VARC

1. Answer: (B)
Explanation:
Option (b) is correct as it establishes a logical link which says ◊ good health ensures good performance levels due to which one can earn with a higher capacity which enables one to earn more and that extra income can lead to saving for a safe future and long life.
In option (a), the flaw lies in savings not being mentioned.
In option (c), the flaw lies in the fact that it is not low medical expenses that lead to savings but higher incomes.
Option (d) does not give the reason for higher job opportunities (ie; higher performance levels as a result of good health).
Thus, option (b) is correct.

2. Answer: (C)
Explanation:
The author has given a detailed analysis about the subject and supported all his points with valid arguments. Such a descriptive, explanatory, and supported by data content must be called as written in an analytical style.
If we talk about option (a), it is not a convenient option as the author is not trying to prove his point by being superior so 'Patronizing' is not a good fit.
'Introspective' tone is when the author is involved in a deep thought so that doesn't happen here.
The author is not 'Speculative' as well, as he is making his points based on facts and not plain assumptions.
So, the best would be to mark option (c).

3. Answer: (B)
Explanation:
The move or transition from large families to small families has only been adopted as people now expect that all their children will survive and support them later as healthy individuals. This was not the case earlier.
Large families meant more hands to earn and with low survival rate among children, parents did not want to risk having no children to support them in their old age.
Option (a) asserts that population grows larger, but, just the opposite is mentioned in the passage which talks of smaller families. So, Option (a) is wrong. Option (c) is absurd and option (d) just states the given concept in a different manner but does not give any reason.

4. Answer: (C)
Explanation:
The passage indicates a direct talk between good health and performance. Research has supported the fact that healthy people have better productivity levels as they do not suffer from medical ailments which can slow down their ability to perform tasks given to them.
Option (a) is incorrect as making correct decisions cannot be linked to good health alone but to a person's capability and intellect. Option (b) is wrong as it doesn't establish a link between productivity and health. Option (d) is wrong as overtime does not ensure good health.

5. Answer: (A)
Explanation:
Option (a) is incorrect as it is refuted in the opening line of the passage which says that all infinite varieties of life on the planet share the same DNA. And the option says they are 'not uniform' which makes it opposite.
Options (b), (c) and (d) are all upheld in the passage. The third paragraph in the third and the second sentences mentions option (b) and (d) and the fourth paragraph towards the end explains how Staphylococcus aureus kills cells making it toxic for the humans; confirms option (c).
Hence, option (a) is the correct answer.

6. Answer: (C)
Explanation:
Option (c) is validated in the second paragraph of the passage.
Options (a), (b), (d) and (e) are all irrelevant in the context of the passage and are, therefore, rejected.
Hence, option (c) is the correct option.

7. Answer: (B)
Explanation:
Option (b) is correct as it appears at the end of the second paragraph.
Options (a), (c) and (d) are incorrect because the passage does not state these.
Hence, option (b) is the correct choice.

8. Answer: (B)
Explanation:
Option (b) is stated in the opening paragraph from the lines: 'Humans share nearly all of their DNA with one another and a goodly chunk with worms and mice…'
Options (a) and (c) are wrong, as the passage does not state these.
Option (d) is incorrect as it includes options (a) and (c).
Hence, option (b) is the correct answer.

9. Answer: (D)
Explanation:
For option (a), the passage did not make any comparison between deaths of human and deaths of animal in (b), animal is actually not the villain for most flues. Rather, it is human. For (c), "Hygiene and management can control what eventually happens" (in the middle of fourth paragraph) therefore, (c) is incorrect.
The correct answer is (d) – the current bird flu epidemic may be a launch pad for the next influenza pandemic, because no animal has pre – existing immunity and it causes a pandemic by spreading from human to human.

10. Answer: (C)

Explanation:
The first paragraph presents a recent virus.
The second and third paragraphs describe similar influenza pandemics in history.
The fourth paragraph concludes who should be responsible for the spread of the virus and what humans can do to control the same.
The last paragraph indicates that people stimulated rather than inhibited its promulgation. We can thus, conclude that the current virus will also leap to humans. Furthermore, the passage as a whole is to "ring alarm bells" which means to cause worry because of being a sign that there may be a serious problem.
Therefore, (c) is the best answer

11. Answer: (A)
Explanation:
The question requires the recognition of a situation that is not similar to the spread of avian flu. The rationale of the paragraph is something like this ◊ Avian flu virus is picked up by the pigs and is transferred to humans.
All the situations described in the answer choices are similar to the same except that in choice (a); (from animal to animal).
Therefore, (a) is the best answer.

12. Answer: (B)
Explanation:
In the beginning of the passage; the author states that "Avian flu virus picked up by pigs can swap genetic materials with another flu virus already in the pig and become a new hitherto unknown flu virus for which no person no animal has pre – existing immunity. The kind of virus causes the same because it spreads from human to human."
In other words; pig is the pot in which viruses swap genes and become new, deadly germs.
Therefore, the correct answer is (b).

