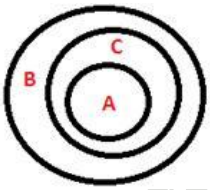
LOGICAL REASONING

SESSION – 1

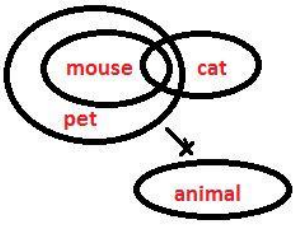
SYLLOGISM

State whether the given conclusion is **True or False.**

1. Ans: [a]
Conclusion is true.
Possibility figure –



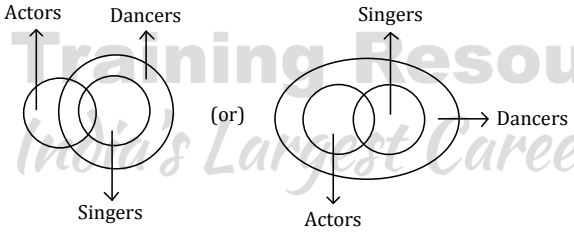
2. Ans: [b]
Conclusion is false because possibility figure is not possible.



3. Ans: [a]
Option (a) is the right answer.

4. Ans: [d]
Read the conclusions and then decide which of the given **conclusions logically follows** from the given statements,

5. Ans: [a]



Only (1) follows.

6. Ans: [b]

7. Ans: [d]

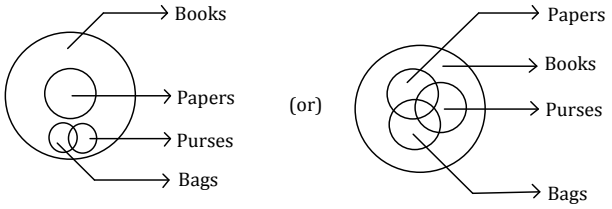
8. Ans: [d]

9. Ans: [a]

10. Ans: [d]
Only II follows

11. Ans: [d]
None follows

12. Ans: [b]



Only (2) and (3) follows.

13. Ans: [b]

14. Ans: [d]

15. Ans: [e]
I and II follow

16. Ans: [d]
All follows

17. Ans: [b]

18. Ans: [a]

19. Ans: [d]

20. Ans: [b]

SESSION – 2

BINARY LOGIC

1. Ans: [b]
We will have to assume some part of the statement to be true and proceed from there.
Case 1: Assumption is that the dog had black hair
The dog had black hair.
=> Short tail (from Shopkeeper number 1)
=> No collar (from Shopkeeper number 3)
Case 2: Assumption is that the dog had white hair
The dog had white hair.
=> Long tail (from Shopkeeper number 1)
=> Collar (from Shopkeeper number 3)
So, from the two cases we get two possible conclusions which are:
The dog had black hair, short tail and no collar.
OR
The dog had white hair, long tail and a collar.
The second case is given to us in **Option B.**

2. Ans: [b]
X is a knight so he is speaking the truth.
=> Y is not a spy.
=> Y is a knave.
=> Z is a spy and he is lying.

Case 2:

X is a knave so he is lying.

=> Y is a spy

=> Z has to be a knight but there is logical inconsistency.

=> Case 2 is not possible.

Case 3:

X is a spy and we do not know whether he is speaking the truth / lying.

=> Z is a knight.

=> Y is a knave.

So, the possible combinations are

X (Knight), Y (Knave) & Z (Spy)

OR

X (Spy), Y (Knave) & Z (Knight)

In both cases **Y is a knave. Option B** is our answer.

3. Ans: [b]

There are 4 cases

(1) It is morning and A is shahrukh, but is invalid because Shahrukh speaks truth only in the morning.

(2) It is morning and A is salman, it may be the answer because Salman speaks truth only in the afternoon and we don't know what does he speak (truth or lie) in the morning.

(3) It is afternoon and A is shahrukh, it may be possible that he is telling a lie so this may be the answer.

(4) It is afternoon and A is salman, this must be the answer because Salman speaks truth only in the afternoon.

4. Ans: [b]

As all are contradictory statements, it is clear that ONLY one of them is telling the truth. So remaining 4 of them are lying. Querishi mentioned that exactly 4 are lying. So, he is telling the truth.

Let us 1st assume that Uma is telling the truth. Then according to her only one is lying. But if only one is lying then all the others' statements are contradicting the possibility. In the same way all the other statements should be checked. If we assume the Querishi is telling the truth, according to him exactly 4 members are lying. So all the others are telling lies and he is the one who is telling the truth. This case fits perfectly.

5. Ans: [c]

Let Rajesh be Truth teller => Prakash is an alternator => Rakesh is a liar.

Rajesh 's first statement => I am liar is true but he is a liar contradicts the fact that Rajesh is truth teller.

So croseed the option where Rajesh is truth teller. Also if we assume he is an alternator ..... none of his statement makes him alternator.

=> Rajesh ia a Liar.....=> Prakash is a Truth teller... (Prakash is not an alternator)=> Rakesh is Alternator..... after checking his statements we ge that and data of table is verified.

6. Ans: [b]

If we assume Good is of Sachcha tribe person, His both statements should be true. But one of his statement Ugly is of sachcha tribe should be wrong as there is only one shachcha tribe person.

Now assume BAD is of sacha tribe person. Now his second statement is obviously true and His first statement indicates that Good is of Jutha type which implies that Ugly is of Lota type. Now checking of the truthfullness of the statements of Good and Ugly, we get Good's both the statements are wrong and Ugly's one statements is correct and one is wrong. So Good Belong to Jutha tribe.

7. Ans: [b]

Lavesh is a King.

Mayank is a Spy.

Manoj is a Bureaucrat.

Mayank is not the king, since if he is, then Lavesh would also be the king.

Manoj is not the king, since his statement would then be a lie.

Therefore Lavesh is the king. Hence Manoj is the bureaucrat, and Mayank is the thief.

8. Ans: [a]

Mr. May is telling the truth.

Mr. April lies when he says that Mr. May is lying. Mr. May is telling the truth when he says that Mr. June is lying. Mr. June is lying when he says both Mr. April and Mr. May are lying since one is telling the truth.

9. Ans: [a]

As only one statement is wrong, other two statements will be true.

Assume Gandhi wins the election. Now Statements of P and Q are true. Which satisfies our condition that 2 of them are truth tellers. So Gandhi wins the election.

If you assume Nehru wins the election, Statements of Q and R are becoming false which is against our condition.

10. Ans: [a]

B is telling the truth.

The only way for there to be just one person telling the truth is if what B says is true. If A is telling the truth, then C's statement that B is a liar also becomes true. On the other hand, if C is telling the truth, then B's statement that A is a liar becomes true. In both cases you end up with two truth-tellers and one liar, so the only possible solution is that B is the one telling the truth.

