CAT-2018
Slot-2
EXPLANATORY
ANSWERS
SECTION-I
VERBAL ABILITY & READING COMPREHENSION

Q.1) Throughout the passage, the author is trying to point out the negative consequences of using performance metrics to incentivize people. Thus, option 1 can be negated as it focuses on long-term and short-term organizational goals. Option 2 is a general statement about performance metrics and its use in organizations. Negate it. Option 3 succinctly puts forth the author’s point made in the passage. Retain it. Though the transaction costs of metric is mentioned in the last paragraph, it is not the main aim of the passage. So option 4 is also incorrect. Hence, [3].

Q.2) As per the question, we need to choose an option which will not add any more depth to the author’s argument. An analysis of why metrics fixation is becoming popular will add another dimension to the passage. Negate option 1. Option 2 can also be negated as a comparative study will further throw light on the drawbacks of the metric-based evaluation. The author has already given two real life examples of the negative effects of performance metric evaluation i.e. the police office and the surgeon. Giving any more examples will not make the paragraph any more meaningful. Retain option 3. Option 4 will compare the merits and demerits of judgment-based evaluation to performance-based evaluation. Thus it will make the paragraph more meaningful. Negate it. Hence, [3].

Q.3) Both the cases of the police officer and the surgeon suggest that in order to maximize their performance metrics, it encourages them to behave in a way that is at odds with the larger purpose of the organization. The duty of a police officer is to protect the law and order of his area. However, if his performance metric judges him by the amount of crime committed in his locality, he will try to downgrade major offences into minor ones. Thus he is being unethical in order to improve his performance metric. Similarly, a surgeon will not handle a case which he is not sure of since it will affect his metric score. Thus option 2 correctly states what the author intends to convey through the examples of the two professionals. Hence, [2].

Q.4) As per the third paragraph, people only tend to focus on those goals which are measured in the metrics at the cost of other more important organizational goals. The author then mentions the example of ‘teaching to the test’ metrics to show how goals are shifted from overall development and education to only those metrics that are measured in the performance. Thus option 1, 2 and 3 can be the possible outcomes to score better in the performance metrics. However, a teacher’s subjective evaluation has not been mentioned in the passage. Hence, [4].

Q.5) Option 1 is a consequence of the metric fixation as stated in the first sentence of the penultimate paragraph. Option 2 is also mentioned when the author states that in order to maximize metrics, professionals only concentrate on maximizing them by incentivizing gaming. Option 3 is not as a consequence as nothing is mentioned about metric fixation improving cooperation among employees. Retain it. Option 4 is mentioned in the third sentence of the third paragraph and can be negated. Hence, [3].

Q.6) Option 1 is true as per the second sentence of the third paragraph. Option 2 can be inferred from the last two statements of the passage which states that since the orbits of Tethys and Dione are not tilted, they were not formed 100 million years ago. Option 3 is incorrect as one of Saturn’s moon,
Enceladus is considered to be the most promising site to look for alien life. Retain it. Option 4 is true as per the last sentence of the penultimate paragraph. Hence, [3].

Q.7) The first sentence of the second paragraph states that big things in the solar system were assumed to be present since the beginning. However, Cassini’s observations negated this assumption. Retain option 1. Option 2 is incorrect as the fourth paragraph talks about Saturn’s old moons destroying themselves which led to the emergence of the rings and the planets’ new moons. However, option 2 generalizes the statement to celestial bodies. Thus it can be negated. Though option 3 is true as per the third sentence of the third paragraph, it does not challenge any assumption. Negate it. Though option 4 is true as per the last sentence of the third paragraph, it is not challenging any assumption but putting forth a new theory. Thus it can be negated. Hence, [1].

Q.8) The main objective of the passage is to provide evidence that Saturn’s rings and moons are recent creations. The beauty and celestial drama of Saturn is only mentioned in the first paragraph. Thus option 2 can be negated. The changing of orbital patterns is only mentioned in the last paragraph. So option 3 is also negated. Option 4 is incorrect as per the last line of the second paragraph which states that the rings are somewhere between 220 to 70 million years old. Hence, [1].

Q.9) The phrase ‘leaving laundry hanging on a line downwind from a smokestack’ means that if clean clothes are hung out to dry in the downwind direction of a smokestack, they will become dirty because of pollution. As per the third paragraph, the solar system is suffused with comet dust which is dark while Saturn’s rings are still bright. If the rings were around for a long period of time, they would also become dark due to the absorption of the comet dust. Thus only option 3 correctly explains the phrase ‘leaving laundry hanging on a line downwind from a smokestack’. Hence, [3].

Q.10) As per the third paragraph, comet dust will discolour the rings of Saturn. Thus comet dust is also a component of the Saturn’s rings. According to the last sentence of the fourth paragraph, the rings were formed when an old set of Saturn’s moons were destroyed. Thus besides water ice, Saturn’s rings were also likely to have comet dust and rock particles. Hence, [2].

Q.11) Putting ‘Band-Aids on a corpse’ is not going to make any difference to the corpse. In a similar way, if the problem is serious, only a superficial solution will not solve the problem. Retain option 2. Option 1 is incorrect as the last sentence of the second paragraph states that medical care providers in the public sector had better skills than the private ones. Nothing is mentioned about the lack of equipment or the funding of public clinics. Thus, options 3 and 4 can be negated as they are beyond the scope of the passage. Hence, [2].

