Solutions for Part – B
(DATA SUFFICIENCY)

Exercise – 11

Solutions for questions 1 to 25:

1. From (1), the code for "is it" is "po lo".
$\Rightarrow$ the code for "who" is "so".
$\therefore$ (1) is sufficient.
From (2), the code of "who" is "so".
$\therefore$ (2) is sufficient. Choice (C)

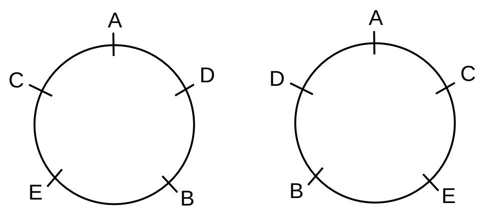
2. From (1), MII may or may not be an IVY league college as Ivy league colleges have good placements but the colleges which have good placements may or may not be IVY league colleges.
$\therefore$ (1) is not sufficient
From (2), as MII has university affiliation, it is not an autonomous college and hence it is not an IVY league college.
$\therefore$ (2) is sufficient. Choice (B)

3. Given a natural number N = (3d) K + 14 ------ (1)
(1) alone gives N = (2d) l + 9 ------- (2)
$\Rightarrow$ d(2l – 3K) = 5 (from (2) – (1))
$\Rightarrow$ d = 5

Hence when N is divided by 5, remainder = remainder of $\frac{14}{5}$ = 4
(2) alone gives d(2l – 3K) = 10
$\Rightarrow$ d = 2, 5, or 10.
But d > 4 $\Rightarrow$ d = 5 or 10 in either case remainder will be 4.
Choice (C)

4. From statement (1) alone:
$2x + y + z = 7 \rightarrow (1)$
$x + 2y + z = 8 \rightarrow (2)$
$3x + y + z = 8 \rightarrow (3)$
$(2) = (3) \Rightarrow x + 2y + z = 3x + y + z$
$\Rightarrow x - 2y = 0 \Rightarrow x = 2y$
$\therefore$ Substituting x = 2y in equations (1) and (2)
$2(2y) + y + x = 7 = 5y + z = 7 \rightarrow (4)$
$2x + 2y + z = 8$
$4y + z = 8 \rightarrow (5)$
solving (4) and (5)
$y = -1, x = -2$
and $2(-2) -1 + z = 7 \Rightarrow z = 12$
$\therefore$ Statement (1) alone is sufficient.
From statement (2) alone:
$(x -1)^2 + (y - 2)^2 + (z - 3)^2 = 0$
$\Rightarrow$ x = 1, y = 2 and z = 3
$\therefore$ Statement (2) alone is sufficient. Choice (C)

5. Using (1) alone: we have the following possibilities.



Using (2) alone: we can't say who sits to the immediate right of A. Combining both, we see that C is to the immediate right of A. Choice (D)

6. The data is tabulated below.

	Pavan	Bharath
Groceries	15x	30y
House rent	25x	40y
Education	35x	20y

Is 30y > 35x?
Using (1) alone
25x < 20y.
$\Rightarrow$ 37.5x < 30y
$\Rightarrow$ 30y > 35x

Using (2) alone
20y > 2 (15)x = 30x.
$\Rightarrow$ 30y > 45x.
$\Rightarrow$ 30y > 35x.
We can answer the question from either statement alone.
Choice (C)

7. From one instant when the two hands coincide to the next instant they do so, every angle $\theta°$ (where $0 \le \theta < 360°$) occurs exactly once. The angle is 210° just once between 12:00 noon and 1:00 p.m. and just once between 1:00 p.m. and 2:00 p.m.
$\therefore$ The question can be answered from either statement alone. Choice (C)

8. Let the perimeter of the triangle be p.
As the largest side is 7 cm, each of the other two sides will be less than 7 cm. Sum of other two sides > 7 cm.
Hence perimeter of triangle > 14 cm. Perimeter of triangle < 21 cm.
Using statement (1), perimeter of the triangle is greater than or equal to 17 cm. Hence, it can be 17 or 19 cm.
Statement (1) alone is not sufficient.
Using statement (2), if the perimeter is less than 17 cm i.e., 13 cm or 11 cm, the sum of the other two sides is 6 cm or less than 6 cm (which is less than 7 cm). This does not satisfy the condition of a triangle. Hence the only possibility of the perimeter is 17 cm. Statement (2) alone is sufficient.
Choice (B)

9. Let the heights of A, B, C and D be a, b, c and d.
Using statement (1) alone, a + b < c + d.
As a > c, d > b must hold true.
As a > d, c > b must hold true.
Hence, B is the shortest.
$\therefore$Statement (1) alone is sufficient.

Using statement (2), $4c < 3b \Rightarrow \frac{b}{c} > \frac{4}{3}$

Hence, B is taller than C. Either D or C is the shortest.
Statement (2) alone is not sufficient.
Choice (A)

10. Let the four-digit number X be abcd.
Using (1) alone: d = 2a. Hence d is even. As none of the digits is zero and abcd is a perfect square. d = 4 or 6.
Hence a = 2 or 3. The perfect squares starting with 2 and ending with 4 are 2304 and 2704. As c = 0, abcd cannot assume any of these values. The only perfect square stating with 3 and ending with 6 is 3136. All digits are non-zero.
Hence abcd = 3136.
Statement (1) alone is sufficient.

Using (2) alone: $c = \frac{1}{3}(a + d) \Rightarrow 3c = a + d$
a + c = d ------- (1)
Adding the above two equations.
a + 4c = a + 2d
$\Rightarrow$ d = 2c -------- (2).
Also d = 6b. As $a \ne 0$, $d \ne 0$.
Hence $0 < d \le 9$. Thus $0 < 6b \le 9$.
Hence $0 < b \le 3/2$.
As b is an integer, b =1.
Hence d = 6. From (2), c = 3.
Hence from (1), a = 3. abcd is 3136.
Statement (2) alone is sufficient.
Hence either statement is sufficient. Choice (C)

11. Let the work done by a man a woman and a boy in a day be m, w and b units.
Using (1) alone, 2 men, 4 women and 4 boys can complete the work in 3 days i.e., 3 (2m + 4w + 4b).
= 6m + 12w + 12 b can complete the work in one day.
Similarly 4 men, 3 women and 6 boys complete (4m + 3w + 6b) 2 units in 2 days. As the work done by both the groups are the same,
3(2m + 4w + 4b) = (4m + 3w + 6b) = 2
$\Rightarrow$ 2m = 3w.
As we know the efficiency of a man in terms of a woman's the question can be answered.
Hence, statement (1) alone is sufficient.
Using (1) alone: 6m + 4b = 3 (w + 2m)

$\Rightarrow w = \frac{4}{3}b$ ----------- (1)

16m + 12b = 4 (5m)
$\Rightarrow$ m = 3b ----------(2)
From (1) and (2), we can work out the ratio of efficiencies of man and woman and then the question can be answered.
Hence, statement (2) alone is sufficient.
Hence, either statement alone is sufficient.
Choice (C)

12. As b + c is even, b and c are either both odd or both even.
Using (1) alone: as ab + cd is even, both ab and cd are of same parity.
If ab and cd are odd, a, b, c and d, all have to be odd. In this case ac + bd is even. If ab and cd are even, at least one of a and b must be even and at least one of c and d must be even. If both b and c are even, a and d may have any parity.
In both cases ac + bd is even.
Statement (1) alone is sufficient.
Using (2) alone: as ad + bc are of opposite parity, if b and c are odd, bc is odd and ad would be even.
If both a and d are of opposite parity, ac + bd would be odd.
If b and c are even, ac + bd is always even.
Hence ac + bd does not have a unique parity.
Statement (2) alone is not sufficient. Choice (A)

13. Neither of the statements alone is sufficient as each has the information about only one of B_1 and B_9.
From (1) and (2), if books B_1 and B_9 are in the same row or column, then B_1 is heavier than B_9 else we have if B_2 and B_3 are in the same row as B_1.
$B_1 > B_2$ and $B_1 > B_3$
As B_9 is the lightest in its column and it must be in the same column as B_2 or B_3.
$B_1 > B_2 > B_9$ or $B_1 > B_3 > B_9$
$B_1 > B_9$
In any case $B_1 > B_9$
Combining both (1) and (2), we can answer the question.
Choice (D)

14. From (1), one of A and D is odd and the other is even.
From (2), all the three given persons – B, C, D have either odd or even scores.
$\Rightarrow$ A and B have odd and even scores (in any order).
$\Rightarrow$ Difference is odd.
$\therefore$ (2) alone is sufficient. Choice (B)

15. Both Akash and Sagar sell n notebooks.
Let the selling price of Akash's and sagar's notebooks be s_1 and s_2 respectively.
Akash's profit = ms_1

His fractional profit = $\frac{ms_1}{(n-m)s_1} = \frac{m}{n-m}$.

Sagar's loss = ps_2

His fractional loss = $\frac{ps_2}{(n+p)s_2} = \frac{p}{n+p}$

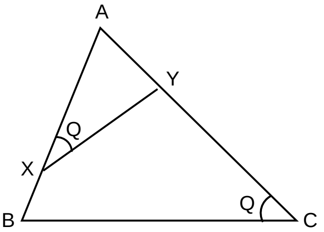
Given $\frac{m}{n-m} = \frac{p}{n+p}$

$\Rightarrow \frac{mn}{n-m} = p\left(1 - \frac{m}{n-m}\right) = p\frac{(n-2m)}{n-m} \Rightarrow p = \frac{mn}{n-2m}$

Using both statements, we get $n - \frac{1000}{n} = 90$.