11. Ans: [b] 12. Ans: [a] 13. Ans: [d] 14. Ans: [c]

15. Ans: [b] 16. Ans: [c] 17. Ans: [c] 18. Ans: [c]

19. Ans: [b] 20. Ans: [a]

SESSION – 3

SEQUENTIAL OUTPUT TRACING

1. Ans: [b]

Step III: year 92 ultra 15 23 strive house 39
Step IV: year 92 ultra 39 15 23 strive house
Step V: year 92 ultra 39 strive 15 23 house
Step VI: year 92 ultra 39 strive 23 15 house
Step VII: year 92 ultra 39 strive 23 house 15

So, four more steps are required.

2. Ans: [c]

Input: any how 49 24 far wide 34 69
Step I: wide any how 49 24 far 34 69
Step II: wide 69 any how 49 24 far 34
Step III: wide 69 how any 49 24 far 34
Step IV: wide 69 how 49 any 24 far 34
Step V: wide 69 how 49 far any 24 34
Step VI: wide 69 how 49 far 34 any 24

So, step V is first step from last.

3. Ans: [d]

Step II: town 74 pair 15 31 nice job 42.

Input can not be determined.

4. Ans: [d]

Input: play over 49 37 12 match now 81.
Step I: play 81 over 49 37 12 match now.
Step II: play 81 over 49 now 37 12 match.
Step III: play 81 over 49 now 37 match 12.

Fourth step cannot be determined.

5. Ans: [b]

Step II: war 58 box cart 33 49 star 24.
Step III: war 58 star box cart 33 49 24.
Step IV: war 58 star 49 box cart 33 24.
Step V: war 58 star 49 cart box 33 24.
Step VI: war 58 star 49 cart 33 box 24.

So, last step is step VI.

6. Ans: [d]

Input: shower fall water 34 51 67 98 goal.
Step I: water shower fall 34 51 67 98 goal.
Step II: water 98 shower fall 34 51 67 goal.
Step III: water 98 shower 67 fall 34 51 goal.
Step IV: water 98 shower 67 goal fall 34 51.
Step V: water 98 shower 67 goal 51 fall 34.

Five steps required to complete the rearrangement.

7. Ans: [c]

After careful analysis of the given input and various steps of rearrangement it is evident that in each step one word and a number are rearranged. In the first step, the word which comes the first in English alphabetical series and the highest number move to the extreme left positions. In the second step, the word which comes to second in English alphabetical series and the second highest number are moved to the extreme left positions. The same procedure is continued till all the words are arranged in the reverse alphabetical order from left to right and all the numbers get arranged in ascending order.

Input: man 58 32 18 want to become 75 99 lazy god 35
Step I: become 99 man 58 32 18 want to 75 lazy god 35
Step II: god 75 become 99 man 58 32 18 want to lazy 35
Step III: lazy 58 god 75 become 99 man 32 18 want to 35
Step IV: man 35 lazy 58 god 75 become 99 32 18 want to
Step V: to 32 man 35 lazy 58 god 75 become 99 18 want
Step VI: want 18 to 32 man 35 lazy 58 god 75 become 99

8. Ans: [b]

Input: man 58 32 18 want to become 75 99 lazy god 35
Step I: become 99 man 58 32 18 want to 75 lazy god 35
Step II: god 75 become 99 man 58 32 18 want to lazy 35
Step III: lazy 58 god 75 become 99 man 32 18 want to 35
Step IV: man 35 lazy 58 god 75 become 99 32 18 want to
Step V: to 32 man 35 lazy 58 god 75 become 99 18 want
Step VI: want 18 to 32 man 35 lazy 58 god 75 become 99

9. Ans: [e]

There are 5 elements (65, credit, 90, money, 24) between 'for' and '18' in the step III.

After careful analysis of the given input and various steps of rearrangement it is evident that in each step one word and a number are rearranged. In the first step, the word which comes the first in English alphabetical series and the highest number move to the extreme left positions. In the second step, the word which comes to second in English alphabetical series and the second highest number are moved to the extreme left positions. The same procedure is continued till all the words are arranged in the reverse alphabetical order from left to right and all the numbers get arranged in ascending order.

Input: Money 48 24 18 wanted for investment 65 90 lock credit 32

Step I: credit 90 Money 48 24 18 wanted for investment 65 lock 32

Step II: for 65 credit 90 Money 48 24 18 wanted investment lock 32

Step III: investment 48 for 65 credit 90 Money 24 18 wanted lock 32

Step IV: lock 32 investment 48 for 65 credit 90 Money 24 18 wanted

Step V: Money 24 lock 32 investment 48 for 65 credit 90 18 wanted

Step VI: wanted 18 Money 24 lock 32 investment 48 for 65 credit 90

And, Step VI is the last step for the given input.

Solutions for Q10 to Q13: After careful analysis of the given input and various steps of rearrangement it is evident that in each step one word and a number are rearranged. In the first step, the word which comes the last in English alphabetical series move to the extreme left position and the highest number is placed at the extreme right position. In the second step the second highest number is placed at the second position from the right and the word which comes in the last second in alphabetical order will moves to the second left extremes position. These two steps are continued alternately till all the numbers are get arranged in the descending order from the right and the words are arranged in descending order from the left extreme positions.

Input: arrow 98 paint 58 lamb 38 each 78 great 18 most 48 rent 88

Step I: rent arrow paint 58 lamb 38 each 78 great 18 most 48 88 98

Step II: rent paint arrow 58 lamb 38 each great 18 most 48 78 88 98

Step III: rent paint most arrow lamb 38 each great 18 48 58 78 88 98

Step IV: rent paint most lamb arrow 38 each great 18 48 58 78 88 98

Step V: rent paint most lamb great arrow each 18 38 48 58 78 88 98

Step VI: rent paint most lamb great each arrow 18 38 48 58 78 88 98

10. Ans: [c]
Lamb is the word which would be fifth to the left of sixth element from the right in the step V.

11. Ans: [d]
In step IV 58 is the eleventh from the left.

12. Ans: [e]

13. Ans: [a]
There are eight elements between "most" and "78" as they appear in the step VI.

Solutions for Q14 to Q16: After careful analysis of the given input and various steps of rearrangement it is evident that in the first step the highest number is placed at the extreme left position and in the second step the word which comes first in the alphabetical order is placed at the extreme right position. In the next step the second highest number is placed at the second position from the left. After that step the word which comes second in the alphabetical order is placed at the extreme right position. These two steps are continued alternately till all the numbers get arranged in the descending order from the left and all the words get arranged in alphabetical order after the numbers.

