 19 terms, then what is the sum of the first 30 terms?

    1. 0   2. −1   3. 1   4. Not unique

Sol. $\dfrac{11}{2} (2a + 10d) = \dfrac{19}{2} (2a + 18d)$

$22a + 110d = 38a + 342d \Rightarrow 16a + 232d = 0 \Rightarrow 2a + 29d = 0.$ **Ans.(1)**

44. If a man cycles at 10 km/hr, then he arrives at a certain place at 1 p.m. If he cycles at 15 km/hr, he will arrive at the same place at 11 a.m. At what speed must he cycle to get there at noon?

    1. 11 km/hr   2. 12 km/hr   3. 13 km/hr   4. 14 km/hr

Sol. Let the distance be 'd' kms, then by the condition given in question

$$\frac{d}{10} - \frac{d}{15} = 2 \Rightarrow d = 60 \text{ km.}$$

Let he cycle at the rate of x kmph to reach at the place at noon.

then, $\frac{60}{10} - \frac{60}{x} = 1 \Rightarrow \frac{60}{x} = 5 \Rightarrow x = 12$ kmph. **Ans.(2)**

Remember solving a similar question in PracCat # 06 " Two skatters meeting at a point.......".PT students might have directly answered this questions.

45. On January 1, 2004 two new societies, S_1 and S_2, are formed, each with *n* members. On the first day of each subsequent month, S_1 adds *b* members while S_2 multiplies its current number of members by a constant factor *r*. Both the societies have the same number of members on July 2, 2004. If *b* = 10.5*n*, what is the value of *r*?

    1. 2.0   2. 1.9   3. 1.8   4. 1.7

Sol. By the condition given in question

$n + 6b = n \times r^6$

$n + 6 \times 10.5 \times n = n \times r^6$

$n + 63n = n \times r^6$

$64n = n \times r^6$

$r^6 = 64 \Rightarrow r = 2.$ **Ans.(1)**

A easy question, very similar questions can be found in practice exercise # 02 of progressions in PT's material.

46. The total number of integer pairs (x, y) satisfying the equation $x + y = xy$ is

    1. 0   2. 1   3. 2   4. None of the above

Sol. Only two pairs satisfying the equation are (0, 0) and (2, 2). **Ans.(3)**

A very simple question, asked already in PracCat's