$\Rightarrow n^2 - 90n - 1000 = 0$
$\Rightarrow$ (n – 100) (n + 10) = 0
$\Rightarrow$ n = 100 or n = –10.
As n > 0, n = 100 and m = 10
$\therefore p = \frac{mn}{n-2m} = \frac{10(100)}{100-2(10)} = \frac{1000}{80} = 12.5$.
Choice (D)

16.



Using statement (1) alone, we can't say what AY is.
Using statement (2) alone, AY can be anything. (We can shift XY parallel to itself. AY would change without $\angle AXY$ changing. However, we get $\Delta AXY \equiv \Delta ACB$.
($\because$ Two angles of the first triangle are equal to the corresponding angles of the other triangle)
$\therefore \frac{AX}{AC} = \frac{AY}{AB}$
Statement (2) alone is not sufficient.
Combining both the statement.
$\Rightarrow AY = \frac{AX}{AC}(AB) = 2.5\left(\frac{3}{4}\right)$ Choice (D)

17. The data is tabulated below.
p e s
2 3 5 37 – (a)
3 –5 7 34 – (I)
0 19 1 T We assume that it is possible to obtain T, by multiplying (a) by p
(I) by q and adding.
i.e., 2p + 3q = 0 $\Rightarrow$ 6p + 9q = 0
3p – 5q = 19 $\Rightarrow$ 6p – 10q = 38
$\Rightarrow$ q = –2 and p = 3.
If we consider the coefficient of s,
5p + 7q = 5(3) + 7(–2) = 1
which matches the required coefficient.
$\therefore$ T = 3(37) – 2(34) = 43
If we had used the equation of statement (2) we would not get the value of T.
The question can be answered from (1), but not from (2).
Choice (A)

18. Let the distances run by A, B, C and D be a, b, c and d when the winner finishes the race.
Using statement (1) alone,
$\frac{a+b+c}{3} = \frac{a+c}{2}$
2a + 2b + 2c = 3a + 3c
$\Rightarrow b = \frac{a+c}{2}$
Hence b is the average of a and c. hence B cannot be the winner. Either A or C or D can be the winner.
Statement (1) alone is insufficient.
Using statement (2) alone,
$\frac{a+d}{2} = \frac{a+b+d}{3} + \frac{a+b}{2}$

$\frac{d-b}{2} = \frac{a+b+d}{3}$
3d – 3b = 2a + 2b + 2d
$\Rightarrow$ d = 2a + 5b
Hence as b > 0, d must be more than 2a.
Hence A is not the winner. Either b or c or d is the winner.
Statement (2) alone is insufficient.
Using both statements, as c cannot be more than 2b whereas d is more than 5b, D is the winner.
Choice (D)

19. Using statement (1), as $a^4 > a^2$, $\infty < a < -1$ or $1 < a < \infty$.
As $a^3 > a^5$, $-\infty < a < -1$ or $0 < a < 1$
As both are true $-\infty$, $a < -1$.
As $a^4 > a^2$, $\sqrt[3]{a^2} < \sqrt[3]{a^4}$
Statement (1) alone is sufficient.
Using statement (2), as $a^2 > a^3$, $-\infty < a < -1$
Or $-1 < a < 0$ or $o < a < 1$.
As $a^7 > a^5$, $-\infty < a < -1$ or $1 < a < \infty$
As both are true, $-\infty < a < -1$. as $a^4 > a^2$, $\sqrt[3]{a^2} < \sqrt[3]{a^4}$
Statement (2) alone is sufficient.
Hence either statement is sufficient.
Choice (C)

20. From (1), we get the following arrangements
A __ __ B __ C __
or
__ A __ __ B __ C
∴ Either B or one among D, E, F and G is at the middle of the row.
∴ (1) is not sufficient.
From (2), there are many possibilities
By combining both the statements, D is adjacent to neither A nor C and also he is not at the middle of the row.
The only possibility is as follows
A __ DB __ C __
∴ B is at the middle of the row. Choice (D)

21. Neither of the statements alone is sufficient as each has no information about the position of Rahul.
From (1) and (2), Anil is among the first 5 students.
Rahul is among the first 9 students.
Also, 60% of 50 i.e., 30 students are girls.
As Vindhya is among the last 50% of the girls, at least 15 girls are standing ahead of Vindhya.
Rahul is ahead of Vindhya.
(1) and (2) together are sufficient. Choice (D)

22. From (1), as A's only sister-in-law's only sister-in-law is B, A cannot be a female.
A cannot be a sister of B.
(1) alone is sufficient.
From (2), A's mother's only son's wife's only sister-in-law can be A's sister (when A is male) or A's mother's daughter -in-law's brother's wife.
In any case, A cannot be a sister of B.
(2) alone is sufficient. Choice (C)

23. Given A > B and, A > C
From (1), since D is not the shortest and A is among top three tallest person, we have the only possibility as
–, A, –, D, –
As A > B and A > C, E must be the tallest.
(1) alone is sufficient.
From (2), E must be the tallest.
(2) alone is sufficient. Choice (C)

24. Let the number be a b c
a b c = 138 $\left(\frac{a+b+c}{3}\right)$ = 100a + 10 b + c = 46(a + b + c)
$\Rightarrow$ 6a = 4b + 5c ------- (1)
c is divisible by 2. let c = 2k
Where k is an integer. $c \le 9 \Rightarrow k \le 4.5$ ------- (2)
(1) $\Rightarrow$ 3a = 2b + 5k ------- (2)
Using statement (1),
B is divisible by 3.
(2) – k is divisible by 3.
k = 0 or 3
c = 0 or 6
c never exceeds 6.
(1) is sufficient.
Using statement (2), c leaves a remainder of 2 when divided by 4.
c = 2 or 6
c never exceeds 6
(2) is sufficient. Either statement alone is sufficient
Choice (C)

25. Using statement (1), Anand's age when he got married = $\sqrt{x}$. His year of birth = x – $\sqrt{x}$.
1800 < x – $\sqrt{x}$ < 1900 ------- (1)
If x = 43^2 or 44^2, (1) is satisfied
x is not unique. (1) is not sufficient.
Using statement (2), Ashok's age when he got married = $\sqrt{x}$. His year of marriage = x + $\sqrt{x}$.
1800 < x + $\sqrt{x}$ < 1900 ------- (2)
If x = 42^2 or 43^2, (2) is satisfied.
x is not unique. (2) is not sufficient.
Using both statements, x = 43^2
Both statements are required to answer the question.
Choice (D)

Exercise – 12

Solutions for questions 1 to 25:

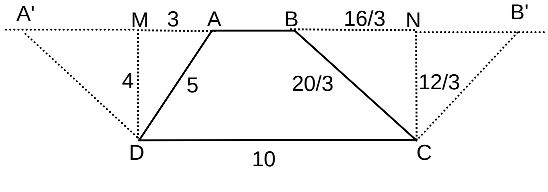
1. Using (1) alone: either 1, 3 or 5 of the six numbers – say a, b, c, d, e, f – are odd.
The possibilities are listed below.

Odd	Even	Σab
a	b, c, d, e, f	Even
a, b, c	d, e, f	Odd
a, b, c, d, e	f	Even

We see that Σab is even, if there are 1 or 5 odd numbers, but odd if there are 3 odd numbers.
Using (2) in combination.
We can conclude that Σab is even. We can answer the question by using both the statements. Choice (C)

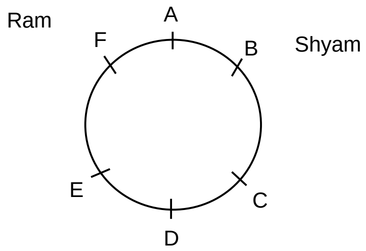
2. Using (1) alone: either the specified year or the next year could be a leap year.
Using (2) alone: we get the same conclusion as above.
We can't answer the question even by combining both the statements. Choice (D)

3. From (1) alone (and ignoring the condition AB < CD), we have the following possibilities.



AB could be 10 + 3 + 16/3 = 55/3
Or 10 + 3 – 16/3 = 23/3
Or 10 – 3 + 16/3 = 37/3
Or 10 – 3 – 16/3 = 5/3
As AB < CD, the possibilities are 23/3 or 5/3.
We need (2) also to decide that AB = 23/3. Choice (C)

4.



Suppose both started at A as shown above. Suppose the 1st, 2nd, 3rd, 4th and 5th and 6th meeting points are denoted by B, C, D, E, F and A respectively. Distances travelled by Ram and Shyam when they met for the first time are $\frac{5}{5+1}$ (1200) = 1000 m and $\frac{1}{5+1}$ (1200) = 200m respectively. AFEDCB = $\frac{5}{5+1}$ (1200) = 1000 m and AB = $\frac{1}{5+1}$ (1200) = 200 m

When both met for the second time, Ram would have travelled BC = $\frac{1}{5+1}$ (1200) = 200 m and Shyam would have travelled BAFEDC = $\frac{5}{5+1}$ (1200) = 1000 m respectively.

Similarly by considering the distances travelled by either Ram or Shyam for the further meetings it can be shown that the third, fourth, fifth and sixth meetings occur at D, E, F and A respectively and DE = EF = AF = 200 m. The further meetings points would be the same as the previous 6 meetings.

Using statement (1), the possible values of k are 3, 9, 15…. For each of these values of k, the meeting point would be the same i.e. is D. (1) is sufficient.