Input: Class 25 war 15 race 73 heap 58 just 88 take 38

Step I: 88 Class 25 war 15 race 73 heap 58 just take 38

Step II: 88 25 war 15 race 73 heap 58 just take 38 class

Step III: 88 73 25 war 15 race heap 58 just take 38 class

Step IV: 88 73 25 war 15 race just take 38 class heap

Step V: 88 73 58 25 war 15 race just take 38 class heap

Step VI: 88 73 58 25 war 15 race take 38 class heap just

Step VII: 88 73 58 38 25 war 15 race take class heap just

Step VIII: 88 73 58 38 25 war 15 take class heap just race

Step IX: 88 73 58 38 25 15 war take class heap just race

Step X: 88 73 58 38 25 15 war class heap just race take

Step XI: 88 73 58 38 25 15 class heap just race take war

And, step XI is the last step.

14. Ans: [e]
The word 'war' is sixth from the left end in step VIII.

15. Ans: [c]
Option (c) is the step X.

16. Ans: [a]
Eleven steps were required to complete the arrangement.

17. Ans: [d]

Input: 89 speed very 87 65 expert 91 comment over 78 must 56

Step I: comment 89 speed very 87 65 expert 91 over 78 must 56

Step II: comment 89 speed very 87 65 expert over 78 must 56 91

Step III: comment expert 89 speed very 87 65 over 78 must 56 91

Step IV: comment expert speed very 87 65 over 78 must 56 89 91

Step V: comment expert must speed very 87 65 over 78 56 89 91

Step VI: comment expert must speed very 65 over 78 56 87 89 91

Step VII: comment expert must over speed very 65 78 56 87 89 91
Step VIII: comment expert must over speed very 65 56 78 87 89 91
Step IX: comment expert must over speed very 56 65 78 87 89 91
Answer is Nine.

18. Ans: [b]
Input: 89 speed very 87 65 expert 91 comment over 78 must 56
Step I: comment 89 speed very 87 65 expert 91 over 78 must 56
Step II: comment 89 speed very 87 65 expert over 78 must 56 91
Step III: comment expert 89 speed very 87 65 over 78 must 56 91
Step IV: comment expert speed very 87 65 over 78 must 56 89 91
Step V: comment expert must speed very 87 65 over 78 56 89 91
Step VI: comment expert must speed very 65 over 78 56 87 89 91
Step VII: comment expert must over speed very 65 78 56 87 89 91
Step VIII: comment expert must over speed very 65 56 78 87 89 91
Step IX: comment expert must over speed very 56 65 78 87 89 91
Answer is very.

19. Ans: [c]
Input: 89 speed very 87 65 expert 91 comment over 78 must 56
Step I: comment 89 speed very 87 65 expert 91 over 78 must 56
Step II: comment 89 speed very 87 65 expert over 78 must 56 91
Step III: comment expert 89 speed very 87 65 over 78 must 56 91
Step IV: comment expert speed very 87 65 over 78 must 56 89 91
Step V: comment expert must speed very 87 65 over 78 56 89 91
Step VI: comment expert must speed very 65 over 78 56 87 89 91
Step VII: comment expert must over speed very 65 78 56 87 89 91
Step VIII: comment expert must over speed very 65 56 78 87 89 91
Step IX: comment expert must over speed very 56 65 78 87 89 91
Answer is Ninth.

20. Ans: [c]
Input: 89 speed very 87 65 expert 91 comment over 78 must 56
Step I: comment 89 speed very 87 65 expert 91 over 78 must 56
Step II: comment 89 speed very 87 65 expert over 78 must 56 91
Step III: comment expert 89 speed very 87 65 over 78 must 56 91
Step IV: comment expert speed very 87 65 over 78 must 56 89 91
Step V: comment expert must speed very 87 65 over 78 56 89 91
Step VI: comment expert must speed very 65 over 78 56 87 89 91
Step VII: comment expert must over speed very 65 78 56 87 89 91
Step VIII: comment expert must over speed very 65 56 78 87 89 91
Step IX: comment expert must over speed very 56 65 78 87 89 91
Answer is must.

SESSION – 4

CRYPTARITHMETIC

1. Ans: [b]

BASIC	60852
+ LOGIC	+47352
PASCAL	108204

2. Ans: [a]

CELLO	96335
+ HORN	+ 8527
ZITHER	104862

3. Ans: [c]

CRASH	67230
+ ERROR	+ 87757
FOLDER	154987

4. Ans: [a]

SATURN	613847
+ TITAN	+ 30317
TRITON	340357
EUROPA	984521

5. Ans: [c]

HOW	152
x WE	x27
HAIL	1064
PAL	304
LHAL	4104

6. Ans: [a]

APT	435
x TO	x 56
MOVE	2610
MVDT	2175
MAPOE	24360

7. Ans: [d]

8. Ans: [a]

ASK	985
x TO	x 76
KARL	5910
OSAK	6895
TYSOL	74860

9. Ans: [d]

AID	795
xAD	x 75
RIAD	3975
DDCD	5565
DICED	59625

10. Ans: [c]

STOP	9284
PAST	4392
POST	4892

11. Ans: [b]

One technique that comes in handy for cryptarithmetic problems which involves subtraction is realizing that subtraction is "upside-down" addition. Or else, you can write "5 – 3 = 2" as ""2 + 3 = 5".

So the question

```
 C O U N T
 – C O I N
-----------
   S N U B
```

can be re-framed as

```
  S N U B
 +C O I N
-----------
C O U N T
```

Assume the columns are numbered from left to right.

1. From column 5, **C = 1** since it is the only carry-over possible from the sum of two single digit numbers in column 4 with or without carry over from column 3. Let's use some digits so that I can drive home this point without tying you in knots. Assume N and O from column 4 to have values 9 (it is impossible because no two letters should have the same digits as per the steadfast rule that I mentioned in the beginning; but still I picked 9 because sum of two single digits would be maximum if both the single digits are maximum. And maximum possible value of single digit is 9.) So sum from column 4 would be 18. Even if there is a carryover from column 3, the sum would be 18 + 1 = 19. So maximum carry over from column 4 would be 1. Hence the conclusion that C = 1.

2. Now we know C cannot be anything else other than 1. Column 4 has two possibilities which can be expressed as "S + 1 = 10 + O" (if there is no c.o. from column 3) or "c.o. + S + 1 = 10 + O" (if there is a c.o. from column 3) where c.o. indicates carry over. From the two expressions we have "S – O = 9" or "S – O = 9 – c.o.". As explained in the first point, c.o. from addition of two single digit numbers cannot be more than 1. So second expression becomes "S – O = 8". Let's substitute O = 1 in both the expressions. You don't need to fume your head to know that only second expression can be satisfied with this assumption. But we need a value of O that satisfies both the expressions. Or else the assumption is wrong. If you substitute value of O anything from 2 till 9, it wouldn't satisfy either of the two equations. So the only possible value of O is 0. So we can conclude **O = 0** i.e. in other words O must be less than M.

