

Answer Key Classic MoCAT 1

Answer Key

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Explanatory Answers – MoCAT 1

1. This was a classic.
 With combinations of 6 and 9, all multiples of 3 starting from 6 upto infinity can be purchased.
 With combination of one 20 box, and then some combinations of 6 and 9, all values which are 1 less than any multiple of 3, starting from 26 to infinity, can be purchased.
 With combination of two 20 boxes, and then some combinations of 6 and 9, all values which are 2 less than any multiple of 3, starting from 46 to infinity, can be purchased.
 \therefore Now we can purchase multiples of 3, 1 less than multiple of 3 and 2 less the multiple of 3. Now 3 less than a multiple of 3 would anyway be a multiple of 3.
 So we have all numbers starting from 46 covered.
 45 is a multiple of 3. So counted in 1st step.
 44 is 1 less than a multiple of 3, so counted in 2nd step.
 43 is not counted. So answer = 43.

Shortcut:

For better visualization of the above, answer the question “What is the largest number that cannot be created using some combination of 2 and 5. Answer is obviously 3.

2. A needs to cover 11 segments. Each time he has a choice of either going north or west. He can only have exactly 5 North's. So in his route when he chooses North determines his route. In the 11 segments he can choose 5 North's in $^{11}C_5$ ways.
 i.e. 462.
 Alternately, he has to choose exactly 6 West's. This can be done in $^{11}C_6$ ways = $^{11}C_5 = 462$.

3. The two diagonals of the rectangle are equal.
 $\therefore DB = AC = 17$ cm, the radius of the circle. Hence, [2].

4. There are 3 ways a^b can be equal to 1 when a and b are integers.
 I) $a = 1$ II) $a = -1$ and b is even III) $b = 0, a \neq 0$.

Case I) $x^2 - x - 1 = 1$

i.e. $x^2 - x - 2 = 0$

i.e. $x^2 - 2x + x - 2 = 0$

i.e. $(x - 2)(x + 1) = 0$

$\Rightarrow x = 2$ or $x = -1$

Case II) $x^2 - x - 1 = -1$ and $x + 2$ is even.

$\Rightarrow x(x - 1) = 0$

i.e. $x = 0$ or $x = 1$

The choice $x = 0$ is a solution since $x + 2$ is even.

Case III) $x + 2 = 0 \Rightarrow x = -2$

This is a solution since

$(-2)^2 - (-2) - 1 = 5 \neq 0$

\therefore There are 4 solutions. Hence [3]

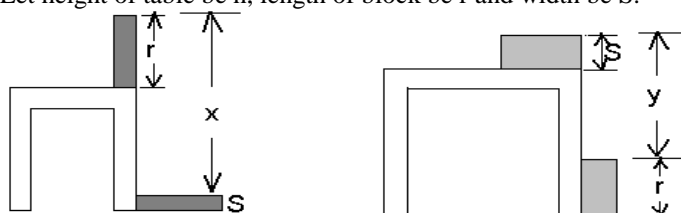
5. $\frac{47}{17} = 2 + \frac{13}{17}$

$$\begin{aligned}
 &= 2 + \frac{1}{\frac{17}{13}} &= 2 + \frac{1}{1 + \frac{4}{13}} \\
 &= 2 + \frac{1}{1 + \frac{1}{\frac{13}{4}}} &= 2 + \frac{1}{1 + \frac{1}{3 + \frac{1}{4}}}
 \end{aligned}$$

Comparing with $2 + \frac{1}{x + \frac{1}{y + \frac{1}{z}}}$ we get, $x = 1, y = 3, z = 4$.

Hence [2]

6. Let height of table be h , length of block be r and width be S .



$$h - S + r = x = 32$$

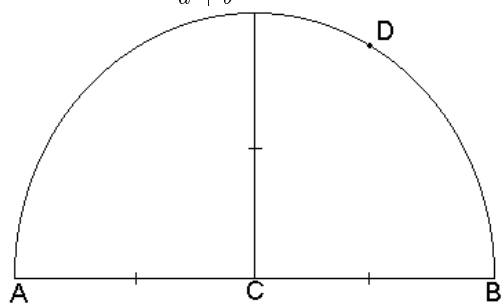
$$h - r + S = y = 28$$

$$2h = 60$$

$$\text{i.e. } h = 30''$$

Hence [3]