13. Answer: (D)
Explanation:
Options (a), (b) and (c) are not true with respect to what is stated in the passage.
Option (d) is stated in the first line of the second paragraph. So, this is the obvious answer.

14. Answer: (C)
Explanation:
The second paragraph towards the end states that the short – lived marriages are the barometer of society's attitudes towards marriage and divorce.
The other options can be eliminated as they are far – fetched as per the context.
Thus, (c) is correct.

15. Answer: (B)
Explanation:
The third paragraph has described the role of children in acting as a unifying force and bringing stability to the lives of married couple. Option (b) is thus, the correct conclusion which can be drawn from the passage. Options (c) and (d) are refuted, as the passage states the opposite. Option (a) is absurd.
So, (b) will be the best choice.

16. Answer: (A)
Explanation:
The last line of the fourth paragraph clearly states the point given in the question. As we can confirm the given point, it is upheld.
Options (b), (c) and (d) can be eliminated and (a) can be marked as the answer.

17. Answer: (A)
Explanation:
The given paragraph can be understood as providing information about the number of people who have been serving a virtual life sentence and another aspect that has been mentioned is that such a punishment is inhuman and degrading (as most of the times, the crime hasn't been proven as well but the person behind bars bears the brunt.)
If we check the options, the first option exactly paraphrases the pertinent point being discussed in the passage.
The second option talks about a decent society which is a new paradigm as nothing of the sort has been discussed in the paragraph.
The third and the fourth options are similar in meaning and just worded differently. These options simply mean that the harshness or the severity of the punishment is doesn't matter as it does little to reduce the crime. This is not the core of the paragraph.
So, the best is to mark option (a) as the answer.

18. Answer: (B)
Explanation:
The third sentence cannot be odd as there is no other sentence that can introduce the idea of the given paragraph. It should start the paragraph for sure.
If we check all the given sentences, they talk about the Buddhist monks only but four out of the given five talk about their regular routine of collecting alms from the people so, these being 3, 5 and 4 will for sure be a part of the same paragraph. We can also find that 1 can succeed 3 and 2 is a misfit as it provides additional information about the monks and their background. This idea will not be able to find place in the sequence.
So, the best would be to mark (B) as the answer.

19. Answer: (C)
Explanation:
The second sentence of the paragraph helps us refute the fourth option because it is not just the humans who can dream but the animals too. The first line of the paragraph also mentions the same. The second option can also be eliminated by the same logic. The first option is also exactly the opposite of what the paragraph is explaining.
We are left with just the third option that can best summarize the given paragraph even when we can find few specific things about the dreams that have not been given clearly in the paragraph.
So, the best is to mark option (C) as the answer.

20. Answer: (D)
Explanation:

We can observe that 4 and 1 are related because, behaviour of sleeping animals in 4 and now known as… in 1 form a link.
Checking the options in which we have 41, we can eliminate options (a) and (c). This confirms that the 2 starts the given paragraph correctly. Now, 2 should be followed by 4 because, 1 and 3 are also connected.
This tells us that the correct sequence is given in option (d).

21. Answer: (C)

Explanation:
A close observation of the given sentences tells us that sentences 1, 4 and 2 are related. If we apply the rule of chronology, we see that 1 talks about the 19th century so it would come before 4 in the sequence. This helps us cancel option (d).
But 1 cannot start because 'while' indicates that something before this should also have been discussed. This cancels the first option as well.
4 and 2 are related. This clarifies that 3 is the best statement that can start the given paragraph coherently.
The correct sequence therefore, can be found in the third option.

22. Answer: (D)

Explanation:
1 and 3 are related as 1 talks about the year in which the Rogers was born and 3 says, 'as a young man' so, this connects well.
2 and 4 are also related as, 2 talks about 1926 when Roger chose psychology which has been explained in 4 as being a relatively new field in that year.
Therefore, the sequence that carries both these connections can be found in option (d).

23. Answer: (A)

Explanation:
Upon reading all the given sentences we find that the given sentences are all related to the role listening can play. Looking at the idea that can start well from 4, we find that 2 continues the idea in 4.
2 and 5 are also related and in continuity. 4, 2 and 5 are hence, related for sure. 3 also discusses the idea of uplifting the ones around us. So, this can also be taken as related.
The first sentence does not fit in the flow of the idea. Hence, the correct answer is option (A).

24. Answer: (B)

Explanation:
The given paragraph discusses the present state of Antarctica and does not talk specifically about its protection or conservation. This helps us eliminate the first option.
The paragraph tells us the way in which the events are creating a chaos in the entire area and affecting the creatures in the area as well as other parts of the world. It tells us how melting of ice will be disastrous for the humans.
(d) is exactly the opposite of the idea in the passage as, limited human activity would not threaten, rather conserve the same.
(b) makes a better option as it is specific in explaining the threats are a pertinent in the entire paragraph.
So, the best would be to mark option (b).