3. Now that we know O is 0, S can be either 8 or 9 depending of whether there is a c.o. from column 3. But if there were a c.o. from column 3, U would be less than O (similar to conclusion from point 2). This is impossible since O = 0. Therefore there is no c.o. from column 3 and **S = 9**.

4. If there is no c.o. from column 2 then N = U since O = 0. This is not possible. Therefore there is a c.o. and N + 1 = U. If there was a c.o. from column 1, then (U + I) mod 10 = N, and U = N + 1. So (N + 1 + I) mod 10 = N which means (1 + I) mod 10 = 0, so I = 9. But S = 9. So there must be a c.o. from column 1 and **I = 8**.

5. To have a c.o. from column 1, we must have B + N = 10 + T. T is at least 2 because 0 and 1 are taken. So B + N = 12. The only two pairs of available numbers that sum to at least 12 is (5, 7) and (6, 7). So either B = 7 or N = 7. Since U = N + 1, N can't be 7 because then U = 8 which is impossible. So **B = 7**.

6. N can't be 6 because then U = 7 which again is impossible. So **N = 5** and **U = 6**.

B + N = 12 so **T = 2**.

SNUB = 9567

12. Ans: [a]

To facilitate the analysis, let's break it down its basic components. i.e., 2 multiplications and 2 subtractions.

I. K × A K A = D Y N A

II. M × A K A = A R K A

III. D A D D

D Y N A (–)

A R M

IV. A R M Y

A R K A (–)

R A

Consider the 1st multiplication AKA × K = DYNA, where A × K = unit digit (A) and A can be 0 or 5. As the product DYNA is greater than the divisor AKA. A must be 5.

Substituting the value of A in 4th condition, we will get

5 R M Y

5 R K 5 (–)

R 5

Y – 5 = 0

Y must be 0.

Consider the 1st multiplication, 5 K 5 × K = D 0 N 5.

The remaining possible digits are 1, 2, 3, 4, 6, 7, 8, and 9.

By trial and error we get the DYNA as 4025.

13. Ans: [d]

From the question, it could be seen that N E T × K = N E T.

K must be 1.

```
      1T
   ---------
NET | LIN1
      NET
   ---------
      1E11
      1TEC
   ---------
      1EY
```

It can be seen from the last step that E can take only 5 because to subtract C from 1 it took one point from the previous number. So the next value becomes 10 – E = E.

The next step will be

```
      1T
   ---------
N5T | LIN1
      N5T
   ---------
      1511
      1T5C
   ---------
      15Y
```

It can be seen from the last step that 4 – T = 1. So T = 3.

As T × T = C, C must be 9.

The next step will be

```
      13
   ---------
N53 | LIN1
      N53
   ---------
      1511
      135C
   ---------
      159
```

From the above division,

N – 3 = 1, so N must be 4

I – 5 = 5, so I must be 0

(L-1) – 4 = 1, L must be 6

L I N K = 6041.

14. Ans: [c]

From the given subtraction is could be easily find that A can take only the number 1.

```
 1PPLE
  TH1T
 ------
  E1T
```

As L – 1 – 1 = 1, L must be 3.

```
 1PP3E
  TH1T
 ------
  E1T
```

By checking the possibility, T must be a bigger number and E received 10 points from 3 to subtract T.

Also we have 10 + (P – 1) – T = 0

9 + P = T

By trial and error, P must be 0 and T must be 9. Then E = 8

APPLE = 10038

15. Ans: [c]

```
E Y E * M A T
--------------
   S Y I A
 G M T A +
A I R Y + +
--------------
A A S M A A
```

Follow the steps to solve the above puzzle:

Step 1: Look for '0' or '1' in the Multiplier (M A T), we do not find one.

Step 2: Now, look at the product term of E Y E * _ A_ = G M T A. If you have gone through the previous post, you will guess that 'E' is either 1 or 6. Since it is not 1, it should be 6. And 'A' should be an even number and hence it should be 2,4,8. Considering 'A' as 2 and rewriting the multiplication we get,

6 Y 6 * M 2 T

S Y I 2
G M T 2 +
2 I R Y + +
---
2 2 S M 2 2

Step 3: Now looking at the sum in the 2nd column form the right i.e. 'I + 2 = 2', we can conclude that 'I' = 0, since there is no carry. Rewriting it would yield us,

6 Y 6 * M 2 T

S Y 0 2
G M T 2 +
2 0 R Y + +
---
2 2 S M 2 2

Step 4: Further, looking at the sum in the 2nd column form the left i.e. 'G + 0 = 2', we can conclude that 'G' is either 1 or 0, since we already have 'I' = 0, 'G' has to be 1. Rewriting it we would have,

6 Y 6 * M 2 T

S Y 0 2
1 M T 2 +
2 0 R Y + +
---
2 2 S M 2 2

Step 5: Now looking at the product 6 Y 6 * M = 2 0 R Y, we can conclude that 'M' = 3. since (6 * M + carry) = 20, and the only value that seems to satisfy that equation is 3. Rewriting this would yield us,

6 Y 6 * 3 2 T

S Y 0 2
1 3 T 2 +
2 0 R Y + +
---
2 2 S 3 2 2

Step 6: If we look at the product term 6 Y 6 * 3 = 2 0 R Y, we can easily figure out 'Y' to be 8, so rewriting the puzzle would give us,

6 8 6 * 3 2 T

S 8 0 2
1 3 T 2 +
2 0 R 8 + +
---
2 2 S 3 2 2

Step 7: Now, the sum term 8 + T + 8 = 3 helps us to find out the value of 'T', yeah it is 7. How? Well there is no carry and the sum has to be 23, since no number is greater than 9 (You could also find out the value of 'T' from the product 686*2 as well.) We will get

6 8 6 * 3 2 7

S 8 0 2
1 3 7 2 +
2 0 R 8 + +
---
2 2 S 3 2 2

Step 8: This step is just a formality, since we got to know the values of the Multiplicand and the multiplier, it is a piece of cake to find out the rest of the values. And they happen to be,

6 8 6 * 3 2 7
---
4 8 0 2
1 3 7 2 +
2 0 5 8 + +
---
2 2 4 3 2 2

16. Ans: [a]

This is a tough question as there are total 9 different alphabets are used.

Step 1: K + A = A. So K = 0

Step 2: From the hundreds column, 2B + A = 10 or 20. As 2B, 10, 20 are even, A should be even. Remember this logic.

Possibilities are, for A and B are (2, 4), (4, 3), (6, 2), (8, 1) and (2, 9), (4, 8), (6, 7), (8, 6)

In the second row of multiplication, we have PAS x B = ASAA.

P2S x 4 = 2S22 ⇒S = 3, 8 But both are not satisfying.

P4S x 3 = 4S44 ⇒S = 8. But P48 x 3 = 4844 is not possible. Ruled out.

