Answers and Explanations

1	2	**16**	1	**31**	2	**46**	2	**61**	3	**76**	4	**91**	3	**106**	2	**121**	1	**136**	4
2	1	**17**	3	**32**	3	**47**	3	**62**	1	**77**	1	**92**	3	**107**	4	**122**	2	**137**	2
3	2	**18**	2	**33**	1	**48**	1	**63**	4	**78**	4	**93**	1	**108**	1	**123**	1	**138**	3
4	4	**19**	1	**34**	4	**49**	1	**64**	2	**79**	1	**94**	1	**109**	1	**124**	1	**139**	3
5	3	**20**	4	**35**	2	**50**	4	**65**	3	**80**	2	**95**	2	**110**	3	**125**	2	**140**	4
6	3	**21**	1	**36**	3	**51**	4	**66**	4	**81**	2	**96**	1	**111**	3	**126**	3	**141**	1
7	3	**22**	3	**37**	1	**52**	4	**67**	2	**82**	4	**97**	3	**112**	3	**127**	3	**142**	3
8	2	**23**	2	**38**	4	**53**	1	**68**	3	**83**	2	**98**	1	**113**	4	**128**	4	**143**	2
9	1	**24**	4	**39**	1	**54**	2	**69**	2	**84**	4	**99**	3	**114**	3	**129**	4	**144**	2
10	4	**25**	3	**40**	2	**55**	1	**70**	4	**85**	2	**100**	3	**115**	2	**130**	3	**145**	4
11	3	**26**	2	**41**	4	**56**	1	**71**	2	**86**	3	**101**	4	**116**	4	**131**	2	**146**	1
12	3	**27**	1	**42**	1	**57**	4	**72**	4	**87**	4	**102**	3	**117**	2	**132**	2	**147**	3
13	2	**28**	4	**43**	1	**58**	4	**73**	2	**88**	3	**103**	4	**118**	3	**133**	1	**148**	1
14	4	**29**	3	**44**	3	**59**	3	**74**	1	**89**	1	**104**	2	**119**	4	**134**	3	**149**	2
15	1	**30**	2	**45**	2	**60**	3	**75**	3	**90**	2	**105**	3	**120**	3	**135**	2	**150**	4

Scoring table

Section	Question number	Total questions	Total attempted	Total correct	Total incorrect	Net score	Time taken
EU + RC	1 to 50	50					
QA	51 to 100	50					
DI	101 to 150	50					
Total		150					

1. 2 The writer is using satire to mildly tease the French winemaker. (1), (3) and (4) are rather extreme choices.

2. 1 Refer to the part *some areas ... have now produced a generation of growers using the varietal names on their labels.* The writer says that (1) is probably the only option left for French winemakers.

3. 2 Refer to the part *it is on every wine label ... the name of the grape from which the wine is made ... acquired a basic lexicon.* (2) well describes that the French winemakers are scared of this trend.

4. 4 Option (4) is the most substantiated reason to support Dr. Renaud's findings. The development in (4) would support Dr. Renaud's findings that fat-derived cholesterols can be dispersed by the tannins in wine.

5. 3 (1), (2) and (4) are stated in the 4th paragraph. (3) is unlikely. A consumer may still not be enough of a connoisseur to discriminate wine tastes.

6. 3 Refer to the part *India would resist payment, and paralyze the war effort.* (3) is clearly the answer.

7. 3 Refer to the part *it reminded the British vividly.* (3) is clearly the answer. (1) was an outcome, not a cause. (2) is a minor factor. (4) is far-sighted.

8. 2 (1), (3) and (4) are stated in the third paragraph. (2) is not a reason for the emergence of the 'white man's burden'. It is a consequence, not a cause.

9. 1 Refer to the part *it was supposedly for the good of the conquered.* (1) entirely captures the meaning of the 'white man's burden'.

10. 4 Refer to the last line of the first paragraph, the second paragraph and the last line of the passage. They amply support (4) as the answer. (1) does not touch on the financial implications. White man's burden *is a single aspect of the passage, not the main idea, so (2) is not right. (3) can be ruled out straightaway.*

11. 3 Refer to the part *much of biotechnology research is also funded by governments*. (3) is clearly the answer.

12. 3 Refer to the part *anti-GM campaign has been quite effective in Europe*. (3) is clearly the answer.

13. 2 Refer to the part *use of ever-stronger herbicides which are poisonous.* The last line specifically supports (2) as the answer and not (1) which is discussed in a different context. The passage has no intention of keeping competing plants standing at all, let alone keeping them weed-free, so (3) is wrong.

14. 4 Refer to the part *much of biotechnology research is also funded by governments in both developing and developed countries.* (4) is the answer. (1), (2) and (3) are disputed in the passage.

15. 1 Refer to the part *GM controversy will soon hit the headlines in India ... use the protato in its midday meal program for schools.* (1) can be inferred. (2) is, of course, wrong. (3) is doubtful. (4) is also not true.

16. 1 The last sentence of the 2nd paragraph states *these large gatherings* which continues as *they* in the 3rd paragraph. (1) is clearly the answer.

17. 3 The passage begins with description of social life and towards the last few paragraphs, moves on to show drying up of our social life. ...(3) is clearly the answer. (2) and (4) are rather extreme observations. (1) is also a blunt statement, whereas the passage does have a subtle tone.

18. 2 Refer to the part *Interest, wonder ... the need of the first two must not be underrated.* (2) is clearly the answer.

19. 1 *Discriminate* means to recognize *passionate attitude, distinguish* is too technical a word to fit the requirement. (2) and (4) are irrelevant.

20. 4 The correct ans. is (4) as can be seen by the first line of the second last para. If you read the previous para also you'll find that what the author is actually saying is that the so called social life is not as per the real definitions. (1). is not right as the author is nowhere showing that the crowds in poor Calcutta can turn violent anytime. He is just giving a couple of instances to prove his point. We can't generalize like this. (2) is the opposite of what the author is trying to show. (3) again is a generalization.