7. Average speed = $\frac{2ab}{a+b}$



$$= \frac{2 \times 70 \times 30}{100} = 42 \text{ km/hr. Hence [1]}$$

8.
$$\text{Average speed} = \frac{\text{Total Distance}}{\text{Total Time}}$$

$$42 = \frac{\text{Total Distance}}{5}$$

Total Distance = 210 km.

$$\therefore \text{Length of Outer Ring Road} = \frac{22}{7} \times \frac{210}{2} = 330 \text{ km}$$

$$\text{Time taken by Ravi} = \frac{330 \text{ km}}{110 \text{ km/hr}} = 3 \text{ hrs.}$$

\therefore Ravi left Indiranagar at 9.00 am. Hence [3]

9.
$$x = \sqrt{3 - \sqrt{5} + \sqrt{9 - 4\sqrt{5}}}$$

$$= \sqrt{3 - \sqrt{5} + \sqrt{(\sqrt{5})^2 - (4\sqrt{5}) + (2)^2}}$$

$$= \sqrt{3 - \sqrt{5} + \sqrt{(\sqrt{5} - 2)^2}} = \sqrt{3 - \sqrt{5} + \sqrt{5} - 2}$$

$$= \sqrt{1} = 1$$

$$y = \sqrt{\sqrt{7} - 1 - \sqrt{(\sqrt{7})^2 - (4\sqrt{7}) + (2)^2}}$$

$$= \sqrt{\sqrt{7} - 1 - \sqrt{(\sqrt{7} - 2)^2}}$$

$$= \sqrt{\sqrt{7} - 1 - \sqrt{7} + 2} = \sqrt{1} = 1$$

$$\frac{x+y}{x-y} = \frac{1+1}{1-1} = \frac{2}{0} = \text{not defined.}$$

Hence [4]

- 10-11. It is given that ,
 $(pqrs) = (pqr) \times (qs)$
 i.e. $(pqr)10 + s = (pqr)(10q) + (pqr)s$
 Comparing we get $q = 1$ and $s = 0$
 10. [2] and 11. [4]

12. The average of 'x' numbers is $20 \frac{7}{13}$.

$\therefore x = \text{approx } 40$ (as numbers are 1, 2,40 with just 1 number missing).

$$\text{Now } 20 \frac{7}{13} = \frac{267}{13} = \frac{267}{13} \times \frac{3}{3} = \frac{801}{39}$$

This indicates that sum of 39 numbers = 801.

$\therefore x$ is definitely 39.

\therefore Total numbers = $x + 1 = 40$.

$$\text{Sum of numbers from 1 to 40} = \frac{40 \times 41}{2} = 820.$$

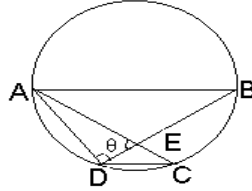
Sum of numbers from 1 to 40 – the missing number = 801

\therefore missing number = 19

13. $N = 7^{5 \cdot 3^{2^{17}}}$, which has only 7 as a prime factor. Hence [1]

14. $2 = f(0) = f(-98 + 98)$
 $= -98 + f(98)$
 $\therefore f(98) = 98 + 2 = 100$
Hence [4]

15. Diameter subtends right angle at the circumference.



$\therefore \Delta DEC$ is similar to ΔAEB we have

$$\frac{\text{area}(\Delta DEC)}{\text{area}(\Delta AEB)} = \frac{DE^2}{AE^2} = \frac{AE^2 \cos^2 \theta}{AE^2} = \cos^2 \theta$$

Hence [3]

- 16.

	Oranges	Rs
CP	q	12
CP	1	12/q
SP	20	P
SP	1	P/20

$$\text{Profit \%} = \left(\frac{\text{SP} - \text{CP}}{\text{CP}} \right) \times 100$$

$$r = \left(\frac{\frac{p}{20} - \frac{12}{q}}{\frac{12}{q}} \right) \times 100$$

$$= \frac{q}{12} \left(\frac{pq - 240}{20q} \right) \times 100$$

$$12r = 5pq - 1200$$

$$\therefore 5pq - 12r = 1200$$

Hence [3]