P6S x 2 = 6S66 ⇒S = 3, 8. But both are not satisfying. Ruled out.

P2S x 9 = 2S22 ⇒S = 8 But P28 x 9 = 2822 is not possible. Ruled out.

P4S x 8 = 4S44 ⇒S = 3. This is possible as P43 x 8 = 4344 then P = 5.

P6S x 7 = 6S66 ⇒S = 8 But P68 x 7 = 6866 is not possible. Ruled out.

P8S x 6 = 8S88 ⇒S = 3, 8 But both are not satisfying. Ruled out.

Therefore, S = 3, P = 5, A = 4, B = 8.

			5	4	3
			R	8	Q
		3	8	0	W
	4	3	4	4	
S	E	5	8		
3	**Q**	**3**	**0**	**4**	**W**

From the above diagram, R = 6 and E = 2. and A = 7 and W = 1.

Final form of the solution is:

			5	4	3
			6	8	7
		3	8	0	1
	4	3	4	4	
S	2	5	8		
3	**7**	**3**	**0**	**4**	**1**

17. Ans: [b]

			1	7
			7	1
			1	7
	1	1	9	
	1	**2**	**0**	**7**

From the first row of multiplication, H =1 is clear.

As HE x H = HE, substitute H = 1 in all places.

Now from the tenth's place, think about, the value of A. 1 + A = M.

If M is a single digit number, then N = 1, which is impossible (Already we have given H = 1).

So A = 9, then M = 0, and N = 2.

Now 1E x E = 119.

So by trial and error E = 7.

Therefore, NAME = 2907

18. Ans : [c]

```
  SEND
+ MORE
----------
 MONEY
----------
```

we have to go for trial and error method, if we add two numbers, the maximum carry over will be 1 for eg 9 + 9 = 18, so m denotes 1, so we can eliminate one option, so 1 + s = o means s should 9 then only carry over will come, so o denotes 0, then from the option if we take e = 5 it satisfies the given condition

```
  9567
+1085
---------
10652
---------
```

19. Ans: [b]

```
  ABC
   ×DE
-----------
   FEC
  DEC
------------
 HGBC
------------
```

from the all answer option last digit ends with 0 or 5,if we check for E = 0 ABC × 0 = FBC, so resultant will be DE00,so we eliminate three options ends with 0,remaining is the answer

20. Ans: [a]

```
  NO
+ GUN
  NO
---------
 HUNT
---------
```

we have to go for trial and error method, if we add two numbers, the maximum carry over will be 1 for eg 9+9=18,so m denotes 1,so we can eliminate two options, by checking remaining two options answer is option A

```
  87
+ 908
  87
-------
 1082
-------
```

SESSION – 5

DATA SUFFICIENCY

1. Ans: [1]

$(a + b)\left(\frac{1}{a} + \frac{1}{b}\right) = 4$

$\Rightarrow 1 + 1 + \frac{a}{b} + \frac{b}{a} = 4$

$\Rightarrow \frac{a}{b} + \frac{b}{a} = 2$

This is possible when a = b. Hence statement 1 alone is sufficient.

Statement 2 $(a - 50)^2 = (b - 50)^2$. We cannot say if a = b in this case. Take for example, let a = 100 and b = 0. Then $(a - 50)^2 = (100 - 50)^2 = 50^2 = 2500$

And $(b - 50)^2 = (0 - 50)^2 = 50^2 = 2500$

Hence, statement 1 alone is sufficient and statement 2 alone is not sufficient.

2. Ans: [4]

From statement (1), we know that the sales value after the salesman's commission. If his commission is 3% of the sales booked. Then the net sales value is 100 – 3 = 97% of the sales booked.

From statement (1), we know that 97% of sales booked = Rs.245,000. So we can find out the sales booked. Statement (1) alone is sufficient.

From statement (2), we know that the original cost of the products is Rs.225,000. We know the sales booked = 1.25 * 225,000. Hence, statement (2) is also sufficient.

As each of the two statements are independently sufficient to answer the question, choice (4) is the best answer.

3. Ans: [3]

The statement provides information about the number of people who sent in deposits this year. However, not all those who sent in deposits may have attended the seminar.

Without knowing whether all of them attended or only a fraction of those who sent the deposit attended, we will not be able to find the answer.

Statement (1) alone is not sufficient.

The moment we realize that statement (1) is not sufficient, we can eliminate choices 1 and 4.

We can narrow down our choices to 2, 3 and 5.

Remember: When you are evaluating statement (2) alone, do not recall information that you read in statement (1).

60 percent of the people who sent deposits attended.

If 1000 sent in their deposits, the answer to the question will be 600.

If 100 sent in their deposits, the answer to the question will be 60.

We are not getting a unique value for the number of people who attended the seminar from this statement.

Statement (2) alone is not sufficient.

We can eliminate choice 2.

The answer narrows down to 3 or 5.

Using the information in the two statements, we can deduce that 60% of 70 = 42 people attended the seminar.

Using the two statements, we could get a unique answer to the question.

Hence, the correct answer is Choice 3. Both statements are needed to answer the question.

4. Ans: [3]

A to C is 3/5th of the total distance.

Without knowing the distance between A and C, we cannot equate the proportion to the actual distance and compute the total distance.

For instance, if the distance between A and C is 300 km, the total distance will be 500 km. Conversely, if the distance between A and Madurai is 600 km, the total distance will be 1000 km.

The bottom line is that we cannot find the total distance from the information given in statement (1).

Statement (1) alone is not sufficient.

The moment we realize that statement (1) is not sufficient, we can eliminate choices 1 and 4.

We can narrow down our choices to 2, 3 and 5.

Remember: When you are evaluating statement (2) alone, do not recall information that you read in statement (1).

We know the distance for one part of the journey – between C and B.

However, from statement (2) we do not know the distance for the other part – distance between A and C

We are not able to determine the total distance using statement (2) alone.

Statement (2) alone is not sufficient.

We can eliminate choice 2.

The answer narrows down to 3 or 5.

From statement (1) we can deduce that the distance between C and B is 2/5th of the total distance.

From statement (2) we know that the distance between C and B is 12 km.

Equating the two we will be able to get a unique answer for the total distance.

Note: You do not have to find the distance in a data sufficiency question. You just need to be sure that you can find a unique answer.

Nevertheless, let us find the distance before wrapping the question

If the total distance is x, then 2/5x = 12

Or x = 30 km

Using statements (1) and (2) together, we could find a unique answer.

Hence, the correct answer is Choice 3. Both statements are needed to answer the question.

5. Ans: [4]

From the question stem we know that Hari purchased 18 cans.

If the number of cans containing diet soda is equal to the number not containing diet soda, we can deduce that 9 cans do not contain diet soda.

We could find a unique answer using statement (1) alone.

Statement (1) alone is sufficient.