21. 1 Refer to the part *it remains a fact that the Greeks...never seem to have realized the importance of experiment.* (1) is clearly the answer. The Greek preference for geometry is not mentioned in the passage, so (2) and (4) are out. (3) is a superficial answer.

22. 3 Refer to the part *physical processes of nature would prove to be unfolding themselves according to rigorous mathematical laws.* (3) is clearly the answer. (1) is not true. (2) is also refuted and (4) is irrelevant.

23. 2 Refer to the part *account be taken of his joint contributions to mathematics and physics*. (2) is clearly the answer. (1), (3) and (4) are specific aspects.

24. 4 Refer to the part *extension of the validity.* The writer states that Einstein's special principle is an extension of the validity of the classical Newtonian principle. This being the concluding sentence makes (4) the best answer. (1) and (2) are not correct observations. (3) sounds plausible but it is actually a vague observation.

25. 3 The correct answer is (3) If you read the 6th line of last para it's given that the principle's assertion was that "absolute velocity must ever escape all experimental detection." Which means that sometimes we can't experiment. This is very similar to (3). Ans. choice (1) is a fact and not an "implication". (2). Is again a fact and in (4). The word "meaningless" is too strong and this choice is a generalization from a specific point. Generalizations need not be correct.

26. 2 Refer to the part *better if it lasts for years …wealthy with all you have gained on the way.* (2) is clearly the answer. (3) is far-fetched. (1) is an isolated observation. (4) is totally incorrect.

27. 1 Refer to the part *as many sensual perfumes as you can … to gather stores of knowledge.* (1) is clearly the answer. (2), (3) and (4) are short-sighted observations.

28. 4 Refer to the part *Keep Ithaka always in your mind. Arriving there is what you are destined for.* (4) is undoubtedly the answer.

29. 3 Refer to the part *you bring them along inside your soul*. (3) is undoubtedly the answer.

30. 2 Refer to the part *Ithaka gave you the marvelous journey, without her you would not have set out*. The poem has a tone of encouragement and promise. (2) is clearly the answer. (1), (3) and (4) are ridiculous choices.

31. 2 *Running … consists* has singular subject-verb agreement. Again, *more than it costs* is the right diction.

32. 3 B and D have inappropriate temporal references. A is also wrong as *products* did not lead to the *heightened focus*. C is the answer as the second and third part of the sentence when put together is complete by itself.

33. 1 Improper use as in "falling back" and "explanations" rule out B and C. Fall back on is the right prepositional phrase and thus A is right.

34. 4 *is regarded* should go together. *Valuable in itself* is the right expression. *Not only as …but also as* has parallel construction.

35. 2 *it would be ideal* expresses a satisfactory proposition. R*eflection* should precede *action*, and *thought* should facilitate *behavior*.

36. 3 ADB is a clear sequence. So is CE. A has a suitable opening with *A few months ago*. The invitation and the response follow in DB. *she* in E has a clear reference to *One senior* in C.

37. 1 CA gives the sequence of action. BD follows with reaction. The outcome is in E. CA outlines the consecutive bids. BD gives Mr. Conway's statements. *Moreover* in D adds to B.

38. 4 C is the best beginning to the paragraph. C spells out the *misnomer*. E makes a statement on *terror* that is justified though B and in D as *Besides*. The humanitarian context of D is given in A.

39. 1 The "these types are rare" of D should follow B. AC also is mandatory as "these cases" of C is an explanation of A. Also D looks like the logical ending and E the logical beginning. Hence the correct ans. is (1)

40. 2 CE gives the *problem*. A gives the solution. BD gives the *Dvorak* angle. Pay attention to the openers, *To avoid this* answers the problem. Similarly, D presents a contrast with *Yet*.

41. 4 *bundle of boy-scouts* is incorrect usage. The correct usage is *a group of boy-scouts*.

42. 1 *He is clear about what is* would have been a better expression. The correct usage is "clear" about certain things.

43. 1 *appreciated the headmaster's gesture of raising* is the correct expression, implication implies negativity.

44. 3 *Ranchi will play the host to* is incorrect. The correct sentence should be '*Ranchi will host*' the next national film festival.

45. 2 *Farmers of "all sorts"* is the correct expression.

46. 2 *conceded* and *offload* are the most appropriate pair of words to fit here. *announced* do not go with *formally*, so (3) is out. Nor does *ratified*, so (4) is out. *Acquire* does not go logically with *purchasers*, so (1) is out.

47. 3 If you have friends outside college, they tend to mask adjustment problems with college colleagues. *treatment* cannot be *compounded*, so (1) is out. If *signals* are *masked*, nothing is *facilitated*, so (2) is out. For similar reasons, *helped* in (4) cannot fill the second blank. *Identification* and *complicated* is thus the right pair.

48. 1 In the first blank the confusion could be between "different" and "distinct". However once you know that certain regions of Spain are unique, only then can you call them distinct, not before. Which is why the first blank can't be distinct. So the first blank should be different. Now between (1) and (4) the correct answer is (1) because discrete means distinct and so we are carrying forward the thought of difference between regions and then in the regions themselves.

49. 1 *resent* and *replacing* is the most appropriate pair of words to fit here. *welcome* cannot go with the implication in *unhappy* so (3) is out. *Resist* is too extreme to fit in a teacher's situation, so (2) is out. *are* in (4) also indicate a compulsive situation which is not evident in the sentence, so (4) is out.

50. 4 Negative reinforcements foster negative behavior. (1), (2) and (3) are easily ruled out as *giving, bestowing* or *conferring* rewards cannot possibly encourage negative behaviour. *Withholding* and *fostering* thus presents the right situation here.

51. 4 **Statement A:**
Success rate for males in 2003

$= \frac{637}{60133} \times 100 \approx 1.06\%$

Success rate for females in 2003

$= \frac{399}{40763} \times 100 \approx 0.98\%$

Hence 'A' is false.

Statement B:
Success rate for females in 2002

$= \frac{138}{15389} \times 100 \approx 0.89\%$

Success rate for females in 2003

$= \frac{399}{40763} \times 100 \approx 0.98\%$.

Hence 'B' is false.