Using statement (2), if k = 3, meeting point is D. If k = 6, meeting point is A. So, meeting point is not unique. (2) is not sufficient. Choice (A)

5. By eliminating x, we have y + 5z = 11
Statement (2) does not help
Using statement (1), (y, z) could be (11, 0) — (1)
or (1, 2) — (2)
or (6, 1) — (3)
However, (1), (3) do not satisfy the second equation. Hence, using (1) alone, we have, (x, y, z) = (0, 1, 2) as a unique solution. Choice (A)

6. From statement (1) alone, we get
(i) C < A < B
(ii) C < B < A
therefore statement (1) alone is not sufficient.
From statement (2) alone, we get only one possibility.
(i) B > A > C ∴C won
Statement (2) alone is sufficient.
Choice (B)

7. The data can be tabulated as show below.

	A	B	C	
m				
w	a	25 – a		
c				
				80

From (1)

	A	B	C	
m				
w	a	25 – a		
c				
	20	30	30	80

From this, we can't get the number of women in C.
From (2),

	A	B	C	
m				25
w	a	25 – a	10	35
c				20
				80

The number of women in C is 10. We can answer the question from (2), but not (1). Choice (B)

8. Let the numbers be a, b, c and d with a > b > c > d
$\frac{a+b+c+d}{4}$ = 15 i.e., a + b + c + d = 60
Using statement (1), 0 or 1 or 2 of the prime numbers exceed 5.
If 2 of the prime numbers exceed 5, there are at least two possibilities -: a = 41, b = 11, c = 5 and d = 3 and a = 29, b = 23, c = 5 and d = 3. The greatest i.e., a is not unique. (1) is not sufficient.

Using statement (2), 2 or 3 or all of the prime numbers exceed 5. If 2 of the prime numbers exceed 5, there are at least two possibilities as shown in statement (1). (2) is not sufficient.

Using both statements, two of the prime numbers exceed 5. Both statements even when taken together are not sufficient as shown above. Choice (D)

9. Let (x – 2) = A, y – 3 = B
Using (1) alone
If x > 4, A > 2
$\Rightarrow A^2 + B^2 > 4$
Hence (1) alone is sufficient.
Using (2) alone, y < 2 ⇒ B < –1
$\Rightarrow A^2 + B^2 > 1$. But we do not know if $A^2 + B^2 > 4$. Hence, (2) alone is not sufficient. Choice (A)

10. From (1), C and D must have left one after the other and hence A left the party at fourth position and C and D left in first and second positions in any order.
∴ B left third.
∴ (1) alone is sufficient.
From (2), C can be second or fourth person to leave.
There are many possibilities. Choice (A)

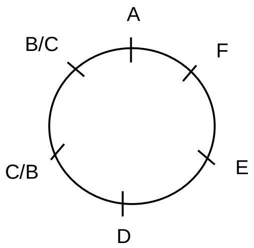
11. The population of X, Y in the three years are tabulated below.

	2002	2003	2004
X	x	1.05x	(1.1) (1.05)x
Y	y	1.1y	(1.05) (1.1)y

From (1), the difference in populations of X, Y in 2004 is (1.1) (1.05) (x – y) = (1.1) (1.05) (50,000)
From (2), 1.05x = 1.1y or x = ky (where k is a known constant). The difference in the populations in 2005 in (1.1) (1.05) (x – y)
= (1.1) (1.05) (k – 1)y. But we don't know y. We can answer the question from (1) but not from (2).
Choice (A)

12. The given statement is of the form
If p and q then r. The implications are:
(1) p and q $\Rightarrow$ r.
(2) ~r $\Rightarrow$ ~ p or ~ q
From (1), we know that q is true but there is no data regarding p hence A alone is not sufficient.
From (2) we know that r happens but there is no implication starting with r hence the given question cannot be answered.
By combining (1) and (2), we only know that p and r are true but there is no data regarding 'q' hence the question cannot be answered. Choice (D)

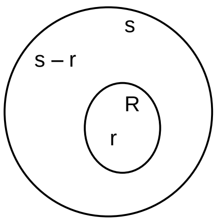
13. Let each person be denoted by the first letter of his name. Neither of the statements, when taken alone, is sufficient as each gives information about only two persons.
Even by combining both the statements, we get the following possibilities.



$\therefore$ F and either B or C are adjacent to A. Choice (D)

14. From (1), X can be a liar or a truth teller.
From (2), as there is only one truth teller, both Y and Z are liars.
$\Rightarrow$ X is the truth teller.
$\therefore$ (2) alone is sufficient. Choice (B)

15. The date is represented in the Venn diagram below.



The number of people who can align Rubik's Cube is r the number who can solve Sam Loyd's puzzle is s and the number who can't do either is 25 – s
From statement (1), s = 13
From statement (2), r + 25 – s = 23
Combing both r = 11.
We can answer the question, only by combining both statements. Choice (C)

16. From (1), we can say that this month has 7n + 1 days, where the only possibility is 29 days i.e., February.
$\therefore$ (1) alone is sufficient.
From (2), the number of odd days in this month and next month combined is 4.
The number of odd days is (1, 3) or (2, 2) (which is not possible) or (3, 1).
$\therefore$ This month is either January or February.
Choice (A)

17. Statement (1) alone : We get $\frac{24}{C-W} = 3 \times \frac{24}{C+W}$
(where C and W are the speeds of the cycle and wind respectively)
But we do not know both C and W.
Using statement (2) alone we know that C – W = 3.
We require $\frac{24}{C-W}$
Hence, using statement (2) alone we can find the value of $\frac{24}{C-W}$ Choice (B)

18. From statement (1) alone we cannot find the required ratio, as the height of the cylindrical portion is not known.
From statement (2) alone
$\frac{2/3\ \pi r^3}{\pi r^3\, 2}$ = 1/12 Choice (B)

19. Let the three-digit number be abc. Hence a < b < c.
Let b = ar and c = ar^2
As the digits are in geometric progression the number can be 124 or 139 or 248 or 469.
Using statement (1), (a) (ar^2) is a perfect square. Hence, the number can still be 124 or 139 or 248 or 469. Hence statement (1) alone is not sufficient.
Using statement (2), (ar) (ar^2) is a perfect cube.
Hence the number can be 124 or 139. Statement (2) alone is not sufficient.
Combining both statements also, the number can be 124 or 139. Choice (D)

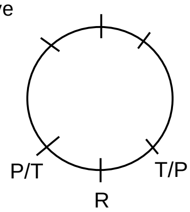
20. From statement (1), we can only say that, A, B and C are sitting together.
A alone is not sufficient.
From statement (2), we cannot answer the question, as we have only a little information.
From statements (1) and (2), as A and C are not adjacent each other, B is adjacent to both A and C, who cannot be adjacent to R.
B and Q are opposite each other.
Statements (1) and (2) together are sufficient.
Choice (C)

21. From (1) $a(2^2) + b(2) + c < 0$ and from (2)
$a(3^2) + b(3) + c > 0$
Since the quadratic expression is negative for x = 2 and positive for x = 3, it can be inferred that the curve of the expression $y = ax^2 + bx + c$ is crossing the x-axis (i.e., y = 0) at some point between x = 2 and x = 3. Hence the roots will be real.
$\therefore$Combining both statements, there is a real root between 2 and 3. Choice (C)

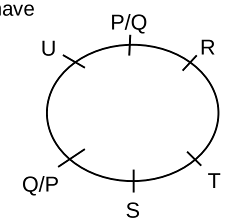
22. Given the tallest is the lightest ——— (1)
Using (1) alone : Height wise, A < B < D
Weight wise, C < B
Hence (1) alone is not sufficient.
Using (2) alone: nothing is mentioned about the names of any persons. Combining both statements also, we get that since C is not the heaviest, he is not the 3rd tallest and since D is definitely not the third tallest, he is not the heaviest. However, the shortest person may still be either A or C.
Choice (D)

23. From (1), we have:
P / R __ __ S ___ ____ R/P
As there is no information about Q, we cannot answer the question.
(1) alone is not sufficient.
For the same reason as above, (2) is not sufficient
From (1) and (2),
P / R V Q S U T R/P or P / R U T S Q V R/P
Statements (1) and (2) even when taken together are not sufficient. Choice (D)

24. From (1), we have



Given that, Q is neither next nor opposite P. Hence, Q must be opposite R.
(1) alone is sufficient.
From (2), we have



Either P or Q can be opposite R. (2) alone is not sufficient. Choice (A)

25. From statement (1) and the given information if P is a truth -teller, then R must also be a truthteller, which is contradicting with R's statement.
$\Rightarrow$ P is a liar.
Atleast one of Q and R is a liar.
But we cannot say who is a liar.
(1) alone is not sufficient.
From (2), if P is a truth-letter, then Q must be a truth teller.
$\Rightarrow$ R must be a liar, which is contradicting P's statement
$\Rightarrow$ P is a liar.
Q and R are truth-tellers.
This is the only possibility.
(2) alone is sufficient. Choice (B)

Exercise – 13

Solutions for questions 1 to 25:

1. Using statement (1) alone:
$3x(4x - 3)$ is prime, for which only x = 1 is possible. Hence, statement (1) alone is sufficient.
Using statement (2) alone, $x^2 - x^3$ is prime and $x = -1$ is the only solution. Hence, statement (2) alone is also sufficient. Choice (B)

2. Using statement (1) alone
$|D - G| = 6$
$\therefore$ D = 12, G = 6 or D = 18, G = 12 (or vice versa)
As $B = \frac{4}{3}C$, B = 16 or 12 or 8 (for each case C having 12 or 9 or 6 respectively)
$\therefore$B must be 8 (since 12 is already allotted to one of D or G)
Using statement (1) alone we can answer the question.
Using statement (2) alone, as $B = \frac{3}{2}C$, the different possibilities for B and C are