The moment we realize that statement (1) is sufficient, we can narrow down our choices to 1 or 4.

To determine whether the answer is choice 1 or choice 4, we need to evaluate statement (2). Remember that you have to evaluate statement (2) even if statement (1) is sufficient.

Remember: When you are evaluating statement (2) alone, please do not recall information that you read in statement (1). Anything said about the number of cans in statement (1) should not be used while evaluating statement (2).

The number of cans containing diet soda is odd. The number could be 1 or 3 or 5 or any odd number up to 17.

Correspondingly, the number of cans not containing diet soda will be an odd number down from 17 to 1.

We cannot find a unique value for the number of cans not containing diet soda from the information given in statement (2).

Statement (2) alone is also sufficient. Hence, choice (4) is the answer.

6. Ans: [2]

Statement 1: If city Y had a population of 0.1 million, then city X will have a population of 1.2 million. The population of city X will be greater than 3 times the population of city Y. The answer to the question is yes.

Statement 2: Alternatively, if city Y had a population of 4 million, city X will have a population of 5.1 million. The population of city X is not greater than 3 times the population of city Y. The answer to the question is no.

The answer is yes for some values of the population of Y and the answer is no for other values of the population of Y.

We could not find a unique answer using statement (1) alone.

Statement (1) alone is not sufficient.

If statement (1) alone is not sufficient, we can eliminate choices 1 and 4.

Choices narrow down to 2, 3, or 5.

Remember: When you are evaluating statement (2) alone, do not recall information that you read in statement (1). Anything said about the population of city X or city Y in statement (1) should not be used while evaluating statement (2).

300,000 Hindus in city X made up for 20% of its population. So, we can deduce that the population of city X in 2000 was 1,500,000.

141,000 Buddhists in city Y made up for 30% of its population. So, we can deduce that the population of city Y in 2000 was 470,000.

Using statement (2) we were able to determine the population of the two cities. With this information, we can conclusively answer the question.

Statement (2) alone is sufficient. Hence, choice (2) is the answer.

7. Ans: [5]

Essentially, we have two out of the 3 dimensions required to find the surface area.

The surface area will take different values for different values of the third dimension.

Statement (1) alone is not sufficient.

If statement (1) alone is not sufficient, we can eliminate choices 1 and 4.

Choices narrow down to 2, 3, or 5.

Remember: When you are evaluating statement (2) alone, do not recall information that you read in statement (1). Anything said about any one face in statement (1) should not be used while evaluating statement (2).

The area of a second face is 6 square units.

There could be multiple possibilities for the two dimensions of this face. It could be 2 * 3 or it could be 6 * 1.

Further, we still do not have information about the 3rd dimension and the final answer is a function of that dimension.

Using statement (2) we were not able to determine a unique value for W.

Statement (2) alone is not sufficient.

If statement (2) alone is not sufficient, we can eliminate choice 2 as well.

Choices narrow down to 3, or 5.

The two faces mentioned could be two opposite faces of a rectangular solid.

In a rectangular solid, opposite faces have the same dimension and hence the same area.

Essentially, it again boils down to the fact that we only have two out of the 3 dimensions required to find the surface area. We do not have the third dimension and it is required to get a unique answer.

Statements (1) and (2) together are not sufficient to determine the surface area of the rectangular solid y.

Hence, choice (5) is the answer.

8. Ans: [4]

From the question stem, we know that the average high temperature for the 5-day period Monday to Friday was 85° F.

Sum = Average * number of terms

So, sum of the high temperature for the 4-day period Monday to Thursday = 87 * 4 = 348.

The sum of the high temperature for the 5-day period Monday to Friday = 85 * 5 = 425.

Hence, the high temperature on Friday = Sum for 5 days (Mon to Fri) – Sum for 4 days (Mon to Thu) = 425 – 348 = 77° F.

We could get a unique answer to the question with statement 1.

Statement (1) alone is sufficient.

If statement (1) alone is sufficient, we can narrow our choices to 1 or 4.

So, average high temperature without Friday's value being counted would have been 1 more than 86 = 87° F

i.e., the average high temperature for Monday through Thursday was 87 degrees Fahrenheit.

This information is the same as what statement (1) provided.

So, if statement (1) is sufficient, so will statement (2) be.

Using statement (2) alone we could get a unique answer to the question.

Statement (2) alone is also sufficient.

If statement (1) alone is sufficient and statement (2) alone is also sufficient, each statement is independently sufficient.

Hence, choice (4) is the answer.

9. Ans: [2]

From statement 1, $p^2 + q^2$ is an integer then the sqrt($p^2 + q^2$) is not necessarily an integer.

For example, $2^2 + 3^2 = 13$ is an integer. But sqrt(13) is not an integer.

So, statement 1 alone is not sufficient to answer the question.

From statement 2, $p^2 - 3q^2 = 0$

$p^2 = 3q^2$

Then $p^2 + q^2 = 3q^2 + q^2 = 4q^2$

So, sqrt($p^2 + q^2$) = sqrt($4q^2$) = 2q

Since, q is an integer then 2q is also an integer.

So, Statement 2 alone is sufficient to answer the question.

Hence, the answer is choice (2), the data in Statement 2 alone is sufficient to answer the question, while the data in Statement 1 alone is not sufficient to answer the question.

10. Ans: [3]

we have to check p + q = 0

i.e., p = – q or – p = q

From statement I, pq < 0.

Either p or q is a negative number, i.e., –p and q or p and –q.

But it does not give the equivalence of p and q.

Then 1 alone is not sufficient to answer the question.

From statement 2, $p^2 = q^2$

+/– p = +/– q

p = q or p = –q or –p = q or –p = –q.

Therefore, we would not have the clear value of p and q.

Now, combining both 1 and 2, we have

p = –q or q = –p

i.e., p + q = 0

Hence the answer is choice 3, since the data in both Statement 1 and 2 together are necessary to answer the question.

11. Ans: [4]

From statement 1, a > p and b < q

If b < q then -b > –q.

Now a > p and –b > –q then a – b > p – q

Hence 1 alone are sufficient to solve the question.

From statement 2, b = 7, q = 8, a = 14 and p = 12.

a – b = 14 – 7 = 7 ... (1)

p – q = 12 – 8 = 4 ... (2)

Statement 1 & 2 implies that, a – b is greater than p – q ?

So, Statement 2 alone is sufficient to answer the question.

Hence, the answer is choice 4, since the data either in Statement 1 or in Statement 2 alone is sufficient to answer the question.

12. Ans: [3]

From Statement 1 we can conclude that there are 40% men in the plain but we can't find the exact number of passengers

From Statement 2: Number of men passengers = 24

By combining both the statements we get, total number of passengers = 24 * 100/40 = (you don't need to calculate the answer)

Hence answer is choice 3.