52. 4 **Statement A:**

Females selected $= \frac{48}{19236} \times 100 \approx 0.25\%$

Males selected $= \frac{171}{61205} \times 100 \approx 0.28\%$

Hence 'A' is false.
Statement B:

Success rate for Males $= \frac{17}{684} \times 100 = 25\%$

Success rate for Females $= \frac{48}{138} \times 100 \approx 34.8\%$

Hence 'B' is false.

53. 1 **Statement A:**
Female absentees in 2002 (19236 – 15389) = 3847

$= \frac{3847}{19236} \times 100 \approx 20\%$

Female absentees in 2003 (45292 – 40763) = 4529

$= \frac{4529}{45292} \times 100 \approx 10\%$

Hence 'A' is true.

Statement B:
Male absentees in 2003 (63298 – 60133) = 3165

$= \frac{63298 - 60133}{63298} \times 100 \approx 5\%$

Hence 'B' is false.

54. 2 It is evident from the graph that Seeta's growth rate decreased from third month as this is the first time the slope has decreased.

55. 1 Geeta grew at the fastest rate in the first two months (the slope of the line in this period is steepest for Geeta).

56. 1 Geeta grew the lowest in the third month (during this period, the slope was least for Geeta).

57. 4 Seeta increased by 7 cm on 50 cm and Shyam by 7 cm on 53 cm. Hence, Shyam grew least.

58. 4 The possible combinations when the respondents are aged less than 40 years is minimum can be:
(i) No children – 1 male(aged 38) and atleast 1 female(aged 34)
(ii) 1 child – 1 male(aged 32) and atleast 1 female(aged 35)
(iii) 2 children – at least 1 male(aged 21) and at least 1 female(aged 37)
(iv) 3 children – 2 males(aged 32 and 33) and 1 female(aged 27)
i.e. there is at least 9 such respondents.

Required percentage $= \frac{9}{30} \times 100 = 30\%$.

59. 3 The possible combinations when the respondents are aged more than 35 years is maximum can be:
(i) No children – 1 male(aged 38) and atmost 4 females
(ii) 1 children – 0 male and at most 7 female
(iii) 2 children – at most 7 males and 3 females
(iv) 3 children – 0 male and 1 female(aged 40)
i.e. there can be at most 23 such respondents.

Required percentage $= \frac{23}{30} \times 100 = 76.67\%$

60. 3 The possible combinations when the respondents are aged between 35 and 40 years(both inclusive) is minimum can be:
(i) No children – 1 male(aged 38) and 0 female
(ii) 1 children – 0 male and at least 1 female(aged 35)
(iii) 2 children – 0 males and at least 1 female (aged 37)
(iv) 3 children – 0 male and 1 female(aged 40)
i.e. there can be at least 4 such respondents.

Required percentage $= \frac{4}{30} \times 100 = 13.33\%$.

61. 3 In case of Products, percentage of spam emails is increasing but at decreasing rate, from Sep 2002 to Dec 2002 products increased by $\frac{7-3}{3} \approx 133\%$ and in Mar 2003 about $\frac{7-4}{7} \approx 43\%$ and in Jun 2003 $\left(\frac{11-10}{10} \approx 10\%\right)$.

62. 1 Since percentage of spam is Dec 2002 is higher than June 2003, and the number of total e-mails received is higher, hence number received in Dec 2002 is higher.

63. 4 Cannot be determined as in Sept 2002 percentage is lower as compared to March 2003, however the total number of emails received in Sept 2003 is higher than that in March 2002. Thus we cannot say anything.

64. 2 It happened only once i.e; on 17-Jul-02

65. 3 From the table we can see that for issue dated, 04 June-03, the 2nd round issue has a lower maturity and the competitive bids received are higher.

66. 4 On 07-Nov 02, the value of non-competitive bids in the 2nd round is greater than that of 1st round. So option (4) is not true.

67. 2 Here the scale of the profit axis is exactly 10% of the scale of turnover axis. Just draw a diagonal line from bottom left point to top right point. All companies lying above this line have profit in excess of 10% of turnover.
From the graph, there are 7 companies, has the profit 10% of turnover.

68. 3 From the graph there are 2 steel companies with a turnover of more than 2000 and profit less than 300.

69. 2 From the graph there are 5 companies.

70. 4 By looking up the table, in University of California - Berkeley median starting salary is $70,000 and annual tuition fee is $18,788.

71. 2 By looking up the table, the number of schools, uniformly better than Dartmouth College is 2, namely Stanford and New York University.

72. 4 8 universities namely, Stanford, Harvard, Pennsylvania, Massachusetts, Chicago, Northwestern, Columbia and Duke university have single digit ranking on atleast 3 of the 4 parameters.

73. 2 Number of children with age $\leq$ 9 years = 45
Number of children with height $\leq$ 135 cm = 48
Therefore, the number of children of age 9 years or less whose height does not exceed 135 cm will be the common of the two (age $\leq$ 9 years and height $\leq$ 135 cm) = minimum(45, 48) = 45

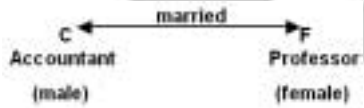
74. 1 Number of children aged more than 10 years
= 100 – 60 = 40
Number of children taller than 150 cm = 100 – 75 = 25
Number of children with weight more than 48 kg
= 100 – 91 = 9
These 9 children are surely included in the 25 children taller than 150 cm and more than 10 years of age because of the assumption given.
Thus, 25 – 9 = 16 children satisfy the given condition.

75. 3 Number of children older than 6 years but not exceeding 12 years = 77 – 22 = 55
Number of children with weights not exceeding 38 kg = 33
These 33 children includes the 22 children with age not exceeding 6 years.
Therefore, the remaining (33 – 22) = 11 comes from the 55 children of ages older than 6 years but not exceeding 12 years.
Therefore, 55 – 11 = 44 children satisfy the given condition.

76. 4 Profitability is defined as percentage of sales. Approximately, Firm A has 20% profit, B has 16.66%, C has 20% and D has approximately 25% profit.