B	6	12	9	18
C	4	8	6	12

Also for D and F, the possibilities are

D	8	12	16
F	6	9	12

The final possibilities are

B	6	6	9	18
C	4	4	6	12
D	16	12	16	8
F	12	9	12	6

So using statement (2) alone, we cannot answer the question. Choice (A)

3. Using statement (1) alone we cannot conclude that Shivani fails every time the number of sections is more than 3.
$\therefore$ (1) alone is not sufficient.
Using (2) alone
Since AIMCAT601 has five sections $\Rightarrow$ Shivani failed to qualify. ($\because$ for *p* unless *q*, $\sim q \Rightarrow p$)
Statement (2) alone is sufficient. Choice (A)

4. Using statement (1) alone, Let us assume that the population of country Y four years ago was 100.
$\Rightarrow$ The population of country X was less than 80 (at most very close to 80)
In this year the population of country Y will be
$(1.08)^4 \times 100 \cong 136$
The maximum possible population of country X in this year could be $(1.12)^4 \times 80 \cong 128$.
Hence, from (1) alone we can determine that the population of country X is definitely not greater than the population of country Y. So, statement (1) alone is sufficient.
Using statement (2) alone, the comparison (i.e., of which is greater) of the present populations is not independent of the initial ratio (i.e. four years ago).
For example, consider that four years ago, population of country Y = 10% of that of country X. Then, clearly the present population of Y will be less than that of X. Again consider that four years ago, population of country Y = 79% of that of country X. Then, the present population of Y will be more than that of X. (This is since Y grows relatively faster than X). Hence statement (2) alone is not sufficient. Choice (A)

5. From statement (1) alone, since the speeds are in the ratio 5 : 3, for every 5 rounds of the first person, the second person covers 3 rounds.
$\therefore$ The first person (faster) has covered $1^2/_3$ times of the distance covered by the second person. Hence we get only the ratio of the distances but not the actual distance that the faster person has covered more than the slower person. Hence statement (1) alone is not sufficient.
Using statement (2) alone, we know that every time they meet, the faster person covers exactly one track length more than the slower person $\Rightarrow$ sixth time they meet he covers 6 x 500 = 3000 m more.
$\therefore$ Statement (2) alone is sufficient. Choice (A)

6. Consider the following four cases for m and n, satisfying statement (1).
(i) m = 1, n = 10
(ii) m = 2, n = 10
(iii) m = 1, n = 11
(iv) m = 2, n = 11
It can be observed that using statement (1) alone, the difference between m and n for the above cases can possibly be any value from 8, 9 and 10.
Hence statement (1) alone is not sufficient.
Using statement (2) alone, we can see that both case (i) and case (iii) satisfy statement (2) but the possible differences of m and n for these cases are 9 and 10 respectively.
Hence statement (2) alone is not sufficient.
Even by using both the statements, we still get two possible differences (i.e., 9 and 10) between m and n. Hence the question cannot be answered even by using both the statements together. Choice (D)

7. All together 12 games are played and a player can get a maximum of 16 points i.e., if he wins all the 8 games. From statement (1) alone, Let A win a_w games and lose a_l games. Then $a_w + a_l = 8$ and given that
$\Rightarrow 1 + \frac{2a_w - a_l}{2} = a_w \Rightarrow 2 + 2a_w - a_l = 2a_w \Rightarrow a_l = 2$
As $a_w = 6$, he must have got the highest number of points.
From statement (2) alone,
As C won 3 points more than B, he must have won one more match than B. As C won the least number of matches, B must have won the second least number of matches and A must have won the highest number of matches. Choice (B)

8. Let the number be abc. Let the common difference be d. a, b and c are in ascending order. d > 0 ----- (1)
a = b – d and c = b + d.
Using statement (1), (b – d) (b + (b + d)) + (b (b – d) + (b + d)) + (b + d) ((b – d) + b) = $\frac{7}{4}$ (b – d + b + b + d) (b) + d^2 i.e., $6b^2 - 2d^2 = \frac{7}{4}$ (3b) (b) + d^2)
i.e., $b^2 = 4d^2$
(1) $\Rightarrow b^2 > 0$ i.e., b, d > 0
b = 2d
(1) is sufficient.
Using statement (2),

(b – d) (b) + (b) (b + d) + (b + d) (b – d) = $\frac{30}{11}$

$$\left[\frac{(b-d+b)(b+b+d)(b+d+b-d)}{b}\right]$$

$3b^2 - d^2 = \frac{11}{30}$ (2) (2b – d) (2b+ d) = $\frac{11}{15}(4b^2 - d^2)$
i.e., $b^2 = 4d^2$. As shown in statement (1), it follows that b = 2d. (2) is sufficient.
Either of the statements is sufficient. Choice (B)

9. From statement (1) alone, two cases are possible
Case 1
The two trains are travelling in the same direction.
In this case, the speed of train B must be more than that of train A.
Case 2
The two trains are travelling in the opposite direction
In this case, if speed of train B = 60 km/hr
Time taken to cross each other

$$= \frac{750}{(60+60)x\frac{5}{18}} = 22.58$$

$\therefore$ Speed of train B must be greater than 60 km/hr i.e. greater than speed of train A.
Since both the cases are possible, nothing can be concluded.
Even after using statement (2), both cases remain.
Choice (D)

10. From statement (1) alone, a + b = (a – b)!
Here, a + b $\leq$ 18 $\Rightarrow$ a – b $\leq$ 3
Now, if a – b = 3, then a + b = 6, this is not possible.
Let a – b = 2, then a + b = 2, the possibility is a = 2 and b = 0. Now, if a – b = 1, then a + b = 1, but it is given as a + b > 1. $\therefore$There is only one possibility.
From statement (2) alone,
2(a – b) = (a + b)!
Here, a – b $\leq$ 9 $\Rightarrow$ a + b $\leq$ 3
Now, the only possibility is a = 3 and b = 0
Either statement alone is sufficient. Choice (B)

11. i^{th} worker worked for i days and completed i units per day.
$\therefore$ Total work done by i^{th} worker = i (i) = i^2

$\therefore$ Total work = $1^2 + 2^2 + 3^2 + \ldots + N^2 = \frac{N(N+1)(2N+1)}{6}$

From statement (1) alone,

$\Rightarrow \frac{N(N+1)(2N+1)}{6} = 385$ i.e., $\frac{(10)(10+1)(2(10)+1)}{6}$

Comparing both sides it follows that N = 10.
(1) is sufficient.
Using statement (2), the number on units completed on the first day = 1 + 2 + …. + N. The number of units completed on the last day = N. 1 + 2 + …N – N = 45 i.e. $\frac{N(N+1)}{2} - N = 45$ i.e $\frac{(N-1)(N)}{2} = \frac{(10-1)(10)}{2}$
Comparing both sides, it follows that N = 10
(2) is sufficient.
Either of the statements is sufficient. Choice (B)

12. Using statement (1), as the number of pins in the box packed with pins is unknown, we cannot find the number of craters on moon.
Hence statement (1) is insufficient.
Using statement (2), we do not have any relationship between number of craters on the moon and the box. Hence statement (2) alone is insufficient. Using both statements, number of tins in the box

$$= \frac{\text{Total w eightof pins}}{\text{Weight of eachpin}}$$

$$= \frac{\text{Total w eightof box andpins} - \text{w eightof box}}{\text{Weight of eachpin}}$$

$$= \frac{16 - \text{w eightof box}}{0.5\text{kg}}$$

As weight of box is unknown, number of pins in the box cannot be found. Hence number of craters on moon cannot be found. Choice (D)

13. Using statement (1), $x^2 + 4x + 3 > y^2 + 2y$
Adding 1 to both sides $(x + 2)^2 > (y + 1)^2$.
Hence x + 2 > y + 1 (i.e. x + 1 > y)
or x + 2 < y + 1
(i.e. x + 1 < y)
Hence statement (1) gives two possibilities and is therefore insufficient.
Using statement (2), given $x^3 - 6x^2 + 12x - 7 > y^3 - 3y^2 + 3y$
Subtracting one from both sides, we get
$(x - x)^3 > (y - 1)^3 \Rightarrow x - 2 > y - 1$
$\Rightarrow x > y + 1 \qquad \Rightarrow x + 1 > y$
$\therefore$ Statement (2) alone is sufficient.
Choice (A)

14. From statement (1) alone,
(2x + 3y) : (3y + 4z) : (4z + 2x) = 3 : 5 : 6
Let, 2x + 3y = 3k ------ (i)
3y + 4z = 5k ------ (ii)
4z + 2x = 6k ------ (iii)
$\Rightarrow$ (i) + (ii) + (iii) i.e., 2(2x + 3y + 4z) = 14k
$\Rightarrow$ 2x + 3y + 4z = 7k ----- (iv)
2x = 2k $\Rightarrow$ x = k
4z = 4k $\Rightarrow$ z = k
3y = k $\Rightarrow$ y = k/3
From this we can find the value of the given expression.
$\therefore$ Statement (1) alone is sufficient.
From statement (2) alone, as the ratio of x and z or y and z is not known, we cannot find the value of the given expression. Choice (A)

15. From statement (1) alone, the train takes 20 seconds to cross a pole i.e., it takes 20 seconds to cross a distance equal to its length. It is taking 50 seconds i.e. 30 seconds more to cross a tunnel of 450 m.
$\therefore$We can say that in 20 seconds it can cover 300 m which is equal to its length.
$\therefore$Statement (1) alone is sufficient.
From statement (2) alone, the train takes 20 seconds more to cross the platform compared to bridge because the length of the platform is 300 m more than the length of the bridge.
$\therefore$It covers 300 m in 20 seconds and 600 m in 40 seconds.
$\therefore$600 m = length of the train + length of the bridge.
$\therefore$Length of the train = 300 m
$\therefore$Statement (2) alone is sufficient. Choice (B)