13. Ans: [3]

Using statement 1 – x is divisible by 4 and 5

Using statement 2 – x is divisible by 3,4, and 7.

By using both statements we can conclude that x is divisible by 28 (4 * 7), hence answer is choice 3.

14. Ans: [3]

Let the tens and unit digits be X and Y respectively.

Then,

From statement 1, we have: X – Y = 3 ... (1)

From statement 2, we have: (X + Y) = 3 + 4 = 7 ... (2)

Adding (1) and (2), we get 2X = 10 => X = 5

Putting X value in (1) or (2), we get: Y = 2

Required two digit number is 52.

Here the data in both Statements 1 and 2 together are necessary to find the answer.

Hence the answer is choice 3.

15. Ans: [3]

Let the tens and unit digits be X and Y respectively.

Then the two digit number is (10X + Y)

From statement 1, we have: X – Y = 1 ... (1)

From statement 2, we have: (10X + Y)/7 = 7 + (21/3)

(10X + Y)/7 = 7 + 7

(10X + Y)/7 = 14

(10X+Y) = 98 ... (2)

Adding (1) and (2), we get 11X = 99 => X = 9

Then, Y = X – 1 = 8.

Therefore the two digit number is 98.

Required sum = 9 + 8 = 15.

Here, the data in both Statements 1 and 2 together are necessary to find the answer.

Hence the answer is choice 3.

16. Ans: [b]

Let the two digit number be xy.

From Statement 1, let us assume that x is the largest digit.

So, x = 9.

Statement (1) alone is not sufficient.

From Statement II,

x + y = 5 (x – y)

x + y = 5x – 5y

$4x = 6y \Rightarrow \frac{x}{y} = \frac{6}{4} = \frac{3}{2}$

$\therefore$ The ratio between the digits of the given two digit number is 3:2.

$\therefore$ Statement (2) alone is sufficient.

$\therefore$ Therefore, the answer choice is option (b).

17. Ans: [4]

Let the tens and unit digits be X and Y respectively.

Then the two digit number is (10X + Y)

From statement I, we have:

Product = XY = 32

Ratio = X/Y = 2/1 = 2

X = 2Y

Then, product XY $(2Y)Y = 2(Y^2) = 32$

$(Y^2) = 16$

Y = 4

And X = 2Y = 2 x 4 = 8

Therefore the number is 84.

From statement II, we have

Sum = X + Y = 12
Difference = X – Y = 4
Adding above two, we get, 2X = 16 => X = 8
Then, Y = 12 – 8 = 4
Therefore, required number = 84
Here, the data either in Statement 1 or in Statement 2 alone are sufficient to answer the question.
Hence the answer is choice 4.

18. Ans: [3]
The question asks one to find the standard deviation of four numbers.
Standard deviation

$$= \sqrt{(\text{Mean of squares of the numbers} - \text{square of the mean of the numbers})}$$

Statement (1) gives the information about the sum of the 4 numbers.
From this information we can find the mean of the four numbers is 6 and the square of the mean of the numbers is 36.
However, this statement does not provide any information about the mean of the squares of the numbers.
Hence, statement (1) alone is not sufficient.
Statement (2) gives the sum of the squares of the 4 numbers.
Hence, the mean of the squares of the numbers is 56.
However, this statement does not provide any information about the square of the mean of the numbers.
Hence, statement (2) alone is not sufficient.
When the information provided in the two statements are combined, one can find the standard deviation of the four numbers.
Hence, answer is choice (3).

19. Ans: [3]
From statement 1, we know that Cindy has no siblings and she is the wife of Bill's only brother Chris. However, this statement does not provide any information about Betty and is hence not sufficient to answer the question.
So, choice A and D are eliminated.
From statement 2, we know that Betty is Cindy's brother in law's wife. This statement establishes a relation between Cindy and Betty. This does not answer the question of how Bill is related to either Cindy or Betty. Hence, statement 2 alone is not sufficient to answer the question. Hence, we can eliminate choice (2).
Now, if we combine the two statements, we know that Bill and Cindy are related to each other through Chris, who is the only brother of Bill and that Cindy is Betty's brother in law's wife.
Cindy does not have any siblings and hence her brother in law has to necessarily be her husband's sibling. As Chris is the only brother of Bill, Cindy's brother in law has to be Bill and Betty is his wife.
As we could answer the question by combining the information in the two statements, choice (3) is the correct answer.

20. Ans: [1]
The given question is an "Is" question. So, the answer has to be a definite yes or a definite no. It cannot be a maybe.
Let us evaluate statement 1.
$(-1)^{(Y+2)} = -1$.
$(-1)^{\text{odd number}} = -1$
Therefore, Y + 2 is an odd number.
Hence, Y has to be an odd number.
So, when Y is divided by 2, the remainder is 1.
Statement 1 is sufficient.
The answer is either choice (1) or choice (4).
Now let us evaluate the statement 2.
Y is prime
Y could be '2' which is an even number.
So, when Y is divided by 2, the remainder is '0'.
All other prime numbers are odd numbers.
So, when Y is divided by 2, the remainder is '1'.
We cannot conclude is Y is 2 or other prime numbers.
As we are not able to conclude if Y is an even number or an odd number with statement 2, it is not sufficient.
Hence, answer is choice (1).

SESSION – 6

DATA INTERPRETATION – TABLES

1. Ans: [c]
Total number of Tokia mobiles sold in 2007

$$= 32000000 * \frac{110}{100} * \frac{120}{100} * \frac{85}{100} * \frac{125}{100} * \frac{108}{100} = 48 \text{ million}$$

2. Ans: [d]
The number of Zamsung mobiles sold in 2004

$$= 48000000 * \frac{115}{100} * \frac{125}{100} * \frac{70}{100} = 48300000$$

The number of Mericson mobiles sold in 2004

$$= 50000000 * \frac{90}{100} * \frac{120}{100} * \frac{110}{100} = 59400000$$

Therefore required percentage = $\frac{483}{594}$

$$\rightarrow \frac{161}{198} \simeq 4:5$$

3. Ans: [a]
The number of Notorola mobiles sold in 2005
= 56 * 1.1 * 0.9 * 1.15 * 1.2 ~ 76.5
The number of Rower mobiles sold in 2005
= 60 * 1.2 * 1.15 * 1.1 * 0.8 ~ 73
Therefore, required difference = 3.5

4. Ans: [b]
Total number of mobiles sold in 2002
= 32 * 1.1 + 48 * 1.15 + 56 * 1.1 + 50 * 0.9 + 60 * 1.2 = 269

5. Ans: [a]
Total number of Zamsung sold in 2005(in millions)
= 48 * 1.15 * 1.25 * 0.7 * 1.08 = 52.164

6. Ans: [c]
Domestic demand in 2007 – 08
$= 180 * \frac{120}{100} = 216$
Forecast production in 2010 – 2011
$= 230 * \frac{70}{100} = 161$
Difference = 216 – 161 = 55 lakh tonnes