77. 1 $\frac{24568+25468}{89570}\times 100 \approx 55\%$

For questions 78 to 80:



Since the Housewife D is married to the Lawyer and A is married to a Housewife, D and A is the other married couple.

Since E is not the Housewife, it implies E is an Engineer and B is a Housewife. As no Engineer is female, E is a male. So the male members in the group are A, C and E and the female members are B, D and F.

78. 4

79. 1

80. 2

For questions 81 and 82:

If D gets portfolio, F does not or vice-versa.
C wants only Home or Finance or none.
If D gets Power, B must get Telecom or if D gets Telecom, then B must get Power.
If A gets a portfolio, E should get the same.

81. 2 Option (1) gets eliminated because C can have either Home or Finance.
Option (3) gets eliminated because F and D cannot be in the same team.
Option (4) gets eliminated because C cannot have Telecom portfolio.
Hence, option (2) is the correct answer.

82. 4 B-Defence, D - Telecom because if D gets Telecom then B must get Power.

83. 2 AVOCADO paint is mixture of ORANGE and PINK in equal quantities.
If ORANGE is made using RED and YELLOW, then the cost of ORANGE would be $\frac{20+25}{2}=22.5$ which is greater than the cost of the ORANGE.
If we make PINK by RED and WHITE, the cost of PINK would be $\frac{20+15}{2}=17.5$ which is less than the cost of the PINK paint.
Hence, the cost of the AVOCADO is $\frac{22+17.5}{2}=19.75$

84. 4 Mixing equal amounts of ORANGE and WHITE can make WASHEDORANGE, ORANGE can be made by mixing equal amounts of RED and YELLOW. So the ratio of RED, YELLOW and WHITE is 1 : 1 : 2

85. 2 If cost of AVOCADO paint is Rs.19.75
The cost of the CREAM is $\frac{7\times15+3\times75}{10}=\text{Rs. }18$
And cost of WASHEDORANGE is Rs.18.50
So CREAM is the most profitable.

For questions 86 to 88:

1	2	3	4	5	6	7
C			B	D	A	G
D			B	C	A	G
C			B	D	G	A
D			B	C	G	A

86. 3 From given options, F is the only possibility.

87. 4 If we look at the options, D and G can sit together. C and F can sit together B and D can sit together. Hence, E and A is the only option which is not possible.

88. 3 E and G is the only possibility.

89. 1 S has 4 uncles and from statement A. F has two brothers. Hence, the other 2 uncles of S must be the brothers of M. Statement B does not give any additional information.

90. 2 If Ram tossed the coin x number of times, then from statement A, we get the equation 10 + x – 100 = 50. Thus, x = 140.
From statement II individually, we have x > 138.
Thus, we are sure that he has paid up more than 148. If he incurs a loss of only Rs. 50, the game has to end normally. Thus, he must have played 140 and got first 138 as tails and 139 and 140 throws as heads. With no other scenario, a loss of just Rs.50 and 138 tails will show up.

91. 3 Since Ms. X bought 21 packets out of which there are 18 O's and A's in total. Since she got one S, there has to be 2 P's which she bought. Hence, both the statements are required to answer the question.

92. 3 Either of the statements is alone not sufficient.
Using both the statements together:
If A takes X seconds then B takes (x + 60) seconds to run 1000 m.
Ratio of speeds of A and C = 1000 : 625 = 8 : 5
Ratio of time taken by A and C = 5 : 8
If B takes y second then C takes (y + 30) seconds to run 1000 m, then
5 (y + 30) = 8x …(i)
and $\frac{1000}{x+60}=\frac{1000}{y}$ …(ii)
Solving, we get the values of x and y.
Hence, both statements are required.

For questions 93 and 94:

G + 8 = A
D + R = 37
J = D + 8
A = D + 5
A + G = 40
Solving the above equations, we get
2G = 32, G = 16, A = 24
D = 19, J = 27, R = 18

93. 1

94. 1 D + J = 46

For questions 95 to 97:
Four of the amounts spent by the five women are Rs.2234, Rs.1193, Rs.1340 ad Rs.2517.

Two cases arise:

(i) <u>The lowest amount spent is Rs.1193</u>(by Chellamma):
Then, the fifth amount will be Rs(1193 + 1378) = Rs.2571, which will then be the highest amount and is spent by Shahnaz. As Archana arrived before Chellamma, so she must have spent Rs.2234. This implies Helen spent Rs.2517 and Dhenuka spent Rs.1340, which is a contradiction.
Hence, this case is not possible.

(ii) <u>The highest amount spent is Rs.2517</u> (by Shahnaz):
Then the fifth amount will be Rs.(2517 – 1378) = Rs.1139. Since it is the lowest amount, it will be spent by Chellamma.

Further analysis leads to the following table:

Order of arrival	1	2	3	4	5
Name	Archana	Chellamma	Dhenuka	Helen	Shahnaz
Amount spent	Rs.2234	Rs.1139	Rs.1193	Rs.1340	Rs.2517

95. 2

96. 1

97. 3

For questions 98 to 100:
From statement (i), possible number of vadas consumed by Ignesh is 6, being the only multiple of 3.Therefore, another person had 4 idlis and 2 vadas.
From statement (vii), Bimal had (6 – 2) = 4 vadas.
Using these inferences and statements (ii), (iii) and (vi), we get that Bimal, Sandeep and Mukesh do not have chutney, while Ignesh and Daljit consume chutney.
From (iii) and (iv), Sandeep has only one idli and no vada.
From (vii), Bimal has two more idlis than Ignesh. This implies that Bimal can have either 6 or 8 idlis. If Bimal had 6 idlis, then Ignesh had 4 idlis. This contradicts statement (i). Therefore, Bimal had 8 idlis and Ignesh had 6 idlis.
Mukesh has half the number of idlis as one other person and the only number satisfying this is 4. Therefore, he must have 2 vadas.
These inferences can be summarised in the table below:

	Idli	Vada	Chutney
Ignesh	6	6	Yes
Bimal	8	4	No
Sandeep	1	0	No
Mukesh	4	2	No
Daljit	5	1	Yes

98. 1

99. 3

100. 3

For questions 101 to 102:

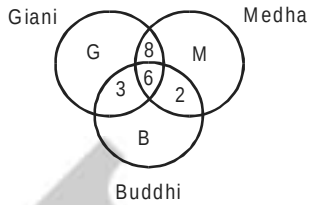
S, M and R in all spend 1248 Bahts.
Initially M pays 211 Bahts and R pays 92 Bahts.
Remaining is paid by S i.e; 945 Bahts
If 1248 is divided equally among S, M and R, each has to spend 415 Bahts.
Hence, M has to pay 205 Bahts which is 5 Dollars to S.
and R has to pay 324 Bahts to S.