LRDI

Answer: (25-28)

The final arrangement is as follows:

Students	Subjects (I)	Subjects (II)
A	Hindi	English
B	Hindi	–––––––––––
C	Hindi	–––––––––––
D	English	Science
E	English	–––––––––––
F	English	–––––––––––
G	English	Hindi
H	English	–––––––––––
I	Science	–––––––––––
J	Hindi	–––––––––––

Or

Students	Subjects (I)	Subjects (II)
A	Hindi	–––––––––––
B	Hindi	English
C	Hindi	–––––––––––
D	English	Science
E	English	–––––––––––
F	English	–––––––––––
G	English	Hindi
H	English	–––––––––––
I	Science	–––––––––––
J	Hindi	–––––––––––

25. Answer: (D)

If G is not good at Hindi, then E, F and H are good at English only.
Hence, option d.

26. Answer: (D)

C is good at Hindi only.
Hence, option d.

27. Answer: (C)

G is good at both Hindi and English only.
Hence, option c.

28. Answer: (D)
If D and I are good at Science.
Hence, option d.

Answer: (29-34)
Starting Point: Start with placing Y, who sits 3rd to the left of N.
Clues:
1. Y sits 3rd to the left of N, who sits opposite to the one, who belongs to Bihar.
2. T sits 3rd to the left of V, who sits at extreme end.
3. P, who belongs to Kerela, sits immediate right of T, who does not belong to Sikkim.
4. Three persons sit between P and R, who sits opposite to the one, who likes orange colour.
Inferences:
From clue 1, we get N sits 4th or 3rd or 2nd or at extreme right end of row 1.
From clue 2 and clue 3, we get P sits 3rd from extreme left end of row 2.
From clue 4, we get the one who likes orange and R sits extreme right end of row 1 and row 2 respectively.
Case I: When N sits 4th from extreme right end of row 1.

States			Kerela	Bihar			
Row 2	V		P	T			R
Row 1	Y			N			
Colour							Orange

Case II: When N sits 3rd from extreme right end of row 1.

States			Kerela		Bihar		
Row 2	V		P	T			R
Row 1		Y			N		
Colour							Orange

Case III: When N sits 2nd from extreme right end of row 1.

States			Kerela			Bihar	
Row 2	V		P	T			R
Row 1			Y			N	
Colour							Orange

Case IV: When N sits at extreme right end of row 1.

States			Kerela				Bihar
Row 2	V		P	T			R
Row 1				Y			N
Colour							Orange

Clues:
5. Z, who likes black colour, sits 3rd to the left of the one, who likes orange colour.
6. S sits opposite to O, who likes red colour.
7. U, who belongs to Assam, sits opposite to the one who likes silver colour.
Inferences:
From clue 5, we reject Case I and Case IV as we can't place Z. Z sits opposite to T.
From clue 6, we get S sits immediate right of R or P or immediate left of T.
From clue 7, we get either Y likes silver or the one who sits 2nd or 5th from extreme left end of row 2 likes silver. Q belongs to Bihar.
Case II:

States		Assam	Kerela		Bihar		
Row 2	V	U	P	T	Q	S	R
Row 1		Y		Z	N	O	
Colour		Silver		Black		Red	Orange

Case III(a):

States		Assam	Kerela			Bihar	
Row 2	V	U	P	T	S	Q	R
Row 1			Y	Z	O	N	
Colour		Silver		Black	Red		Orange

Case III(b):

States			Kerela		Assam	Bihar	
Row 2	V	S	P	T	U	Q	R
Row 1		O	Y	Z		N	
Colour		Red		Black	Silver		Orange

Clues:
8. The one, who belongs to MP, sits immediate left of the one, who belongs to UP.
9. The one, who likes pink colour, sits opposite to the one, who belongs to Sikkim.
Inferences:
From clue 8, we get either R or S belongs to MP, S or T or V belongs to UP.
From clue 8 and clue 3, we get T belongs to Goa or either V or R belongs to Sikkim or Goa.
From clue 9, we reject Case III(b) as we can't place the one who likes pink colour. V belongs to Sikkim.
Case II:

States	Sikkim	Assam	Kerela	Goa	Bihar	UP	MP

Row 2	V	U	P	T	Q	S	R
Row 1		Y		Z	N	O	
Colour	Pink	Silver		Black		Red	Orange

Case III(a):

States	Sikkim	Assam	Kerela	UP	MP	Bihar	Goa
Row 2	V	U	P	T	S	Q	R
Row 1			Y	Z	O	N	
Colour	Pink	Silver		Black	Red		Orange

Clues:

10. The one, who likes blue colour, does not sit adjacent to the one, who likes black colour.
11. Neither A nor M likes pink colour.
12. M does not like silver colour.