17. $x^2 - 5x + 6 < 0$
 $\Rightarrow (x - 3)(x - 2) < 0$
i.e. $(x - 3) < 0$ and $(x - 2) > 0$
or $(x - 3) > 0$ and $(x - 2) < 0$
i.e. $x < 3$ and $x > 2$
or $x > 3$ and $x < 2$
 $\therefore x < 3$ and $x > 2$
 $P = (x + 2)(x + 3)$
 \Rightarrow Using the values of x we get $20 < P < 30$
Hence [2]
Alternately
 x will lie between the roots.
 $2 < x < 3$
Hence $20 < P < 30$

18. $\text{Average} = \frac{100(-1)}{200} = -0.5$

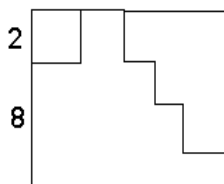
Hence [2]

19. We have $88 \times 11 = 968$ and $9 + 6 + 8 = 23$

\therefore the sides of the Δ are 9, 6, 8. Using hero's formula we get area = $\frac{\sqrt{8855}}{4}$

Hence [3]

20. Perimeter = $2(10 + 12) = 44$



Hence [3]

21. The line $x = k$ intersects $y = \log_5(x + 4)$ and $y = \log_5 x$ at $(k, \log_5(k + 4))$ and $(k, \log_5 k)$ respectively. Since the length of the vertical segment is 0.5,

$$0.5 = \log_5(k + 4) - \log_5 k$$

$$\text{i.e. } 0.5 = \log_5 \frac{k + 4}{k}$$

$$\text{i.e. } \sqrt{5} = \frac{k + 4}{k}$$

$$\text{i.e. } k = \frac{4}{\sqrt{5} - 1} = 1 + \sqrt{5}$$

$$\therefore a + b = 1 + 5 = 6.$$

Hence [1]

22. Complete the triangle by joining the ends of the two diagonals. \therefore the angle is 60° .

Hence [2]

23. Let the two numbers be a and b .

$$\frac{a + b}{2} = \frac{11}{2} \Rightarrow a + b = 11 \dots\dots\dots (1)$$

$$\frac{2ab}{a + b} = \frac{56}{11} \Rightarrow 2ab = 56$$

$$(a + b)^2 - (a - b)^2 = 4ab$$

$$\Rightarrow 121 - (a - b)^2 = 112$$

$$\therefore (a - b)^2 = 9$$

$$\text{i.e. } a - b = 3 \dots\dots\dots (2)$$

Solving (1) and (2) we get $a = 7$, $b = 4$.

Hence [2]

24. The pigeonhole principle is as follows: If n pigeon holes shelter $kn + 1$ pigeons, where k is a positive integer, atleast 1 hole shelters atleast $k + 1$ pigeons.

$$r = 4 = k + 1 \Rightarrow r = 3.$$

$$\therefore \text{there are 3 colours } \therefore n = 3$$

$\therefore kn + 1 = 3(3) + 1 = 10$ balls must be removed.

Hence [2]

Alternately

Such questions can be considered looking at worst-case scenarios.

In the worst case, you may draw 3 balls each of 3 different colours. Hence the 10th ball that you draw will definitely form the 4th ball of that particular colour.

25. $r = 9 = k + 1 \Rightarrow r = 8$

Here $n = 1$ as there is only 1 colour with 9 balls.

$$\therefore 4 + 7 + (kn + 1)$$

$$= 4 + 7 + [8(1) + 1]$$

$$= 20 \text{ balls.}$$

Hence [4]

Alternately

9 balls of the same colour is only possible for red balls. In the worst case, you may draw 19 balls and still not get all red. So you have to draw 20 balls to ensure that you have all red colour balls.

26. Let the base be x

$$(20)_x - (12)_x = (24)_x - (20)_x$$

$$2x + 0 - [x + 2] = 2x + 4 - [2x + 0]$$

$$\text{Solving, } x=6$$

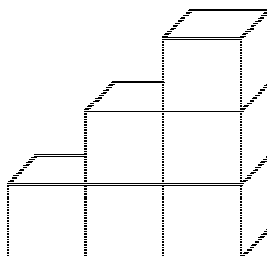
27. The question is basically sum of numbers from 1 to 12 divided by 3.

28. Transfer 1, 2, 3, 4, 5 and 6 to B. Now transfer 7 to C. From B transfer 6, 5, 4, 3, 2 and 1.

29. Two perpendicular lines crossing at the centre of a square, divide the square into 4 congruent pieces.

So the shaded portion is $\frac{1}{4}$ (area of the square), i.e. $\frac{10 \times 10}{4}$, i.e. 25 cm^2 . Hence, [3].