101. 4

102. 3

103. 4 Putting the value of M in either equation, we get G + B = 17.
Hence neither of two can be uniquely determined.

104. 2 As per the given data we get the following:



G + B = M + 16
Also, M + B + G + 19 = (2 × 19) – 1
i.e. (G + B) = 18 – M
Thus, M + 16 = 18 – M
i.e. M = 1

105. 3 $2^x - x - 1 = 0$
$\Rightarrow 2^x - 1 = x$
If we put x = 0, then this is satisfied and if we put x = 1, then also this is satisfied.
Now, if we put x = 2, the equation this is not valid.

106. 2 For the curves to intersect, $\log_{10} x = x^{-1}$

Thus, $\log_{10} x = \frac{1}{x}$ or $x^x = 10$

This is possible for only one value of x such that $2 < x < 3$.

107. 4 The surface area of a sphere is proportional to the square of the radius.

Thus, $\frac{S_B}{S_A} = \frac{4}{1}$ (Surface area of B is 300% higher than A)

$\therefore \frac{r_B}{r_A} = \frac{2}{1}$

The volume of a sphere is proportional to the cube of the radius.

Thus, $\frac{V_B}{V_A} = \frac{8}{1}$

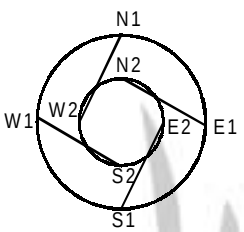
Hence, V_A is $\frac{7}{8}$th less than B i.e. $\frac{7}{8} \times 100 = 87.5\%$.

108. 1 It is given that $p + q + r \neq 0$, if we consider the first option, and multiply the first equation by 5, second by –2 and third by –1, we see that the coefficients of x, y and z all add up-to zero.
Thus, 5p – 2q – r = 0
No other option satisfies this.

109. 1 Let 'x' be the number of standard bags and 'y' be the number of deluxe bags.
Thus, $4x + 5y \le 700$ and $6x + 10y \le 1250$
Among the choices, (3) and (4) do not satisfy the second equation.
Choice (2) is eliminated as, in order to maximize profits the number of deluxe bags should be higher than the number of standard bags because the profit margin is higher in a deluxe bag.

110. 3 Let the 1st term be 'a' and common difference be 'd' then we have 3^{rd} term = a + 2d
15^{th} term = a + 14d
6^{th} term = a + 5d
11^{th} term = a + 10d
13^{th} term = a + 12d
Since sum of 3^{rd} and 15^{th} term = sum of 6^{th}, 11^{th} and 13^{th} term, therefore we have
2a + 16d = 3a + 27d
$\Rightarrow$ a + 11d = 0
Which is the 12^{th} term.

For questions 111 to 113:



If the radius of the inner ring road is r, then the radius of the outer ring road will be 2r (since the circumference is double).

The length of IR = 2π r, that of OR = 4π r and that of the chord roads are $r\sqrt{5}$ (Pythagoras theorem)
The corresponding speeds are
20π, 30π and $15\sqrt{5}$ kmph.
Thus time taken to travel one circumference of
IR = $\frac{r}{10}$ hr, one circumference of OR = $\frac{r}{7.5}$ hr and one length of the chord road = $\frac{r}{15}$ hr

111. 3 Sum of the length of the chord roads = $4r\sqrt{5}$ and the length of OR = 4π r.
Thus the required ratio = $\sqrt{5} : \pi$

112. 3 The total time taken by the route given = $\frac{r}{30} + \frac{r}{15} = \frac{3}{2}$
(i.e. 90 min.)
Thus, r = 15 km. The radius of OR = 2r = 30 kms

113. 4 The total time taken = $\frac{r}{20} + \frac{r}{15} = \frac{7r}{60}$
Since r = 15, total time taken = $\frac{7}{4}$ hr. = 105 min.

114. 3 Let the number of questions answered correctly be 'x', that of answered wrongly be 'y' and that of left unattempted be 'z'.
Thus, x + y + z = 50 …(i)
And $x - \frac{y}{3} - \frac{z}{6} = 32$
The second equation can be written as,
6x – 2y – z = 192 …(ii)
Adding the two equations, we get,
$7x - y = 242$ or $x = \frac{242 + y}{7}$
Since x and y are both integers, the minimum value of y must be 3.

115. 2 Since there are 27 people, each person can have 0 upto 26 acquaintances.
If a person has zero acquaintances, then the maximum number of acquaintances any of the other persons can have is 25.
Similarly, if a person has one acquaintance, then the maximum number of acquaintances any of the other persons can have is 26.
Therefore, the number of acquaintances can be any number from 0 to 25 or from 1 to 26. This rules out options (1) and (3).
The congregation consists of 27 people whereas the number of acquaintances any person can have is 26 (either 0 to 25 or 1 to 26). This implies that there is one person who share the same number of acquaintances as atleast one of the other persons. This contradicts option (2).
Hence, (2) is the desired option.

NOTE: If we consider the situation other wise, to satisfy condition 2, the first person must have 26 acquaintances, the second 25, third 24 and so on. If we continue, the last one should have 0 acquaintance, which is not possible.

116. 4 We can see that x + 2 is an increasing function and 5 – x is a decreasing function. This system of equation will have smallest value at the point of intersection of the two. i.e. 5 – x = x + 2 or x = 1.5.
Thus smallest value of g(x) = 3.5

117. 2 **Case 1:** If $x < 2$, then $y = 2 - x + 2.5 - x + 3.6 - x = 8.1 - 3x$.
This will be least if x is highest i.e. just less than 2.
In this case y will be just more than 2.1

Case 2: If $2 \le x < 2.5$, then $y = x - 2 + 2.5 - x + 3.6 - x = 4.1 - x$
Again, this will be least if x is the highest i.e. just less than 2.5. In this case y will be just more than 1.6.