16. Let the cost price be 100 and marked up percentage be m.
Then MP = 100 + m
From statement (1) alone,

$$(100 + m)\ \frac{(100-m)}{100} = 100 - \frac{m}{2}$$

$10000 - m^2 = 10000 - 50$ m
$\Rightarrow m^2 = 50$ m
Since m $\neq$ 0, m = 50
So, statement (1) alone is sufficient.
From statement (2) alone,

$$(100 + m)\frac{\left(100-\frac{m}{2}\right)}{100} = 100 + \frac{m}{4}$$

$$10000 + 50m = \frac{m^2}{2} = 10000 + 25m$$

$$\frac{m^2}{2} - 25m = 0$$

Since $m \neq 0$, $m = 50$.
Hence, (2) alone is sufficient. Choice (B)

17. From statement (1) alone if year X was a leap year then the month of February should not have any day of the week occurring five times or more.
$\Rightarrow$ The year was a leap year
$\therefore$ (1) alone is sufficient
From statement (2) alone: The number of days in the year is odd hence the year X must have 365 days i.e. it is not a leap year.
$\therefore$ (2) alone is sufficient. Choice (B)

18. Times taken by Bhavan and Chetan to complete it are (x – y) days and (x + y) days respectively. Time taken by them to complete it = $\frac{(x-y)(x+y)}{x-y+x+y}$

= $\frac{x^2-y^2}{2x} = \left(\frac{x}{2} - \frac{y^2}{2x}\right)$ days. Time taken by David and Eswar to complete it = $\frac{x.y.x.y^2}{x.y + x.y^2} = \frac{x.y^3}{y+y^2} = \frac{xy^2}{1+y}$

Using statement (1), $y \geq 1$. $y^2 \geq y \geq 1$
$1 + y \leq 2y^2$

$$\frac{xy^2}{1+y} \geq \frac{x}{2}$$

$$\frac{x}{2} - \frac{y^2}{2x} < \frac{x}{2} \text{ ------- (1)}$$

$$\frac{x^2-y^2}{2x} < \frac{xy^2}{1+y} \text{ when } y \geq 1$$

Combined efficiency of Bhavan and Chetan is more that of David and Eswar. (1) is sufficient.
Using statement (2), $y \leq 1$. $y^2 \leq y \leq 1$

$1 + y \geq 2y^2$

$$\frac{xy^2}{1+y} \leq \frac{x}{2}$$

(1) $\Rightarrow$ if y = 1, $\frac{x}{2} - \frac{y^2}{2x} < \frac{xy^2}{1+y}$

If y < 1, Suppose y = $\frac{1}{2}$.

Then $\frac{x}{2} - \frac{y^2}{2x} - \frac{xy^2}{1+y} = \frac{x}{3} - \frac{1}{8x}$

= $\frac{1}{24x}(8x^2 - 3)$

If $8x^2 - 3 > 0$ i.e., $x^2 > \frac{3}{8}$ this is positive i.e., $\frac{x}{2} - \frac{y^2}{2x} > \frac{xy^2}{1+y}$

if $8x^2 - 3 = 0$ i.e., $x^2 = \frac{3}{8}$ this is 0 i.e., $\frac{x}{2} - \frac{y^2}{2x} = \frac{xy^2}{1+y}$. In the first case, combined efficiency of Bhavan and Chetan is less than that of David and Eswar. In the second case, it is not less than that of David and Eswar. (2) is not sufficient.
Choice (A)

19. Let the number be abcd with a > b > c > d. Minimum possible values of a, b, c and d are 3, 2, 1 and 0 respectively. Maximum possible values of a, b, c and d are 9, 8, 7 and 6 respectively.
$3 + 2 + 1 + 0 \leq a + b + c + d \leq 9 + 8 + 7 + 6$ i.e.,
$6 \leq a + b + c + d \leq 30$
a + b + c + d is a perfect cube. It can be 8 or 27 only. Units digit of abcd = d.

Using statement (1), two or more of the digits of abcd are prime. If a + b + c + d = 8, a possible value of abcd is 5210. In this case, d = 0. If a + b + c + d = 27, a possible value of abcd is 9873. In this case, d = 3. d is not unique. (1) is not sufficient.
Using statement (2), either 0 or 1 or 2 of the digits of abcd are prime.

If a + b + c + d = 27, a possible value of abcd is 9864. In this case, d = 4. If a + b + c + d = 8, a possible value of abcd is 4310. In this case, d = 0d is not unique. (2) is not sufficient.

Using both statements, two of its digits are prime numbers. If a + b + c + d = 27 and abcd = 9873, d = 3. If a + b + c + d = 27 and abcd = 9765, d = 5. d is not unique. Both statements even when taken together are not sufficient to answer the question. Choice (D)

20. From (1), if B is a truth-teller, then A, B and C are truth-tellers, which are violating statements made by A.
B is not a truth teller. If B's first statement is true, then also, A's statements will contradicted.
B's first statement is false.
B's second statement must be true.
B is an alternator.
A's first statement is false.
C may or may not be a liar (A's statement)
A can be a liar or an alternator
(1) alone is not sufficient.
From (2),
It C's first statement is true, then A's first statement must be false as A's second statement is true.
C must be a truth-teller.
If C's first statement is false, then his second statement can be true or false.
Also, A's second statement must be false.
A must not be an alternator.
A is liar.
C is not a liar.
C is an alternator.
Now, B must be a truth-teller.
(2) alone is not sufficient.
From (1) and (2), B is an alternator and A is not a truth-teller.
$\therefore$ C can be a truth-teller or a liar or an alternator.
$\therefore$ (1) and (2) even when taken together are not sufficient.
Choice (D)

21. Neither of the statements is sufficient as we cannot find the exact number of boys and girls.
By combining both the statements, there are two boys and two girls. Choice (C)

22. From (1), as it is raining, Ramu may or may not go to school and hence he may or may not play cricket.
$\therefore$ (1) is not sufficient.
From (2), as Ramu woke up early, he attended the class and hence he did not play cricket.
$\therefore$ (2) is sufficient. Choice (A)

23. From (1), as nothing is said about the number of boys, it is not sufficient.
From (2), C is the third boy but the number of girls infront of D is not known.
(2) is not sufficient.
By combining both the statements, C is the third boy and the number of girls in front of D is four.
But as we do not know the number of boys infront of D, we cannot answer the question.
Choice (D)

24. Neither of the statements is sufficient as it gives information about at most three persons.
By combining both the statements, none of A, B and E is the toper.
$\therefore$ C or D is the toper. Choice (D)

25. Let x be the number of person in the queue. From (1), if Vijay is in front of Suman.

$\underline{\frac{3}{4}x}$ $\underline{V}$ $\underline{10}$ $\underline{S}$ $\underline{16}$

$\therefore$ 10 + 16 + 2 = $\frac{1}{4}x \Rightarrow x = 112$

If Suman is in front of Vijay

$\underline{\frac{3}{4}x - 11}$ $\underline{S}$ $\underline{10}$ $\underline{V}$ $\underline{5}$

$\therefore 5 + 1 = \frac{1}{4}x$

$\Rightarrow x = 24$

$\therefore$ (1) is not sufficient

From (2), if Vijay is infront of Suman

$\underline{18}$ $\underline{V}$ $\underline{10}$ $\underline{S}$ $\underline{\frac{2}{3}x}$

$\therefore \frac{1}{3}x = 18 + 10 + 2 \Rightarrow x = 90$

If Suman is in front of Vijay

$\underline{7}$ $\underline{S}$ $\underline{10}$ $\underline{V}$ $\underline{\frac{2}{3}x - 11}$

$\therefore \frac{1}{3}x = 7 + 1$

x = 24

$\therefore$ (2) is not sufficient.

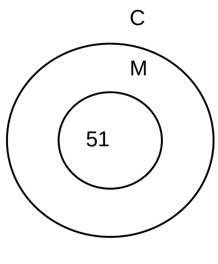
By combining both the statements, the total number of members is 24. Choice (C)

Exercise – 14

Solutions for questions 1 to 25:

1. Using statement (1), $-1 < x < 0$ or $1 < x < \infty$, if $-1 < x < 0$, else $|x| > 1$.
Statement (1) alone is insufficient.
Using statement (2), $0 < x < 1$ or $-1 < x < 0$ or $-\infty < x < -1$.
If $0 < x < 1$ or $-1 < x < 0$, $|x| < 1$, else $|x| > 1$.
Statement (2) alone is insufficient
Using both statements, $-1 < x < 0$. Hence $|x| < 1$.
Choice (C)

2. Since we do not if there is any one who plays neither the question cannot be answered.



Choice (D)

3. Let the profit be 40%. The selling price is 1.4c (where c = cost price)

The marked price (m) = $\frac{1.4}{0.8}c = 1.75c$

If the profit (and discount) are lower, m would be lower.
If the profit (and discount) are higher, m would be higher.
From statement (1), p has to be more than 40%.
From statement (2), p has to be less than 40%.
We can answer the question from either statement.
Choice (B)

4. Using statement (1), a = 9 and b = 4 or a = 12 and b = 1 are the possibilities.

If a = 9, b = 4, $a + \sqrt{b} = 13$.

If a = 12, b = 1, $a + \sqrt{b} = 13$.