30. The steps will be as shown in the diagram.



$$\therefore \text{For 230 metres you require } 230 + 229 + 228 + \dots + 2 + 1 = \frac{230 \times 231}{2} = 26565$$

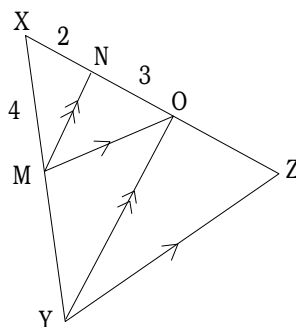
31. Two situations possible. The chords are on the same side of the circle or the chords are on two sides of the center. Do not calculate distance. Answer has to be “can’t say”.

32. Let the average of all 8 be Rs. x

$$8x = 6 \times 30 + x + 10 + 55$$

$$7x = 245, \quad x = 35, \quad \text{Total sum} = 280.$$

33. In $\triangle XYO$, $MN \parallel YO$, let $MY = x$ cm.



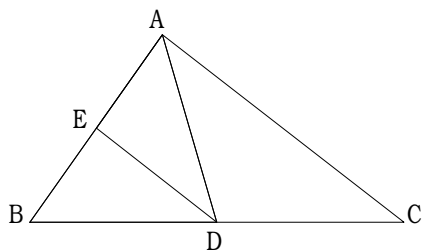
$$\therefore \frac{XM}{MY} = \frac{XN}{NO} \text{ (BPT)} \quad \therefore \frac{4}{x} = \frac{2}{3} \Rightarrow x = \frac{4 \times 3}{2} = 6 \text{ cm}$$

In $\triangle XYZ$, $MO \parallel YZ$. Let $OZ = y$ cm.

$$\therefore \frac{XM}{MY} = \frac{XO}{OZ} \text{ (BPT)} \quad \therefore \frac{4}{6} = \frac{5}{y} \Rightarrow y = \frac{6 \times 5}{4} = 7.5 \text{ cm}$$

Hence, [1].

34. Let ABC be the scalene triangle. Let D be the midpoint of BC and E , the midpoint of AB .



$\therefore AD$ divides $\triangle ABC$ into two triangles of equal area.

Also, DE divides $\triangle ABD$ into two triangles of equal area. $\therefore \frac{\Delta(BED) \text{ or } \Delta(AED)}{\Delta(ABC)} = \frac{1}{4}$

Hence [1].

35. The numbers can start from any number between 900 and 992 (both included); so there are 93 choices. Hence, [2].

36-39

- If AK only works with RM, then 2003 hit of AK is with RM.
- Hence SRK in 2003 combined with PZ to give a hit
- If AR and SK do not work together, then AR's two hits in 2000 are with SRK and VO.
- Hence SK's hit in 2000 is with RM.
- SRK has had hits with PZ and AR in 2003 and 2000 respectively. So SRK's hits in 2002 are with PZ and AR. Also SRK's in 2004 is with AR.
- VO's 2004 hit is with MD.
- As VO has had 2 hits in 2001, atleast one of them is with MD. Given that PZ has not worked with VO, then VO's 2nd hit in 2001 is with RM.
- Hence in 2001, PZ has a hit with HR.

36. Hits are with PZ and AR. Hence [1].

37. MD's both hits have been with VO. Hence [2].

38. HR's hits have been with PZ in 2001 and others in 2002 and 2004. Hence [3].
 39. The 2 hits of others in 2004 are with HR and SK, and the three hits in 2002 are with AK, HR and SK. Hence both HR and SK have had 2 hits with others. Hence [3].
 40. If Vibha eats Peach, then she eats sweet lime. But she does not eat a mango if she eats a citrus fruit. Hence [3]
 41. With sweet lime and guavas, two of the four fruits have been chosen. Mango cannot be eaten. So from the five remaining fruits, she has to select 2. This can be done in 10 ways.
 42. If Vibha has had mangoes, then she cannot eat oranges, sweet lime and also peaches. So from 4 fruits she has to select 3. i.e. she can avoid eating any one of the four fruits. Hence [4].