Case 3: If $2.5 \le x < 3.6$, then $y = x - 2 + x - 2.5 + 3.6 - x = x - 0.9$
This will be least if x is least i.e. $x = 2.5$.

Case 4: If $x \ge 3.6$, then
$y = x - 2 + x - 2.5 + x - 3.6 = 3x - 8.1$
The minimum value of this will be at $x = 3.6$ and $y = 2.7$
Hence, the minimum value of y is attained at $x = 2.5$

Alternate method:
At $x = 2$, $f(x) = 2.1$
At $x = 2.5$, $f(x) = 1.6$
At $x = 3.6$, $f(x) = 2.7$
Hence, at $x = 2.5$, f(x) will be minimum.

118. 3 There are 101 integers between 100 and 200, of which 51 are even.
Between 100 and 200, there are 14 multiples of 7, of which 7 are even.
There are 11 multiples of 9, of which 6 are even.
But there is one integer (i.e., 126) that is a multiple of both 7 and 9 and also even.
Hence, the answer is $(51 - 7 - 6 + 1) = 39$.

119. 4 Since the last digit in base 2, 3 and 5 is 1, the number should be such that on dividing by either 2, 3 or 5 we should get a remainder 1. The smallest such number is 31. The next set of numbers are 61, 91.
Among these only 31 and 91 are a part of the answer choices.

Among these, $(31)_{10} = (11111)_2 = (1011)_3 = (111)_5$
Thus, all three forms have leading digit 1.
Hence the answer is 91.

120. 3 The ratio of the speeds of the fastest and the slowest runners is 2 : 1. Hence they should meet at only one point on the circumference i.e. the starting point (As the difference in the ratio in reduced form is 1). For the two of them to meet for the first time, the faster should have completed one complete round over the slower one. Since the two of them meet for the first time after 5 min, the faster one should have completed 2 rounds (i.e. 2000 m) and the slower one should have completed 1 round. (i.e. 1000 m) in this time. Thus, the faster one would complete the race (i.e. 4000 m) in 10 min.

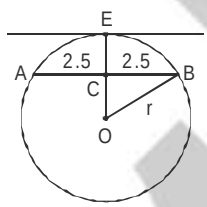
121. 1 Since b can take any even number 2, 4, 6,..., we cannot say anything from statement A.

Consider statement B.
If $b > 16$, say $b = 17$, then $2^{44} < (16 + 1)^{11}$.
$\Rightarrow 2^{44} < (2^4 + 1)^{11}$
Hence, we can answer the question using statement B alone.

122. 2 Solution can be found using Statement A alone as we know both the roots for the equation (viz. $\frac{1}{2}$ and $-\frac{1}{2}$).

Also, statement B alone is sufficient.
Since ratio of c and b = 1, c = b.

Thus, the equation is $4x^2 + bx + b = 0$. Since $x = -\frac{1}{2}$ is one of the roots, substituting, we get $1 - \frac{b}{2} + b = 0$ or $b = -2$.
Thus, $c = -2$.

123. 1 

We can get the answer using the second statement only. Let the radius be r.
AC = CB = 2.5 and using statement B, CE = 5, thus OC = (r – 5).
Using Pythagoras theorem, $(r - 5)^2 + (2.5)^2 = r^2$
We get r = 3.125 cm.

Note: You will realize that such a circle is not possible (if r = 3.125 how can CE be 5). However we need to check data sufficiency and not data consistency. Since we are able to find the value of r uniquely using second statement the answer is (1).

124. 1 Both the series are infinitely diminishing series.

For the first series: First term = $\frac{1}{a^2}$ and $r = \frac{1}{a^2}$

For the second series: First term = $\frac{1}{a}$ and $r = \frac{1}{a^2}$

The sum of the first series = $\frac{\frac{1}{a^2}}{1-\frac{1}{a^2}} = \frac{1}{a^2-1}$

The sum of the second series = $\frac{\frac{1}{a}}{1-\frac{1}{a^2}} = \frac{a}{a^2-1}$

Now, from the first statement, the relation can be anything (depending on whether a is positive or negative).
But the second statement tells us, $4a^2 - 4a + 1 = 0$ or $a = \frac{1}{2}$. For this value of a, the sum of second series will always be greater than that of the first.

125. 2 **From statement (A):**
We can find the sides of triangle ABC.
Hence, area of the triangle ABC and triangle DEF can be found.
From statement (B):
The question tells us that the area of triangle DEF will be $\frac{1}{4}$ th the area of triangle ABC. Thus by knowing either of the statements, we get the area of the triangle DEF.

126. 3 Given that Shephard had 9 dozens of goat at the end of 1998.
$\therefore$ Number of goats at the beginning of 1999 = (1 + p%) 9 dozens
He sells off q% of this at the end of the year 1999.
$\therefore$ Number of goats at the end of 1999 = (1 – q%) (1 + p%) 9 dozens
Since every year the same process is repeated and at the end of 2002, he has the same number as at the end of 1998,
we can get that (1 + p%) (1 – q%) = 1
$\Rightarrow 1 + p - q - pq = 1$
$\Rightarrow p - q = pq$
$\Rightarrow p > q$ (Since $p > 0$ and $q > 0$)

127. 3 Let the total number of angles in the polygon be x. Therefore, the number of concave corners will be x – 25.
$\therefore 25 \times 90 + (x - 25) \times 270 = (x - 2) \times 180$
$\Rightarrow x = 46 \Rightarrow x - 25 = 21$.

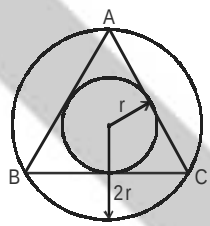
Alternative solution:
In this kind of polygon, the number of convex angles will always be exactly 4 more than the number of concave angles.