7. Ans: [a]
Total demand for salt in 2007 – 08(in lakh tonnes)
$= 210\left[1 + \frac{12}{100}\right] = 235.2$
Required gap (in lakh tonnes)
= 360 – 235.2 = 124.8 lakh tonnes

8. Ans: [d]
Required difference = 250 – 250 = 0

9. Ans: [b]
Growth rate required
$= \frac{210 - 180}{180}(100\%) = 16\frac{2}{3}\%$

10. Ans: [a]
Required percentage
$= \frac{300 - 275}{275}(100\%) = 9.1\%$

DATA INTERPRETATION –PIE CHART

11. Ans: [c]
Labour cost of A = 4050
Labour cost of B = 24800 * 20/100 = 4960
Required % = 4960 – 4050/4050 * 100
= 910/4050 * 100
~ 22%

12. Ans: [a]
The selling price of A = 125/100 * 16200 = 20250
The selling price of B = 120 * 100 * 24800 = 29760
The required ratio = 20250/29760
= 675/992

13. Ans: [d]
Transportation cost of A
= 20/100 * 16200 = 3240
New transportation cost of A
= 110/100 * 3240 = 3564
Material cost of A = 30/100 * 16200 = 4860
New material cost A = 85/100 * 4860 = 4131
The effective change in the cost price of A (3240 + 4860) – (3564 + 4131) = 405
The new cost of A = 16200 – 405 = Rs.15795

14. Ans: [b]
The storage cost of A = 15/100 * 16200 = 2430
The storage cost of B = 18/100 * 24800 = 4464
Required % = 2430/4464 * 100 ~ 54%

15. Ans: [c]
The material cost of A = 30/100 * 16200 = 4860
The material cost of B = 35/100 * 24800 = 8680
The required difference = 8680 – 4860
= Rs.3820

16. Ans: [c]
Required % = [(20/100) * 115/(30/100) * 100] * 100
= (230/3) * 100
$= 76\frac{2}{3}\%$

17. Ans: [b]
The number of Tata indicom users in 2006
= 115 * 20/100 = 23
The number of Tata indicom users in 2005 = 8
= Required % = (23 – 8)/8 * 100
1500/8
= 187.5%

18. Ans: [a]
Required ratio = 12/[15 * (115/100)]
= 48/69
= 16/23

19. Ans: [b]
= (2300 * 100)/115 = 2000
The number of Airtel users in 2005
= 2000/4 = 500

20. Ans: [d]
No. Of Tata indicom users in 2006
= (20/100) * 115 = 23
No. Of people who use 'others' in 2007 = 10% (115) + 20% (23) = 11.5 + 4.6 = 16.1
Required ratio = 12/16.1 = 120/161

SESSION – 7

DATA INTERPRETATION – BAR DIAGRAM

1. Ans: [a]
The number of votes received by CJB in
A = 450000 – (110000 + 160000 + 130000) = 50,000
B = 500000 – (200000 + 120000 + 90000) = 90,000
C = 600000 – (170000 + 220000 + 140000) = 70,000
D = 575000 – (80000 + 180000 + 210000) = 105,000
So in A, CJB received minimum number of votes.

2. Ans: [d]
The required difference = (120000 + 220000) – (120000 + 220000) = 0

3. Ans: [b]
The required percentage = [120000/(160000 + 120000 + 220000 + 180000)] * 100 ~ 17.6%

4. Ans: [c]
Percentage of votes received by CJB in
A = (50000/450000) * 100 = $11\frac{1}{9}$%
B = (90000/500000) * 100 = 18%
C = (70000/600000) * 100 = $11\frac{2}{3}$%
D = (105000/575000) * 100 = 18.2%
In 2 constituencies, CJB received more than 17%.

5. Ans: [d]
Required ratio = (120000 + 180000)/(50000 + 70000) = 5:2

Solutions for questions 16 to 20:

Company	Mahi	Yuvi	Sachin	Viru	Total
A	20	40	15	60	135
B	30	60	30	50	170
C	30	30	40	40	140
D	20	70	15	50	155

6. Ans: [d]
From the table we can see that Viru has invested Rs.60,000 in the shares of a company which is the highest.

7. Ans: [b]
From the table, the maximum investment is company B.

8. Ans: [a]
Total investment in A now = Rs.1, 85,000 which would be the highest.

9. Ans: [c]
140/600 * 100 = 23.33%

10. Ans: [a]
Mahi invested in all the 4 companies in the range of Rs.20,000 to Rs.50,000. Hence, he made the maximum.

DATA INTERPRETATION – LINE GRAPH

11. Ans: [d]
From the graph it is observed that the consumption of metal was less than the consumption of plastic for 5 years from 2002 to 2006.

12. Ans: [b]
Total consumption (in thousand tonnes)
2001 – 50
2002 – 50
2003 – 50
2004 – 45
2005 – 45
2006 – 55
Only in 2004, the total consumption was less than that in the previous year.

13. Ans: [d]
Total consumption of metal
= 30 + 20 + 20 + 20 + 15 + 15 + = 120 thousand tonnes
Total consumption of plastic
= 20 + 30 + 30 + 25 + 30 + 40 + = 175 thousand tonnes
The required ratio = 120:175 = 24:35

14. Ans: [b]
In the year 2006, the percentage increase in the total consumption over that in 2005 = (10/45) * 100 = $22\frac{2}{9}$%

15. Ans: [b]
Only for one year, the consumption remained constant for both the products i.e. 2002 – 03.

16. Ans: [a]
The percentage of students who passed without distinction.
In P = (200/1000) * 100 = 20%
In R = (600/1500) * 100 = 40%
In S = (450/1000) * 100 = 45%
In U = (750/1500) * 100 = 50%

17. Ans: [c]
By observation, we can say that in schools, P, Q and R, the pass percentage is less than 80%.
School S = 800 = 80% of 1000
School T = 1250 > 80% of 1300
School U = 1250 > 80% of 1500
∴ In S, T and U, the pass percentage is at least 80%.

18. Ans: [c]
The ratio of the number of students passing with distinction to those failing
In Q = 400/650 = 8/13 = 0.61
In R = 400/500 = 4/5 = 0.8
In P = 300/500 = 3/5 = 0.6
In T = 600/50 = 12
3/5 is the least among the given values and hence, School P.

19. Ans: [a]
The overall pass percentage with distinction
= (300 + 400 + 400 + 350 + 600 + 500)/ (1000 + 1400 + 1500 + 1000 + 1300 + 1500 * 100)
= (2550/7700) * 100 = 33.1%

20. Ans: [c]
The total number of students who passed = 5550
The total number of students who failed = 7700 – 5550 = 2150
The required ratio = 2150/5550 = 43/111