Inferences:

From clue 10, we reject Case II as we can't place the one who likes blue colour. N likes blue colour.
From clue 11 and clue 12, we get M likes orange colour, A likes silver colour and X likes pink colour.
The final arrangement is as follows:

States	Sikkim	Assam	Kerela	UP	MP	Bihar	Goa
Row 2	V	U	P	T	S	Q	R
Row 1	X	A	Y	Z	O	N	M
Colour	Pink	Silver	Grey	Black	Red	Blue	Orange

29. Answer: (D)
U, who belongs to Assam, sits opposite to the one, who likes silver colour.
Hence, option d.

30. Answer: (D)
All pairs are opposite to each other except R & N.
Hence, option d.

31. Answer: (D)
Two persons sit between the one, who belongs to Goa and the one, who sits opposite to the one, who likes black colour similarly as in between (V and T), (A and O).
Hence, option d.

32. Answer: (A)
Z, who likes black colour, sits 2nd to the left of Q after the rearrangement.
Hence, option a.

33. Answer: (B)
X, who likes pink colour sits 3rd to the left of M, who sits opposite to R after the rearrangement.
Hence, option b.

34. Answer: (D)
Q sits opposite to the one who sits immediate left of A after the rearrangement.
Hence, option d.

Answer: (35-40)
For Sundar:
Total quantity (with water) of vegetables sold = 500 kg
Quantity (with water) of cabbage sold = 180 kg
Quantity of water present in potatoes = 0.45 × 180 = 81 kg
Quantity of potatoes (without water) sold = 320 – 81 = 239 kg
Quantity of water present in cabbage = 120 – 81 = 39 kg
Therefore, quantity of cabbage (without water) sold = 180 – 39 = 141 kg
Similarly,

Seller	Quantity (in kg) of potatoes sold (with water)	Quantity (in kg) of water present in potatoes	Quantity (in kg) of potatoes sold (without water)	Quantity (in kg) of cabbage sold (with water)	Quantity (in kg) of water present in cabbage	Quantity (in kg) of cabbage sold (without water)
Sundar	320	81	239	180	39	141
Jetha	250	50	200	400	200	200
Taarak	800	96	704	480	64	416
Baagha	150	100	50	250	50	200
Sodhi	500	60	440	400	120	280

35. Answer: (C)
Required ratio = (239 × 10):(141 × 8) = 1195:564
Hence, option c.

36. Answer: (C)
Cost price of 200 kg of dry cabbage for Jetha = 200 × 5 = Rs. 1000
Selling price of 400 kg of wet cabbage for Jetha = 400 × 8 = Rs. 3200
Required profit earned = 3200 – 1000 = Rs. 2200
Hence, option c.

37. Answer: (A)
Difference between quantity of cabbage (without water) sold by Jetha and Sodhi = 280 – 200 = 80 kg
Quantity of cabbage (with water) sold by Jetha and Taarak = 480 – 400 = 80 kg
Hence, option a.

38. Answer: (D)
Required ratio = (96 + 100 + 60):324 = 256:324 = 64:81

Hence, option d.

39. Answer: (A)

Required sum of profits = (39 × 5) + (50 × 8) + (120 × 4) = Rs. 1075

Hence, option a.

40. Answer: (C)

Required profit percentage = 60/440 × 100 = 13.64%

Hence, option c.

Answer (41-44)

Let number of students who baked butter cookies only = 5x

So, number of students who baked peanut cookies only = 1.40 × 5x = 7x

And, number of students who baked strawberry cookies only = (15/7) × 7x = 15x

Number of students who baked strawberry and butter cookies both but not peanut cookies = 0.36 × 15x = 5.4x

Let number of students who baked peanut and strawberry cookies both but not butter cookies = 'a'

And, number of students who baked peanut and butter cookies both but not strawberry cookies = 'b'

And, number of students who baked all three types of cookies = 'c'

So, 7x + a + b + c = 8c

Or, 7x + a + b = 7c.....(1)

And, {(b + c)/(a + c)} = 14/17

Or, 17b + 17c = 14a + 14c

Or, 3c = 14a – 17b.....(2)

And, 5.4x + c = 632.....(3)

Also, a/5.4x = 10/9

Or, 9a = 54x

Or, a = 6x.....(4)

From equation (1), (2) and (4), we get

13x + b = 7c.....(5)

And, 84x – 17b = 3c.....(6)

Equation (5) ÷ Equation (6), we get

{(13x + b)/(84x – 17b)} = 7/3

Or, 122b = 549x

Or, b = 4.5x

Since, 14a – 17b = 3c

So, 14 × 6x – 17 × 4.5x = 3c

Or, 3c = 7.5x

Or, c = 2.5x

So, 5.4x + 2.5x = 632 [from equation (3)]