Note: The number of vertices have to be even. Hence, the number of concave and convex corners should add up to an even number. This is true only for the answer choice (3).

128. 4 The number of terms of the series forms the sum of first n natural numbers i.e.
$\frac{n(n+1)}{2}$.
Thus the first 23 letters will account for the first $\frac{23 \times 24}{2}$ = 276 terms of the series.
The 288th term will be the 24th letter which is x.

129. 4 $p + q = \alpha - 2$ and $pq = -\alpha - 1$
$(p + q)^2 = p^2 + q^2 + 2pq$,
Thus $(\alpha - 2)^2 = p^2 + q^2 + 2(-\alpha - 1)$
$p^2 + q^2 = \alpha^2 - 4\alpha + 4 + 2\alpha + 2$
$p^2 + q^2 = \alpha^2 - 2\alpha + 6$
$p^2 + q^2 = \alpha^2 - 2\alpha + 1 + 5$
$p^2 + q^2 = (\alpha - 1)^2 + 5$
Thus, minimum value of $p^2 + q^2$ is 5.

130. 3



Since the area of the outer circle is 4 times the area of the inner circle, the radius of the outer circle should be 2 times that of the inner circle.
Since AB and AC are the tangents to the inner circle, they should be equal. Also, BC should be a tangent to inner circle. In other words, triangle ABC should be equilateral.
The area of the outer circle is 12.
Hence, the area of inner circle is 3 or the radius is $\sqrt{\frac{3}{\pi}}$.
The area of equilateral triangle = $3\sqrt{3}\ r^2$, where r is the inradius.
Hence, the answer is $\frac{9\sqrt{3}}{\pi}$.

131. 2 $(a + b + c + d)^2 = (4m + 1)^2$
Thus, $a^2 + b^2 + c^2 + d^2 + 2(ab + ac + ad + bc + bd + cd) = 16m^2 + 8m + 1$
$a^2 + b^2 + c^2 + d^2$ will have the minimum value if (ab + ac + ad + bc + bd + cd) is the maximum.
This is possible if a = b = c = d = (m + 0.25) [since a + b + c + d = 4m + 1]
In that case, $2(ab + ac + ad + bc + bd + cd) = 12(m + 0.25)^2 = 12m^2 + 6m + 0.75$
Thus, the minimum value of $a^2 + b^2 + c^2 + d^2$
$= (16m^2 + 8m + 1) - 2(ab + ac + ad + bc + bd + cd)$
$= (16m^2 + 8m + 1) - (12m^2 + 6m + 0.75)$
$= 4m^2 + 2m + 0.25$
Since it is an integer, the actual minimum value
$= 4m^2 + 2m + 1$

132. 2 If the radius of the field is r, then the total area of the field = $\frac{\pi r^2}{2}$.

The radius of the semi-circles with centre's P and R = $\frac{r}{2}$.

Hence, their total area = $\frac{\pi r^2}{4}$

Let the radius if the circle with centre S be x.

Thus, OS = (r – x), OR = $\frac{r}{2}$ and RS = $\left(\frac{r}{2}+x\right)$.

Applying Pythagoras Theorem, we get

$(r-x)^2 + \left(\frac{r}{2}\right)^2 = \left(\frac{r}{2}+x\right)^2$

Solving this, we get $x = \frac{r}{3}$.

Thus the area of the circle with centre $S = \frac{\pi r^2}{9}$.

The total area that can be grazed = $\pi r^2\left(\frac{1}{4}+\frac{1}{9}\right) = \frac{13\pi r^2}{36}$

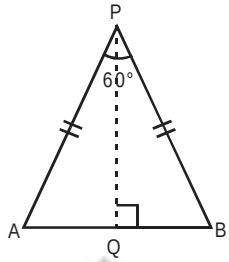
Thus the area of the field that cannot be grazed $= \frac{\pi r^2}{2} - \frac{13\pi r^2}{36} = \frac{5\pi r^2}{36}$

The percentage $= \frac{\frac{5}{36}\pi r^2}{\frac{1}{2}\pi r^2} \times 100 \simeq 28.$

133. 1 It is very clear, that a regular hexagon can be divided into six equilateral triangles. And triangle AOF is half of an equilateral triangle.
Hence, the required ratio = 1 : 12.

134. 3 If y = 2 (it cannot be 0 or 1), then x can take 1 value and z can take 2 values.
Thus with y = 2, a total of 1 × 2 = 2 numbers can be formed. With y = 3, 2 × 3 = 6 numbers can be formed. Similarly checking for all values of y from 2 to 9 and adding up we get the answer as 240.

135. 2



Given ∠APB = 60° and AB = b.

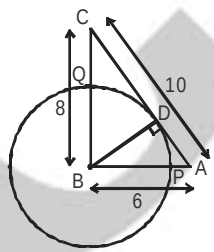
$\therefore PQ = \frac{b}{2} \times \sqrt{3}$

Next, $\frac{b}{2}$, h and PQ form a right angle triangle.

$\therefore \frac{b^2}{4} + h^2 = \frac{3b^2}{4}$

$\Rightarrow 2h^2 = b^2$

136. 4



Triangle ABC is a right angled triangle.

Thus $\frac{1}{2}$ × BC × AB = $\frac{1}{2}$ × BD × AC

Or, 6 × 8 = BD × 10. Thus BD = 4.8.
Therefore, BP = BQ = 4.8.
So, AP = AB – BP = 6 – 4.8 = 1.2 and CQ = BC – BQ = 8 – 4.8 = 3.2.
Thus, AP : CQ = 1.2 : 3.2 = 3 : 8

137. 2 Using the Basic Proportionality Theorem, $\frac{AB}{PQ} = \frac{BD}{QD}$ and $\frac{PQ}{CD} = \frac{BQ}{BD}$.

Multiplying the two we get, $\frac{AB}{CD} = \frac{BQ}{QD}$ = 3 : 1.

Thus CD : PQ = BD : BQ = 4 : 3 = 1 : 0.75

138. 3 Assume the number of horizontal layers in the pile be n.