Hence, $a + \sqrt{b}$ is unique statement (1) alone is sufficient.
Using statement (2), a = 10, and b = 9 are a = 12 and b = 1 are the possibilities.

For possibilities we have $a + \sqrt{b} = 13$ or 19.
Statement (2) alone is not sufficient. Choice (A)

5. AC < BC + AB (from statement (1))
$\Rightarrow$ A, B, C may be collinear or may not be collinear i.e., they may form a triangle as well.
From statement (2) alone, the argument is similar to that of what we have when we take statement (1) alone.
Combining both the statements, if AC > BC and AC > AB and if A, B, C are collinear, we can never have AC < BC + AB. (Infact AC = BC + AB). Hence, we can conclude that the points are non-collinear. Choice (C)

6. Even upon using both the statements we can only conclude that two of the opposite sides are parallel and sum of 2 angles is 180°.
In order to conclude that ABCD is a rectangle which is also a cyclic quadrilateral we also need to know whether the opposite sides are equal in length. Choice (D)

7. From statement (1), the possible values of the numbers are 14, 25, 36, 47, 58, 69, 80 or 91. If the number is 91 then the required difference is 72 (which is more than 69). If the number is 41, then the required difference is 27.
$\therefore$ Statement (1) alone is not sufficient.
From statement (2), the possible values of the numbers are 15, 26, 37, 48, 59, 70, 81, 92. In any of the above possible values, the required difference is less than 69.
$\therefore$Statement (2) alone is sufficient. Choice (A)

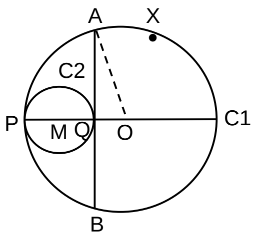
8. Discriminant = $(2P(Q + R))^2 - 4(P^2 + R^2)(P^2 + Q^2)$
$= -4(P^2 - QR)^2 \le 0$ ------- (1)
As the roots are real, $-4(P^2 - QR^2) \ge O$
(1) $\Rightarrow 4(P^2 - QR)^2 = 0$ i.e., $(P^2 - QR)^2 = 0$ i.e.,
$P^2 = QR$
$Q < P < R$
Possibilities of Q, P and R
Are (1, 2, 4), (1, 3, 9), (2, 4, 8) and (4, 6, 9)
Using statement (1), (Q, P, R) must be (4, 6, 9). Q = 4
(1) is sufficient.
Using statement (2), (Q, P, R) must be (1, 2, 4) or (1, 3, 9) or (2, 4, 8)
Q = 1 or 2. (2) is not sufficient. Choice (A)

9. The table below gives the parity (even(e) or odd(o)) of $(a^2 - b^2)/2$ for different combinations of a and b. The corresponding types of ab is also given.

a	b	ab	a^2	b^2	$(a^2 - b^2)/2$
e	e	e	e	e	e
e	o	e	e	o	not an integer
o	e	e	o	e	not an integer
o	o	o	o	o	e

We see that if ab is even, $(a^2 - b^2)/2$ may be an even integer or not an integer at all.
If ab is odd, $(a^2 - b^2)/2$ is an even integer.
We can answer the question from (2), but not from (1).
Choice (A)

10.



XY intersects C_2 if $PX \le PA$ and it doesn't intersect C_2 if $PX > PA$.

$PA = \sqrt{PQ^2 + QA^2} = \sqrt{PQ^2 + (OA^2 - OQ^2)}$

$= \sqrt{4^2 + (5^2 - 1^2)} = \sqrt{16 + 24} = \sqrt{40}$

$\Rightarrow PA^2 = 40$

From (1), $PX^2 < 36$, i.e. PX is less than PA($\sqrt{40}$). We can say that XY intersects C_2. From (2) $PX^2 > 49$, i.e. PX > PA and XY doesn't intersect C_2. We can answer the question from either (1) or (2). Choice (B)

11. Here, $S_n - S_{n-1} = t_n$. Both S_n and S_{n-1} are of same parity (even/odd) i.e., if both S_n and S_{n-1} are odd (or) both S_n and S_{n-1} are even, then t_n will be even. But, if S_n and S_{n-1} are of different parities, i.e. one of them is odd and the other is even, then t_n will be odd.

$\therefore$The number of even terms from t_1 to t_9 will be the least possible, if in the series – $S_1, S_2, S_3, S_4, S_5, S_6, S_7, S_8$ and S_9 – the least number of consecutive pairs of terms are of same parity. To make this minimum, the alternate terms of the above series must be of one parity and the remaining terms must be of the other parity. Now, from statement (1) alone, six terms of the above series are even. The best possible in which we can arrange the even and odd terms of the above series is

S_1	S_2	S_3	S_4	S_5	S_6	S_7	S_8	S_9
Odd	Even	Odd	Even	Odd	Even	Even	Even	Even

In this case also, the number of even terms is three i.e.,

$t_7 = S_7 - S_6$ = Even

$t_8 = S_8 - S_7$ = Even

$t_9 = S_9 - S_8$ = Even

If we arrange in any other way also, we will get more number of even numbers from t_1 to t_9. Hence (1) alone is sufficient.

From (2) alone, the best possible arrangement is

S_1	S_2	S_3	S_4	S_5	S_6	S_7	S_8	S_9
Odd	Even	Odd	Even	Odd	Even	Odd	Even	Even

In this case only $t_9 = S_9 - S_8$ = Even. But if we consider other arrangements, there may be more number of even terms. Let us see one.

S_1	S_2	S_3	S_4	S_5	S_6	S_7	S_8	S_9
Even	Even	Even	Even	Even	Odd	Odd	Odd	Odd

In this case, $t_1, t_2, t_3, t_4, t_5, t_7, t_8$ and t_9 are even.

(2) alone is not sufficient. Choice (A)

12. From statement (1), there is only one case where the two hands of the clock coincides between eleven and one i.e. exactly at 12 'O clock. So, (1) alone is sufficient. From statement (2), there are two cases, where the two hands of the clock coincides between 1 and 3. i.e. at 2 hours $10^{10}/_{11}$ minutes and at 3 hours $15^{5}/_{11}$ minutes. So, (2) alone is not sufficient. Choice (A)

13. Let the two geometric progression be a, 1.1ar, $1.21ar^2$ and b, br, br^2

From (1) alone, a = 0.96 and the difference of the third terms is $(1.089 - 1)\,br^2 = 0.089\,br^2$ which could be positive or negative depending on b.

From (2) alone, br > 0, ar > 0 ($\therefore$ 1.21 or > 0) and the difference of the third terms in r (1.21ar – br) which could be positive or negative. Even by combining both statements we can't decide. The magnitude of the third term of the first progression is greater, but the sign could be positive or negative. Choice (D)

14. We cannot conclude anything by taking any one of the two statements individually; let us take both the statements together. Since d/b > 0, either both b and d are positive or both b and d are negative.

If both b and d are negative, since from the second statement, a < d, if a also is negative; now if we take bd, this will be the product of two negative quantities and hence will be positive and so a will be less than bd; but this contradicts the statement given in the question that a > bd; hence b and d cannot be negative.

If both b and d are positive, then a < d will mean a can be positive or negative; in either case bd which will be positive, can be greater than a when a is positive and b is a fraction; hence the statement given in the question that a > bd can be true and there will not be a contradiction; Hence by taking both the statements, we can conclude that b > 0.

Choice (C)

15. Clearly, neither statement is enough by itself. Combining the statements and tabulating the data, we can get the ratio of water in A and B as follows.

	Ratios			Actual weights		
	A	B	C	A	B	C
Salt	4	3	2	4x	3x	2x
Water					23z – 3x	17z – 2x
Total	14	23	17	14z	23z	17z

We have $\dfrac{17z - 2x}{23z - 3x} = \dfrac{3}{4}$ $\Rightarrow 68z - 8x = 69z - 9x$ $\Rightarrow x = z$

$\therefore$ The water in A is 14z – 4x = 10. Water in B is 20 and in C, it is 15. The question can be answered by using both statements. Choice (C)

16. Let the sides be a, b and c.

Let the circumradius be R and the inradius be r.

Its area = $\dfrac{abc}{4R} = \dfrac{a+b+c}{2}.r$

$Rr = \dfrac{abc}{2(a+b+c)}$

$k = \dfrac{Rr}{P^2} = \dfrac{\dfrac{abc}{2(a+b+c)}}{(a+b+c)^2} = \dfrac{abc}{2(a+b+c)^3}$

$\dfrac{a+b+c}{3} \ge \sqrt[3]{abc}$

($\because$ A. M (a, b, c) $\ge$ G. M (a, b, c))

$\left[\dfrac{a+b+c}{3}\right]^3 \ge$ a.b.c. i.e., $(a + b + c)^3 \ge 27$ a.b.c

$k \le \dfrac{a.b.c}{2(27a.b.c.)} \le \dfrac{1}{54}$ with the equality applying if

a = b = c i.e., the triangle is equilateral ----- (1)

Using statement (1), $k \ge \dfrac{1}{54}$. (1) $\Rightarrow k = \dfrac{1}{54}$

The triangle is equilateral. (1) is sufficient.