Or, 7.9x = 632

Or, x = 80

And, a = 6x = 6 × 80 = 480

And, b = 4.5x = 4.5 × 80 = 360

And, c = 2.5x = 2.5 × 80 = 200

Number of students who baked butter cookies only = 5x = 5 × 80 = 400

Number of students who baked peanut cookies only = 7x = 7 × 80 = 560

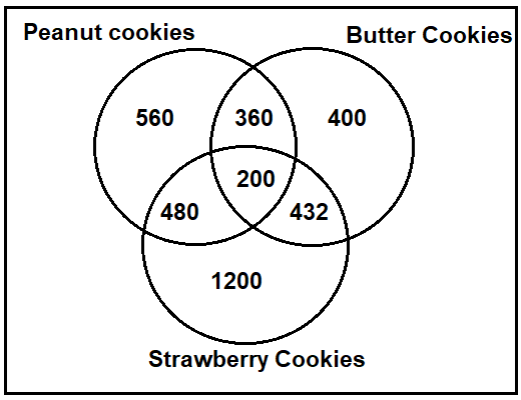
Number of students who baked strawberry cookies only = 15x = 15 × 80 = 1200

Number of students who baked strawberry and butter cookies both but not peanut cookies = 5.4x = 5.4 × 80 = 432

Number of students who baked peanut and strawberry cookies both but not butter cookies = 'a' = 480

Number of students who baked peanut and butter cookies both but not strawberry cookies = 'b' = 360

And, number of students who baked all three types of cookies = 'c' = 200



41. Answer: (C)

Total number of students who baked strawberry cookies = 2312

Hence, option c.

42. Answer: (D)

Number of students who baked exactly two types of cookies = 360 + 480 + 432 = 1272

Hence, option d.

43. Answer: (C)

Let number of aspirants who got passed in Hindi only be '2x'

Number of aspirants who got passed in English only = 1.50 × 2x = 3x

Number of aspirants who got passed in both subjects = 2 × 2x = 4x
So, 2x + 4x + 3x = 0.60 × 1200 = 720
Or, 9x = 720
Or, x = 80
So, number of students who got passed in both subjects = 4x = 4 × 80 = 320
Hence, option c.

44. Answer: (D)
Number of students who baked all three types of cookies = 200
Hence, option d.

Quantitative Aptitude

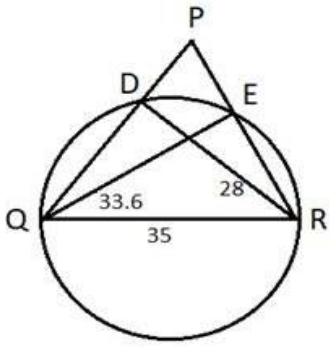
45. Answer: (C)
Let the cost of the expensive rice be ₹ P/kg and let the S.P of the mixture of rice be ₹ k/kg.
As amount of expensive rice used in mixture = 4kg
So, amount of cheaper rice used in mixture = (7/8) × 4 = 3.5 kg
So, total C.P. of mixture of expensive rice and cheaper rice = 4P + 3.5 × 25 = 4P + 87.5
Net total C.P = 56P + 87.5
And S.P. of (4 + 3.5) = 7.5 kg of mixture = 7.5k
Now, M.P. of expensive rice = 1.15P
So, S.P. of 20 kg of rice = 20 × 1.15P = 23P
Again, remaining amount of rice = 56 – 4 – 20 = 32 kg
S.P. of 32 kg of rice = 0.9 × 1.15P × 32 = 33.12P
So, total S.P. = 7.5k + 23P + 33.12P = 7.5k + 56.12P
Now, S.P. – C.P. = 7.5k + 56.12P – (56P + 87.5) = 7.5k + 0.12P – 87.5
7.5k + 0.12P – 87.5 = 164.80
7.5k + 0.12P = 252.3 .. (i)
Now, we know that 25 < k < P.
From the options and using (i),
When P = 45,
7.5k = 246.9
k = 32.92
When P = 100,
7.5k = 240.3
k = 32.04
When P = 32,
7.5k = 248.46
k = 33.128
As k > P, so P cannot be 32.
When P = 137,
7.5k = 235.86
k = 31.448

46. Answer: (C)
$\log_{1/7}(c/126) = \log_7(c-5)$
or $-\log_7(c/126) = \log_7(c-5)$
or $\log_7(c/126)^{-1} = \log_7(c-5)$
or $\log_7(126/c) = \log_7(c-5)$
or $126/c = c - 5$
or $126 = c^2 - 5c$
or $c^2 - 5c - 126 = 0$
or $(c-14)(c+9)=0$
or $c = 14, -9$
Now, c cannot be negative, hence c = – 9 is not possible.
Thus c = 14 is the only solution.