So $\sum \frac{n(n+1)}{2} = 8436$

$\Rightarrow \frac{1}{2} [\sum n^2 + \sum n] = 8436$

$\Rightarrow \frac{n(n+1)(2n+1)}{12} + \frac{n(n+1)}{4} = 8436$

$\Rightarrow n(n+1) \left[\frac{2n+4}{12}\right] = 8436$

$\Rightarrow \frac{n(n+1)(n+2)}{6} = 8436$

$\Rightarrow n(n+1)(n+2) = 36 \times 37 \times 38$

So n = 36

139. 3 The best way to do this is to take some value and verify.

E.g. 2, $\frac{1}{2}$ and 1. Thus, n = 3 and the sum of the three numbers = 3.5.

Thus, options (a), (b) and (d) get eliminated.

Alternative method:

Let the n positive numbers be $a_1, a_2, a_3, \ldots a_n$

$a_1, a_2, a_3, \ldots a_n = 1$

We know that AM $\geq$ GM

Hence, $\frac{1}{n}(a_1 + a_2 + a_3 + \ldots + a_n) \geq (a_1 a_2 \ldots a_n)^{1/n}$

or $(a_1 + a_2 + a_3 + \ldots + a_n) \geq n$

140. 4 Using log a – log b = $\log\left(\frac{a}{b}\right)$, $\frac{2}{y-5} = \frac{y-5}{y-3.5}$, where $y = 2^x$

Solving we get y = 4 or 8

i.e. x = 2 or 3.

It cannot be 2 as log of negative number is not defined (see the second expression).

141. 1 If y = 10°,

$\angle BOC$ = 10° (opposite equal sides)

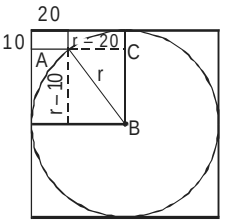
$\angle OBA$ = 20° (external angle of ΔBOC)

$\angle OAB$ = 20 (opposite equal sides)

$\angle AOD$ = 30° (external angle of ΔAOC)

Thus k = 3

142. 3



Let the radius be r. Thus by Pythagoras' theorem for ΔABC we have $(r - 10)^2 + (r - 20)^2 = r^2$

i.e. $r^2 - 60r + 500 = 0$. Thus r = 10 or 50.

It would be 10, if the corner of the rectangle had been lying on the inner circumference. But as per the given diagram, the radius of the circle should be 50 cm.

143. 2 u is always negative. Hence, for us to have a minimum value of $\frac{vz}{u}$, vz should be positive. Also, for the least value, the numerator has to be the maximum positive value and the denominator has to be the smallest negative value. In other words, vz has to be 2 and u has to be –0.5.

Hence, the minimum value of $\frac{vz}{u} = \frac{2}{-0.5} = -4$.

To get the maximum value, vz has to be the smallest negative value and u has to be the highest negative value. Thus, vz has to be –2 and u has to be –0.5.

Hence, the maximum value of $\frac{vz}{u} = \frac{-2}{-0.5} = 4$.

144. 2 GRRRRR, RGRRRR, RRGRRR, RRRGRR, RRRRGR, RRRRRG
GGRRRR, RGGRRR, RRGGRR, RRRGGR, RRRRGG
GGGRRR, RGGGRR, RRGGGR, RRRGGG
GGGGRR, RGGGGR, RRGGGG
GGGGGR, RGGGGG
GGGGGG
Hence 21 ways.

145. 4 Putting $y_1 = y_2$, we get

$x^3 + x^2 + 5 = x^2 + x + 5$

$\Rightarrow x^3 = x \Rightarrow x^3 - x = 0 \Rightarrow x = -1, 0, 1$.

Alternative method:

When we substitute two values of x in the above curves, at x = –2, we get

y = –8 + 4 + 5 = 1

y = 4 – 2 + 5 = 7

Hence, at x = –2 the curves do not intersect.

At x = 2, y_1 = 17 and y_2 = 11

At x = –1, y_1 = 5 and 2 and y_2 = 5

When x = 0, y_1 = 5 and y_2 = 5

And at x = 1, y_1 = 7 and y_2 = 7

Therefore, the two curves meet thrice when x = –1, 0 and 1.

146. 1 Let us say there are only 3 questions. Then, there are $2^{3-1} = 4$ students who have done 1 or more questions wrongly, $2^{3-2} = 2$ students who have done 2 or more questions wrongly and $2^{3-3} = 1$ student who must have done all 3 wrongly. Thus, total number of wrong answers = $4 + 2 + 1 = 7 = 2^3 - 1 = 2^n - 1$.
In our question, the total number of wrong answers = $4095 = 2^{12} - 1$. Thus n = 12.

147. 3 Here x, y, z are distinct positive real number

So $\frac{x^2(y+z)+y^2(x+2)+z^2(x+y)}{xyz}$

$= \frac{x}{y}+\frac{x}{z}+\frac{y}{x}+\frac{y}{z}+\frac{z}{x}+\frac{z}{y}$

$= \left(\frac{x}{y}+\frac{y}{x}\right)+\left(\frac{y}{z}+\frac{z}{y}\right)+\left(\frac{z}{x}+\frac{x}{z}\right)$ [We know that

$\frac{a}{b}+\frac{b}{a} > 2$ if a and b are distinct numbers]

$> 2 + 2 + 2 > 6$

148. 1 The least number of edges will be when one point is connected to each of the other 11 points, giving a total of 11 lines. One can move from any point to any other point via the common point.
The maximum edges will be when a line exists between any two points. Two points can be selected from 12 points in $^{12}C_2$ i.e. 66 lines.

149. 2 From 12 to 40, there are 7 prime numbers, i.e., 13, 17, 19, 23, 29, 31 and 37 such that (n – 1)! is not divisible by any of them.

150. 4 $T_n = a + (n - 1)d$
$\Rightarrow 467 = 3 + (n - 1)8$
$\Rightarrow n = 59$
Half of n = 29 terms
29th term is 227 and 30th term is 235 and when these two terms are added the sum is less than 470.
Hence the maximum possible values the set S can have is 30.