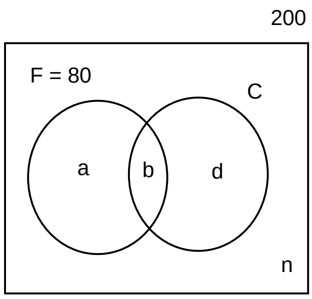
Using statement (1), $k \le \dfrac{1}{54}$. If $k = \dfrac{1}{54}$, the triangle is equilateral. Otherwise, it is any non-equilateral triangle. (2) is not sufficient. Choice (A)

17. Let the numbers of children in the groups A, B, C and D be a, b, c and d respectively.
Using statement (1), if chocolates are distributed among the children of A each child would have got a^2 chocolates.
If chocolates are distributed among the children of B, each child would have got b chocolates.
$N = a\ (a^2) + 9 = b(b)$
$a^3 + 9 = b^2$
Possible values of (a, b) are at least two i.e., (3, 6), (6, 15), N = 36 or 225
(1) is not sufficient.
Using statement (2), if chocolates are distributed among the children of C, each child would have got c chocolates. If chocolates are distributed among the children of D, each child would have got d^2 chocolates.
$N = c\ (c) = c^2$ and $N + 28 = (d)\ (d^2) = d^3$
$N = c^2 = d^3 - 28$
$C^2 + 28 = d^3$
Possible values of (c, d) are at least two i.e., (6, 4), (22, 8), N = 36 or 484
(2) is not sufficient.
Using both statements, $N = a^3 + 9 = d^3 - 28$
$d^3 - a^3 = 37$ ------- (1)
$1^3 = 1,\ 2^3 = 8,\ 3^3 = 27,\ 4^3 = 64,\ 5^3 = 125$
It can be seen from the above values that only possible values of d and a must be 4 and 3 respectively
As the gap between adjacent perfect cubes increases and since $5^3 - 4^3 > 37$, we do not expect any other possibilities for d and a. N = 36. Both statements together are sufficient to answer the question. Choice (C)

18. From (1), X and Y scored equal goals.
$\therefore$ (1) is not sufficient.
From (2), the score of X cannot be found.
$\therefore$ (2) is not sufficient.
By combining both the statements, X scored 5 goals.
Choice (C)

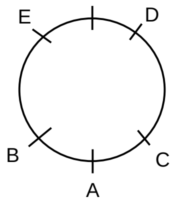
19. Using statement (1) alone, the minimum length of AC (which occurs when AB = BC) is $8\sqrt{2}$ (occurring when AB = BC = 8)
$\therefore AC > 11$.
Using statement (2) alone, the minimum length of AC is 12 (occurring when AB = BC = $\sqrt{72}$) $\because$ AC > 11. We can answer the question from either A or B. Choice (B)

20. Required answer is 200 – b for which we need to find the value of b.

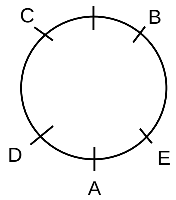


From (1), we get d = 60
$\Rightarrow n = 200 - 80 - 60 = 60$
But we do not know the number of students who play only football.
$\therefore$ (1) is not sufficient.
From (2), we get a + d = 100
$\Rightarrow b + n = 100$
But we cannot find the value of b.
By combining both the statements $b = 100 - n$
$= 100 - 60 = 40$. Choice (C)

21. From (1), we cannot say the exact positions of B and C. (1) alone is not sufficient.
From (2), as there is no information about A, we cannot answer the question.
From (1) and (2) we have:



(or)



(1) and (2) even when combined, we cannot answer the question. Choice (D)

22. From (1), we can only say that at least one of P, Q and R is sitting at extreme ends.
(1) alone is not sufficient.
From (2), we cannot answer the question as there is no information about the remaining two persons.
(2) alone is not sufficient.
From (1) and (2), we have many possibilities of which two are
<u>Q</u> <u>S</u> <u>R</u> <u>T</u> <u>P</u> <u>U</u>
Or
<u>Q</u> <u>S</u> <u>R</u> <u>T</u> <u>U</u> <u>P</u>
(1) and (2) even when taken together are not sufficient.
Choice (D)

23. From statement (1), of the 21 games, the games won by A and B can be
(i) A – 11, B – 10 (or)
(ii) A – 10 and B – 11
In case (i) A will have a profit of $11 \times 3 - 10 \times 2$ = ₹13
In case (ii) A will have a profit of $10 \times 3 - 11 \times 2$ = ₹8
As we don't know the amount with him,
(1) alone is not sufficient.
From (2), as we don't know the number of games won by either of them, we cannot answer the question. (2) alone is not sufficient.
From statements (1) and (2), as A's final amount is ₹10, he cannot gain more than 10, hence only case (ii) prevails.
At the beginning, A has ₹2 and B has ₹23.
(1) and (2) together are sufficient. Choice (C)

24. Let the number of ₹5, ₹2 and ₹1 coins be a, b and c respectively.
a + b + c = 13
From (1),
$5a < 2b < c$
a must be equal to 1.
$b \geq 3$
If b = 3, then c = 9
If b = 4, then c = 8, which is violating the given condition
a = 1, b = 3 and c = 9
(1) alone is sufficient.
From (2),
$a - b < b - c$
But we cannot find the values of a, b and c.
(2) alone is not sufficient. Choice (A)

25. From (1):
(a1) if P is a truth teller, then Q is a truth teller and R is the mayor.
(a2) if P is a liar, then Q is a liar and one of P and Q is the mayor.

$\therefore$ (1) is not sufficient.
From (2):
(b1) if R is a truth teller, then Q is the mayor and Q is a liar.
(b2) if R is a liar, then the mayor is a truth teller and Q is not the mayor.
$\Rightarrow$ P is the mayor.
$\therefore$ (2) is not sufficient.
By combining both the statements, only a2 and b1 do not contradict.
Hence Q is the mayor. Choice (C)

Exercise – 15

Solutions for questions 1 to 25:

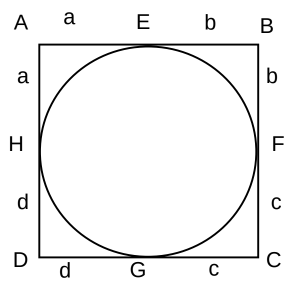
1. Let the amounts with Viru and Prasad be a and b.
a + b = 200 ------- (1)
Using statement (1), if Viru gives ₹10 to Prasad, Viru and Prasad would have a – 10 and b + 10 respectively.
a – 10 – (b + 10) = 20 or
b + 10 – (a – 10) = 20
i.e., a – b = 40 or a = b
Different values of a are obtained when combining a – b = 40 and a = b along with (1). Hence statement (1) alone is not sufficient.
Using statement (2), if Prasad gives ₹20 to Viru, Viru and Prasad would have a + 20 and b – 20 respectively.
a + 20 – (b – 20) = 40 or
b – 20 – (a + 20) = 40
i.e., a = b or b – a = 80
Different values of a are obtained when combining a = b and b – a = 80 along with (1).
Hence statement (2) alone is not sufficient.
Using both statements,
$a = b = \frac{200}{2} = 100$
Hence both statements are required.
Choice (C)

2. Let the speeds of Eswar, Ganesh and Harish be e, g and h respectively.
Using statement (1),
$$\frac{e+g+h}{3} - \frac{e+g}{2} = \frac{1}{4}\left(\frac{e+h}{2} + \frac{g+h}{2}\right)$$
$\Rightarrow$ 8 (e + g + h) – 12 (e + g) = 3 (e + g + 2h)
$\Rightarrow$ 2h = 7 (e + g).
As h > e and h > g, Harish is the winner.
(1) is sufficient.
Using statement (2),
$$\frac{10}{9}\left(\frac{e+g+h}{3}\right) = \frac{e+g}{2} + \frac{g+h}{2} - \frac{e+h}{2}$$
$\frac{10}{9}\left(\frac{e+g+h}{3}\right) = g$ i.e., e + h = 1.7g ------- (2)
If e > g, then g > h.
If h > g, then g > e.
Either Eswar or Harish is the winner.
(2) is not sufficient. Choice (A)

3. Using (1) alone,
$\log_{x+3}(2x-3)(x+3) + \log_{2x-3}(2x-3)(x+3) = 4$
$\log_{x+3}(2x-3) + \log_{x+3}(x+3) + \log_{2x-3}(2x-3) + \log_{2x-3}(x+3) = 4$.
Let $\log_{x+3}(2x-3) = a$
$a + 1 + 1 + \frac{1}{a} = 4$.
$\Rightarrow a^2 - 2a + 1 = 0$
$\Rightarrow$ a = 1.
Let $\log_{x+3}(2x-3) = 1$
$\Rightarrow$ 2x – 3 = x + 3
$\Rightarrow$ x = + 6
Statement (1) alone is sufficient.
Using (2) alone: $x^3 - 6x^2 + 12x - 8 = 0 = (x-2)^3 = 0$
$\Rightarrow$ x = 2
Hence, statement (2) alone is sufficient.
Hence, either statement alone is sufficient.
Choice (B)

4. The minimum value of the quadratic expression is
$\frac{4ac - b^2}{4a}$ where $a \neq 0$.
Using (1) alone: As $a \neq 0$, a > 0. Hence 2b – 16c > 0 i.e., b > 8c. If c = 1, b > 8. Hence b = 9 is the only possibility. If $c \geq 2$, b becomes a two digit number which is not possible.
Hence c = 1 is the only possibility a = 2 in this case. As a, b and c are known, the minimum value can be found.
Statement (1) alone is sufficient.
Using (2) alone, $c^3 - 19 = (2b)^2$ ------ (1) i.e., it is a perfect square. By trial and error for each single digit integer c only c = 7 results is $c^3 - 19$ as a perfect square. Hence it is the only possible value of c. In this case, b = 9. (from (1)). a = b – c = 2. As a, b and c are known, the minimum value can be found.
Statement (2) alone is sufficient.
Hence either statement is sufficient.
Choice (B)

5.