47. Answer: (A)
$x^4 - 8x^3 - px^2 - qx + 4 = 0$
The above equation has 4 roots.
Now, we know in any equation $ax^4 + bx^3 + cx^2 + dx + e = 0$ and roots m, n, o, r.
Sum of the roots = m + n + o + r = – b/a
Also, mn + no + or + rm + mo + nr = c/a
And, mno + nor + orm + mnr = – d/a
mnor = e/a
Hence, for the given equation,
m + n + o + r = 8 .. (i)
mn + no + or + rm + mo + nr = p
mno + nor + orm + mnr = q
mnor = 4 .. (ii)
So, arithmetic mean, from (i), of the four roots = 8/4 = 2
And, geometric mean, from (ii), of the four roots = √4 = 2
As they are positive and real roots and arithmetic mean = geometric mean, so m = n = o = r = 2 (from (i))
Hence, $x^4 - 8x^3 - px^2 - qx + 4 = 0$ is the same as $(x-2)^4 = 0$
mn + no + or + rm + mo + nr = p

4 + 4 + 4 + 4 + 4 + 4 = p
p = 24
And, mno + nor + orm + mnr = q
8 + 8 + 8 + 8 = q
q = 32
p + q = 24 + 32 = 56

48. Answer: (C)



QR is the diameter, so RD and QE are perpendicular to PQ and PR respectively. [Angle subtended by a semi – circular arc at a point on the circle is 90°]
Hence, by Pythagoras theorem,
In ΔQDR,
$QD^2 = QR^2 – RD^2 = 35^2 – 28^2 = 441$
QD = 21 cm
In ΔQER,
$RE^2 = QR^2 – EQ^2 = 35^2 – (33.6)^2 = 96.04$
RE = 9.8 cm
Also, Area of ΔPQR = (1/2) × base × height
So, (1/2) × PQ × DR = (1/2) × PR × QE
28PQ = 33.6PR
PQ = 1.2PR .. (i)
Now,
$PR^2 = PD^2 + DR^2 = (PQ – QD)^2 + DR^2$
$PR^2 = PQ^2 + (QD^2 + DR^2) – 2PQ.QD$
$PR^2 = PQ^2 + QR^2 – 2PQ.QD$ .. (ii)
Similarly,
$PQ^2 = PR^2 + QR^2 – 2PR.RE$ .. (iii)
Adding (ii) and (iii)
$QR^2 = PQ.QD + PR.RE$
1225 = 21PQ + 9.8PR
175 = 3PQ + 1.4PR .. (iv)
From (i) and (iv),
PR = 35 cm and PQ = 42 cm
Required difference = 42 – 35 = **7 cm**

49. Answer: (A)

4p + 9q = 312
The smallest positive value of p which satisfies the equation is 6, then q = 32.
The next set of values is (15, 28).
We see that 6 + 9 = 15 while 32 – 4 = 28
So, all the sets of (p, q) which satisfy the equation must be (6 + 9k, 32 – 4k), where k = 1, 2, 3, ..
Hence, the consecutive sets are:
(24, 24)
(33, 20)
(42, 16)
(51, 12)
(60, 8)
(69, 4)
As q < p, so from (33, 20), there are 5 such pairs.

50. Answer: (D)

Let us modify the given equation

$$x^2 + y^2 - 26x - 34y = -233$$

$$(x-13)^2 + (y-17)^2 = 225$$

The point P lies outside the circle
$(28-13)^2 + (25-17)^2 > 225$
The center here is $(13,17)$
Radius $= 15$
The farthest distance = radius + distance between P and the centre
The farthest distance $= 15 + \sqrt{(28-13)^2 + (25-17)^2} = 32$

51. Answer B

Time taken by 'A' to complete the whole work = 8/0.40 = 20 days

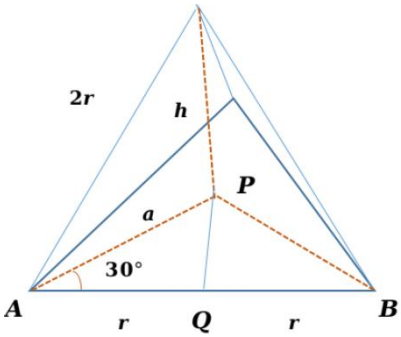
Time taken by 'B' to complete the whole work = 20/0.80 = 25 days
Let the total work = 100 units (L.C.M of 20 and 25)
Efficiency of 'A' = 100/20 = 5 units/day
Efficiency of 'B' = 100/25 = 4 units/day
Time taken by 'A' and 'B' to complete 45% of the work = 0.45 × 100/(5 + 4) = 5 days
Amount of work done by 'A' and 'B' in 5 days = (5 + 4) × 5 = 45 units
Remaining work = 100 – (45 + 45) = 10 units
Therefore, 5x = 10
Or, x = 2 units/day
Original efficiency of 'C' = 2 × 4 = 8 units/day
Time taken by 'C' to complete 80% of work = (0.80 × 100)/8 = 10 days