- 43-46** I : F = 4.5 : 3 \therefore I = 9 and F = 6
 A : B : C = 1 : 2 : 4, hence the options are (1, 2, 4) or (2, 4, 8)
 A = 2 E. \therefore (A, B, C) = (2, 4, 8) and E = 1.
 D = 2 J. This is only possible if D = 10 and J = 5, from the remaining numbers.
 G : I = 1 : 3. So, G = 3
 \therefore H = 7

A	B	C	D	E	F	G	H	I	J
2	4	8	10	1	6	3	7	9	5

Now all questions can be answered.

47. It makes sense to convert all values to Rs. Befre starting. Wipro on NQE had the highest percentage increase (60.5 to 71.5)
 48. Percentage Profit from TCS is highest. (445.5 to 450) = over 10%.
 49. Use this smarter approach. Total shares = 1 million. Average share price = $(247 + 232) / 2$.
 So if one wants to buy entire SIFY (100% of SIFY), then consideration = approx Rs. 240 million.
 So for 15% of SIFY, one needs to pay around Rs. 36 million.
 50. A) $a^n - b^n$ is divisible by $a - b$ for all values of n.
 B) $a^n + b^n$ is divisible by $a + b$ only for the odd values of n.
 51. A) $x = 6$. we don't know the value of y
 B) $y = x - 1$ when $\frac{x^{356}}{x-1}$ the remainder is I.
 52. Both the statements together & either statement alone is not sufficient to give a unique solution
 53. A) is not sufficient
 B) $5x + 6y + 7z = 5x + 5y + 5z + (y + 2z)$
 $y + 2z$ is divisible by 5, because $y + 2z$ is divisible by 10.
 Hence $5x + 6y + 7z$ is divisible by 5.
 54. Statement A alone is sufficient.
 55. Combination of the two statement will also not give the answer
 A) $a^x = x^a$ Four cases arise.
 1) $a = x$ 2) $a = 2; x = 4$ 3) $a = 4; x = 2$ 4) $a = -2$ and $x = -4$
 But in two cases $a > x$
 B) $a \neq x$. does not help.
 56. A) Statement A alone is not sufficient. (2 unknowns)
 B) Sum of two square numbers is 0 implies both numbers are 0.
 So $x = 2$ and $y = -3$. Hence B alone is sufficient.
 57. The statements alone are not sufficient.
 Taken together, we get
 $b - 3 = 3a$
 i.e. $b = 3a + 3$
 $a = 7k + 6$

$$b = 3(7k+6) + 3$$

$$b = 21k + 18 + 3$$

$$b = 7(3k+3)$$

Hence [3]

58-61 New computers infected every day can be calculated as

	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5
NIMDA	1	$1 \times 5 = 5$	$(1 + 5) \times 20 = 120$	$(120 + 5) \times 30 = 3750$	$(3750 + 120) \times 40 = 154800$	$(154800 + 3750) \times 40 = 6342000$
LOVEBUG	1	$1 \times 20 = 20$	$(20 + 1) \times 15 = 315$	$(315 + 20) \times 15 = 5025$	$(5025 + 315) \times 15 = 80100$	Not required

62. Kamaths = $30000 + 18000 + 32500 = 80500$
 Biyanis = $9000 + 7500 + 7500 = 24000$
 Difference = 56500
63. Music System = $35 / 8$
 TV = $22.5 / 7.5$
 DVD = $32.5 / 7.5$
 Least is TV.
64. $(18000 + 27000) \times 0.9 + 12000 = 52500$
65. Kamaths = $14000 + 9000 + 7500 = 30500$
 Sharmas = $18000 + 22500 + 27000 = 67500$
 Savings = $37500 / 67500 = \text{approx } 55\%$.
66. Most expensive music system is Kenwood, TV is Sony and DVD is either Kenwood or Panasonic. All these are the desirables of Biyanis. So they have to spend the most.

67-71

Using the data, we can get the following.

- In 1 match India has scored 3 goals and the opponent scored 4 goals. That is only possible with Pakistan.
 - Canada has played 3 matches, so these are against all other countries but India. So Korea's match was against Canada and the score line was Korea 2 – Canada 1.
 - So of the 4 goals Canada scored, 1 was against Korea. Remaining 3 against Pak and Germany.
 - And both the goals hit against Canada are by Korea.
 - Now, Canada has drawn 1 match. This has to be with Germany. That has to be a goalless draw. So the score line in third match of Canada was Canada 3 – opponent 0.
 - Canada's 3-0 is only possible with Pakistan.
 - Germany has won one match, and this has to be against Pakistan. Score line was 3-2.
- Now all questions can be answered.