Using (1) alone: A parallelogram that circumscribes a circle can only be a square.
Hence $AB = \frac{\text{Perimeter of ABCD}}{4} = \frac{68}{4}$ = 17 cm
Statement (1) alone is sufficient.
Using (2) alone as AB and CD are tangents at E and G respectively, ∠AEG = ∠GEB = 90 and ∠EGC = ∠EGD = 90°. As AEGD and EGCB are both cyclic quadrilaterals, ∠ADG = 180° – ∠AEG = 90°,
Similarly ∠DAE, ∠EBC and ∠BCG are all 90°.
Hence ABCD is a parallelogram, which means that ABCD is a square.
$\Rightarrow$ AB = $\frac{68}{4}$ = 17 cm.
Statement (2) alone is sufficient.
Hence either statement is sufficient.
Choice (B)

6. Let the perpendicular sides of the triangle be a and b. Given, ab = 12.
Using statement (1) alone,
Hypotenuse = 2 × (circum radius) = 5
As we know, $a^2 + b^2 = 25$ and ab = 12
We can find the values of a and b, there by inradius by using Area = (in radius) (Semi perimeter)
Using statement (2) alone, $\frac{1}{a} + \frac{1}{b} = \frac{7}{12}$
$\Rightarrow \frac{a+b}{ab} = \frac{7}{12} \Rightarrow a + b = 7$
Hence, we can find the values of a and b, there by the value of inradius.
Hence statement (2) alone is sufficient. Choice (B)

7. Let the four prime numbers be a, b, c and d with a < b < c < d.

$$\frac{a+b+c+d}{4} = 10$$

$\Rightarrow$ a + b + c + d = 40
Using statement (1) alone, there are more than one possibility. The numbers can be (3, 5, 13, 19) or (5, 7, 11, 17) and so on.
$\therefore$ Statement (1) alone is not sufficient.

Using statement (2) alone, a + d = b + c = $\frac{40}{2}$ = 20

The only possibility for this is a = 3; d = 17; b = 7; c = 13
$\therefore$ The greatest of the four integers is 17.
Statement (2) alone is sufficient. Choice (A)

8. Let the sides of the triangle other than the longest be a cm and b cm with a > b
40 > a > b ------- (1)
40 + a + b and a + b are prime.
By triangle inequality, a + b > 40 i.e. 40 + a + b > 80
(1) = 40 + a + b < 3 (40) = 120 i.e. a + b < 80
40 + a + b is prime = 40 + a + b = 83 or 89 or 97 or 101 or 103 or 107 or 109 or 113.
a + b is prime $\Rightarrow$ a + b = 43 or 61 or 67 or 73 ------- (2)
Using statement (1), (a, b) = (22, 21) or (31, 30) or (34, 33) or (37, 36).
As one of a and b is prime, (a, b) = (31, 30) or (37, 36).
(1) is not sufficient
Using statement (2), neither a nor b is a perfect square.
We have more than one possibility.
$\therefore$ (2) alone is not sufficient.
Combining both, as b $\neq$ 36, a = 31 and b = 30.
Both statements when taken together are sufficient to answer the question. Choice (C)

9. Neither statement alone is sufficient – using both also, we can say that she watched at least 11 movies but we can't say exactly how many. Choice (D)

10. As statement (1) does not mention anything about vowel O, statement (1) alone is not sufficient.
From statement (2), we have the given word as
-- REPUBLIC DAY. The vowels in this word are A, E, I and U. As the required word is not having any of these vowels, it has all the three vowels as O.
$\therefore$ Statement (2) alone is sufficient. Choice (A)

11. From statement (1) alone, on simplification we get a = x^3y^2.
Hence, x^6. y^4 = a^2
$\Rightarrow$ 2 logx + 4 logxy = 2 loga.
From statement (2) alone, it is an identity as we get LHS = RHS i.e., there is no additional information available from this statement. Choice (A)

12. Let N be abc.
a = c
None of the digits is 0. N is a perfect square = 1, 4, 5, 6 and 9 are the possible values of c.
If a = 1, N = 121. If a = 4, N = 484
If a = 5 or 9, N has no possibility. If a = 6, N = 676.
N = 121, 484 or 676.
Using statement (1), S is a perfect square when N = 121 or 484. Middle digit of N = b = 2 or 8. (1) is not sufficient.
Using statement (2), when N = 121, or 484, N is divisible by its units digits. Middle digit of N = b = 2 or 8. (2) is not sufficient.
Using both statements, middle digit of N = b = 2 or 8. Both statements even when taken together are not sufficient to answer the question. Choice (D)

13. From (1), the possible values of m and n are substituted in the expression in the left
4(m) + 5(m) = 87 ------- (I)
4(3) + 5(15) =
4(8) + 5(11) =
4(13) + 5(7) =
4(18) + 5(3) = 87
Hence statement (1) alone is not sufficient.
Using statement (2) also, m = 3 and n = 15 is the only possibility that satisfies. Both statements together are sufficient. Choice (C)

14. If n is odd 3^n is of the form 4k + 3 and if n is even, 3^n is of the form 4k + 1.
The only way in which, $2^m + 3^n$ can be a multiple of 4 in when 2^m = 1 and 3^n is 4k + 3.
i.e., m = 0 and n is odd.
We can determine that n is odd from (1).
From (2), $(-1)^n + (1)^m$ is zero.
$\therefore$ n is odd.
We can answer the question from either statement.
Choice (B)

15. The possible values of K, the index of the highest power of 2 and 7 are tabulated below.

K	Index of the highest power of 2	Index of the highest power of 7.
45	22 + 11 + 5 + 2 + 1 = 41	6
46	23 + 11 + 5 + 2 + 1 = 42	6
47	23 + 11 + 5 + 2 + 1 = 42	6
48	24 + 12 + 6 + 3 + 1 = 46	6
49	24 + 12 + 6 + 3 + 1 = 46	7 + 1
50	25 + 12 + 6 + 3 + 1 = 47	7 + 1

From (1), the index of the highest power of 7 in K! is 6 or 8.
From (2), it is 6.
Hence (2) alone is sufficient. Choice (A)

16. From (1), it can be either Wednesday or Thursday.
From (2), it can be either Tuesday or Wednesday.
By combining both the statements, it is Wednesday.
Choice (C)

17.

Person	Number of goals made	Number of Goals Saved	Number of chances dropped
Amar	–	y	x
Binod	–	2	x + 2
Kamal	–	–	3

and x $\geq$ 2
Using statement (1) alone,
Number of goals made Amar = Number of goals made by Binod = n + 4, when n = Number of goals made by Kamal.
$\Rightarrow$ There is a tie.
Statement (1) alone is not sufficient.
Using statement (2) alone,
2 + x = 1 + y
y = 1 + x and 1 + x $\geq$ 3
Number of goals saved by Amar > Number of goals saved by Binod.
Statement (2) alone is not sufficient.
Combining both the statements, we can answer the question. Choice (C)

18. Let the number of employees = n
Each employees' contribution = P
$\Rightarrow$ nP = 10,000
Using statement (1) alone:
(n + 5) (P – 100) = 10,000
$\Rightarrow$ nP – 100n + 5P = 10,500 $\Rightarrow$ 5P – 100n = 500
$\Rightarrow$ P – 20n = 100

$$\frac{10000}{n} - 20n = 100$$

$20n^2$ + 100n – 10,000 = 0
n^2 + 5n – 500 = 0
n^2 + 25n – 20n – 500 = 0

$n = 20$, $n = -25$
$P = 500$
As n cannot be negative, $n = 20 \quad \Rightarrow P = 500$
Hence, statement (1) alone is sufficient.
Using statement (2) alone:
$n \le 20$
$P \le 500$.
But $n \times P = 10,000$
$\Rightarrow n = 20, P = 500$
Statement (2) alone is also sufficient.

Choice (B)

19. We cannot answer the question by using any statement alone. By combining both the statements, the weight of the golden ball must have been either same as or lesser than the iron ball.
$\therefore$ The golden ball is not heavier than iron ball.

Choice (C)

20. From (1), either blue or green is opposite to red.
From (2), as we do not know about the third green face we cannot answer the question.
By combining both the statements, as the blue faces are adjacent to each other, one of these faces must be opposite to red and the other must be opposite to the third green face.

Choice (C)

21. From (1), if P is the mother of R, then P may or may not be a sister of Q.
(1) alone is not sufficient.
From (2), as we don't know the gender of P, we cannot answer the question.
(2) alone is not sufficient.
From (1) and (2), as Q is only aunt of R we can say R is the child of P, but P may or may not be the sister of Q.
(1) and (2) even when taken together are not sufficient.

Choice (D)

22. (1) alone is not sufficient as we don't know whether Ravi attends the party or not.
(2) alone is not sufficient as it has no information about Kiran.
From (1) and (2), as Varun did not attend the party, Ravi did not attend the party.
$\Rightarrow$ Kiran did not attend the party.
(1) and (2) together are sufficient.

Choice (C)

23. Clearly, neither of the statements alone is sufficient as each has only a partial information.
From (1) and (2), as we don't know whether Arvind failed in physics or not, we cannot answer the question.
(1) and (2) even when taken together are not sufficient.

Choice (D)

24. Neither of the statements is sufficient as each statement gives information about only one person.
By combining both the statements, we can say that S and P are of different gender and as S has more brothers, S is female and hence P is brother of S. Choice (C)

25. Neither of the statements is sufficient as the angle may increase or decrease in each case.
By combining both the statements, we can say that the angle is decreasing.
$\therefore$ The angle between the hands = 70 + 55 = 125.

Choice (C)