52. Answer: (D)

As we know that area of triangle whose vertices are (x_1, y_1), (x_2, y_2) and (x_3, y_3) is
$= [x_1 (y_2 – y_3) + x_2 (y_3 – y_1) + x_3 (y_1 – y_2)]/2$
So the area of the triangle = ½[a(b – 2c) + a(c – b – c) + (– a) (b + c – b + c)]
= ½ (ab – 2ac – ab – 2ac) = ½ (– 4ac) = – 2ac
As area of the triangle cannot be negative so the area = 2ac

53. Answer: A

We can form a pyramid by stacking one sphere on a base of three spheres. The centres of the spheres forming the bottom layer are ' r ' cms above the wooden floor. On connecting the centres of the spheres, we obtain a tetrahedron as shown below:



Calculating ' h ' from the above setup and adding it to twice the radius of the sphere will render us our desired answer. Since AP bisects the equilateral triangle forming the base, $\angle PAB = 30°$
$a\cos 30° = r;$
$\therefore a = \frac{2r}{\sqrt{3}}$
We can find h in terms of ' r ' by using the Pythagoras theorem: $h^2 + a^2 = 4r^2$
On solving we obtain, $h = 2r\sqrt{\frac{2}{3}}$
Hence, the total height till the top of the sphere would be $(h + r + r) = 2r\left(1 + \sqrt{\frac{2}{3}}\right) \approx 40\text{cms}$
Thus, Option A is the correct choice.

54. Answer B

Let the original marked price be Rs. 100x
New marked price = 125x
Selling price of the article = 0.8 × 0.85 × 0.875 × 125x = Rs. 74.375x
Cost price of the article = 74.375x/1.25 = Rs. 59.5x
Another selling price = 0.8 × 0.85 × 125x = Rs. 85x
According to question,
85x – 59.5x = 459
25.5x = 459
x = 18
Desired cost price = 59.5 × 18 = Rs. 1071
Hence, option b.

55. Answer: (D)

(7a + 64) + (7a + 62) + (7a + 60) + ... + (7a + 8) = 23577
(7a + 7a + 7a + ..) + (64 + 62 + 60 + .. + 8) = 23577
All even numbers from 8 to 64 are added, so there are a total of (64 – 8)/2 + 1 = 29 terms
Hence total no. of 7a = 29
Now, sum of n consecutive even numbers = n(n + 1)
So, 2 + 4 + 6 + .. + 64 = 32(32 + 1) = 1056
And, 8 + 10 + .. + 64 = 1056 – 12 = 1044
Hence, 29 × 7a + 1044 = 23577
203a = 22533
a = 111
Hence, sum of the first a natural numbers = 1 + 2 + 3 + ... + a = 1 + 2 + 3 + ... + 111 = 111(111 + 1)/2 = 6216

56. Answer: (C)

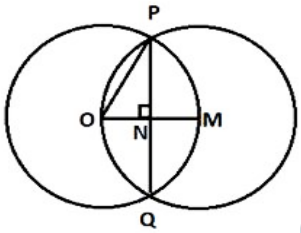
(f1,f2,f3), (S1,S2),(T1). The first year students can be arranged among themselves in 3! Ways, second year in 2! Ways and the third year student can stand in one way. For each arrangement of the students in their respective groups , the three groups can be arranged in 3! Ways. Number of ways of arrangement =3! × 2! × 1 × 3! = 72 ways.

57. Answer: (B)

Sum of 8 integers = 8 × 35 = 280
Since difference between any two integers is more than 1 which means we cannot take consecutive integers.
Minimum value an integer can take is 13.
To find maximum value of an integer, remaining 7 integers must be as low as possible. All the integers are distinct and are not consecutive.
Value of 7 integers to make maximum possible value of any integer = 13, 15, 17, 19, 21, 23, and 25
Maximum possible value of an integer = 280 – (13 + 15 + 17 + 19 + 21 + 23 + 25) = 280 – 133 **= 147**

58. Answer: (A)
Sum of 8 integers = 8 × 35 = 280
Since difference between any two integers is more than 1 which means we cannot take consecutive integers.
Maximum value an integer can take is 45.
To find minimum value of an integer, remaining 7 integers must be as large as possible. All the integers are distinct and are not consecutive.
Value of 7 integers to make minimum possible value of any integer = 45, 43, 41, 39, 37, 35, and 33
Maximum possible value of an integer = 280 – (45 + 43 + 41 + 39 + 37 + 35 + 33) = 280 – 273 **= 7**

59. Answer: (C)
Let the centres of the two circles be O and M.



So, radius of each circle = OM = PO
Now, PQ is the common chord which is equal to $8\sqrt{3}$ cm.
So, PN = PQ/2 = $4\sqrt{3}$ cm
Also, ON = OM/2 = PO/2
In Δ PON,
$PO^2 = PN^2 + ON^2$
$PO^2 = (4\sqrt{3})^2 + (PO/2)^2$
$3PO^2/4 = 48$
$PO^2 = 64$
PO = 8
So, radius = 8 cm