72. While i and ii are mentioned, iii has not been mentioned in context of the professional banker.
73. The first 3 paras are about the lack of finesse in the Turki's approach, and his care-a-damn attitude. In para 4, the difference starts arising. In para 5, he talks about the eye to details of the Chinese carter.
74. Para 5, first few lines clearly says that Chinese use ta-suan in all spheres of life.

75. Nowhere it is said that the profits from trade of animals is higher, though it is mentioned that it is substantial.
76. Refer 2nd para last line.
77. Refer 3rd para.
78. Refer 4th para penultimate line.
79. Refer last para 1st line.
80. Refer last para. The analogy of going fishing was too close, so ideas turned up were routine.
81. Refer 6th para.
82. Refer first 3 lines of the passage.
83. The frying an egg analogy is mentioned after suggestion that the fishing analogy was too close. It was said in the context of lack of creative ideas that may emerge as the analogy was too close.
84. While both 2 and 3 seem correct, to define why the army remained a state within a state, only 3 is correct.
85. 2, 3 and 4 are not mentioned. 1 is implied in the passage.
86. Option 1 is incorrect as nowhere it is mentioned that new recruits had a difficulty in proving themselves. Option 2 is incorrect as nowhere it is mentioned that Gaulle supported Petain even after Petain being branded traitor. Again, Gaulle was not rash in his decision making. The passage actually says that it may seem rash, but it was not so. Hence [3]
87. Refer last para.
88. Get one's act together implies to get organized. However, in statement 4, it is used in the context of better acting, which is incorrect usage.
89. One fight's off opponents, not fights 'of'. Hence [3]
90. Correct usage is "on ground of his declaration"; it has to be used in singular.
91. "let on" means admit or pretend. Not correct in the context used here.
92. Option [3] should be knock-off an enemy.
93. A and E are linked. B and D are linked. F comes after A.
94. The classic opening lines of the "Gift of the Magi". While A, B, C and D are obvious, E stands out as the fifth statement as 'Christmas' is introduces, but not spoken about. So E is best the last sentence.
95. C is the best sentence to follow 1. The phrase 'that year' in C corresponds with 1895 in 1. The possible answers are (1) and (4). B is a logical precedent to 6 (the continuity link "little bodies"). The best answer is (4).
96. The best sentence to follow 1 is B. Note the continuity link 'space-time.' The only answer choice is (2).
97. C is the best sentence to follow 1. The best answer is (4).
98. C is the best sentence to follow 1. The best answer is (2).
99. A is the best sentence to precede 6. (1) is the best answer.
100. C is the best sentence to follow 1. The best answer is (2).
101. Option 1 is correct.
102. Option 3 is correct.
103. Option 2 is correct.
104. Option 4 is correct.
105. Option 3 is correct.
106. Option 4 is correct.
107. Option 4 is correct.
108. Option 3 is correct.
109. Option 2 is correct.
110. B is the obvious starting sentence. D and E are linked, and it is E which should come before as it talks about a subject not discussed again.
111. B is the starting sentence. Then in statement A, he says that something reached his year. Then the sounds become a hum in D. But not for long, in F. Then he sees the black judges in C who seem to be white to him in E.

112. A and F are linked in the form of Answer and a surprise at the answer. D is a reiteration of the answer. C presents the reason for the shock and disbelief in F. E is the answer to C and B a retort to E. By the way, the protagonists are aliens, discussing human species.
113. Best answer is 4. Cannot be 2. Nowhere it is hinted that quality of education provided is bad. Only what has been hinted is that evaluation process is not upto the mark.
114. An important question. Please remember that when two statements are linked by an and, we have to consider that as one statement. Now False of A and B leads to 3 cases
1] only A False 2] only B false, and c] both false.
So Jackie speaks the truth. i.e. Both do not know the way to the mall. And Sujata has to speak false. So from the two parts of her statement, even if one is false, that is sufficient. The second part of her statement is false.
115. The kind of 'war' being spoken here is blackmail, armtwisting etc. between nations. That is the underlying current in option 3, as when US failed to convince China to devalue its currency, it starts seeking other options, in trying to force China to do so.