60. Answer: (A)
Let Lokesh scored 'n' marks.
So, Arihant scored (n + 312) while Naina scored (n – 72).
So, difference between Arihant and Naina's scores = (n + 312) – (n – 72) = 384
When we consider percentage, the difference = 65 – 49 = 16%
Hence, total marks = 384/0.16 = 2400
So, marks scored by Disha = 78% of 2400 = 1872

61. Answer: (C)
Let the original cost of the article be ₹ A.
S.P. for Jaya = C.P. for the store = 0.6A
M.P. by the store = 1.28 × 0.6A = 0.768A
S.P. for the store = C.P. for the man = 0.75 × 0.768A = 0.576A
Again, S.P. for the man = 0.9 × 0.576A = 0.5184A
As (A – 0.5184A) = 12304.88
0.4816A = 12304.88
A = 25550
So, M.P. by the store = 0.768A = ₹ 19622.40

62. Answer: (C)
Let B's capital be Rs. X
A's capital = Rs. 441x/400
B receives Rs. $x(1 + 5/100)^3$ = Rs. $x(1.05)^3$
Let A invest at a rate of r%
A receives 441x/400 + 441xr(3/100)(1/400) = $x(1.05)^3$
r = 5/3%

63. Answer: (A)
When they wave for the first time, the total distance travelled by them is d, where d is the distance between A and B.
For every subsequent point where they wave, they have to travel 2 d each.
The first time, they wave, the bus from A has travelled $25/(25 + 35) \times 18 = 7.5$ km
For the 10th time that they wave, total distance $= d + (9 \times 2)d = 19d = 19 \times 18.$
Distance travelled by the bus from point $A = 25/(25 + 35) \times 19 \times 18 = 142.5$ km
This means that the bus is $144 - 142.5 = 1.5$ km from A. Difference in distance $= 7.5 - 1.5 = 6$ km.

64. Answer A
P and Q together can complete a work in 2/3rd times more than the time taken by R and S together. Then,
1/((1/P) + (1/Q)) = (5/3) × (1/((1/R) + (1/S)))

When R started work alone and on second day P joined him, then the remaining work is completed in 18 days. Then, one day work done by R alone = 1/R
Remaining work = 1 – 1/R = (R – 1)/R
Then, 18 = ((R – 1)/R) × 1/((1/P) + (1/R))
P = 18R/(R – 19)
Q can complete the whole work alone in 20 and R takes 70% more time to complete the work alone. Then,
Q = 20 days
R = 170% of 20 = 34 days
Then, P = 18 × 34/(34 – 19) = 204/5 days
Now, 1/((5/204) + (1/20)) = (5/3) × (1/((1/34) + (1/S)))
S = 306/29 days
New time taken by S alone = 87% of 306/29 = 459/50 days
Then, percentage work completed by P and S together in 5 days
= 5 × ((5/204) + (50/459)) × 100 = **67%**

65. Answer: (B)

As we know that when a person receives simple interest on any amount, then the interest which he gets in each year always remains same because the Principal amount does not change for the entire period.
Simple interest for 3 years is Rs 1200 so the interest for 1st year = 1200/3 = Rs 400
Also one important point here is that if we invest the same amount at the same interest rate in two schemes in which one offers compound interest while the second offers simple interest , then interest obtained in the first year is same for both the schemes.
So the compound interest for the 1st year is = Rs 400
It is noteworthy that in case of compound interest the interest we will get in each year is different, because in compound interest we receive interest on interest as well.
So if the rate of interest is r% pa and we got Rs A interest in any year in case of compound interest => in the very next year, we will get interest that will be equal to Rs (A + r% of A) .
Therefore if interest rate is r%, then compound interest in the 2nd year will be = 400 + r% of 400
Hence, 400 + 400 × (r/100) = 440
⇒ 4r = 40
⇒ r = 10%
Compound interest in 3rd year = 440 × 1.1 = Rs. 484
Compound interest for the entire duration is = Rs (400 + 440 + 484) = Rs 1324
And simple interest is = Rs 1200 which is given in the question.
Difference = Rs (1324 – 1200) = Rs 124

66. Answer: (D)

It is an easy induction to show that x20 gets to place 30 or later if and only if x20 it is the largest of $x_1, x_2, \ldots, x_{30}$. Since it does not get to place 31 it must be less than x_{31}. The chance that x_{31} is the largest of $x_1, \ldots, x_{31}$ is obviously 1/31. The chance that x_{20} is the largest of $x_1, \ldots, x_{30}$ is 1/30.
The required probability = 1/30 x 1/31 = 1/930