Q.12) The author doesn’t intend to censure the government’s involvement in any of the implementation-intensive services. Reject option 1. Though the author talks of the disadvantages of a complete dependence on technology through the example of the ANMs (option 3), his main purpose is not that. Neither is it the issue of poor service delivery in the educational sector (Option 4). Last paragraph clearly points to the author’s argument— that autonomy and accountability are crucial in successful provision of services. Hence, [2].

Q.13) As the examples of the nurses in Rajasthan and the teacher in West Bengal show, services that involve face-to-face interactions need committed people to give these services. Thus, option 1 is correct. Option 2 is incorrect as only the skills of the medical care providers in the public sector were better than those in the private sector. Though monitoring systems do not improve the motivation of service
providers, nothing is mentioned about improving the skills of the service providers by using monitoring systems. Thus option 3 is also incorrect. Option 4 is not implied in the paragraph. Hence, [1].

Q.14) The author mentions the use of computers in aiding education in the first paragraph. Thus, option 1 can be negated. Recruitment of motivated teachers is mentioned in the third sentence of the penultimate paragraph. Negate option 2. Access to performance information is suggested in the last sentence of the passage. Thus, option 3 can also be negated. However, the author does not mention the elimination of government involvement in the passage. Hence, [4].

Q.15) As per the last sentence of the passage, empowerment and accountability will lead to better performance of the services providers. Thus we need a statement which weakens this argument. Option 1 is incorrect as the passage clearly states that using technology will not solve the problem of motivation in the service providers. Negate it. Option 2 states that empowerment will lead to complacency and rigged performance results. If this is the case, then empowerment will further decrease the performance of the service providers. Thus, option 2 weakens the case presented in the passage. Retain it. Nothing has been mentioned about work ethic in the passage. Thus, option 3 can be negated. Since the main argument of the passage is to increase the motivation of the service providers in the public sector, having better skills in any sector will not weaken the argument of the passage. Thus, option 4 can also be negated. Hence, [2].

Q.16) As per the penultimate sentence of the passage, decision trees in the random decision forest are trained on the hardest cases. Thus option 1 which talks about trees being trained on easy cases weaken the efficacy of the random decision forest. Retain it. Since option 2 talks about easy as well as hard cases, it will not weaken the efficacy of the random decision forest. Negate it. Options 3 and 4 cannot be inferred from the last paragraph and can be negated. Hence, [1].

Q.17) The main argument of the passage is that modern problems are complex and so a multidimensional team is needed to study or solve it as one person cannot have the knowledge of so many categories at one time. We need to find an option which undermines this argument. Option 1 does not have any effect on the argument and can be negated. If top-scorers possess multidisciplinary knowledge, then they can look at a problem with different perspectives. This weakens the argument in the passage that one person cannot have multidisciplinary knowledge. Retain option 2. Option 3 is incorrect as time and conflict factors are not discussed in the passage. Option 4 is also incorrect as it does not relate to the main argument of the passage. Hence, [2].

Q.18) In the second paragraph the author gives an example of the field of neuroscience in order to prove the point that no test can determine the depth and breadth of the various knowledge domains. Thus option 1 correctly states the purpose of the example. Option 2 is incorrect as neuroscience is an example to show the complexity of each knowledge domain. Option 3 can be eliminated as nothing has been mentioned about the ‘narrow fields of knowledge’. Option 4 is beyond the scope of the passage and can be eliminated. Hence, [1].

Q.19) As per the forth sentence of the second paragraph, choosing the best from different categories will not become the best team since no test can test the depth and breadth of each subject. Thus option 1 is incorrect and can be negated. Option 2 can be retained because as per the teams with diverse compositions and optimal hiring will lead to the formation of a better team for solving the problem of rising obesity levels. Options 3 and 4 are incorrect as there is no diversity in the teams, which consist only of nutritionists. Hence, [2].
Q.20) We need to find an option which has not been mentioned by the author as a critique of meritocracy. Option 1 is stated in the first paragraph of the passage. Negate it. Option 2 is true as per the last two sentences of the second paragraph. Thus, it can be negated. Option 3 is true as per the fourth and fifth sentences of the second paragraph and can be eliminated. Option 4 is in direct contrast to what the author says about meritocracy. Hence, [4].

Q.21) In the entire passage, the author is giving various possible explanations to prove why the white-lipped variety of grove snails is found only in Ireland and the Pyrenees. Option 1 is wrong as the second sentence of the second paragraph clearly eliminates the possibility of the white-lipped grove snails being wiped out in other places except Ireland and the Pyrenees. Option 2 is incorrect as the clearly states that evolution is not responsible for the white-lipped grove snails in both the places. Option 3 is the main aim of the author in writing the passage. Retain it. The last sentence of the second paragraph clearly states that if the snails had naturally colonized Ireland, they would have similar genetic traits across other snails in Europe. But since this is not the case, migration of snails can be negated as an explanation. Thus option 4 can be negated. Hence, [3].

Q.22) As per the first and second sentences of the third paragraph, evolution would introduce some genetic variation in the snails but the genetic similarities rule out evolution. Thus, option 1 correctly eliminates the reason for convergent evolution. Hence, [1].

Q.23) As per the last sentence of the penultimate paragraph, humans used to eat these snails as their burnt shells have been found in Stone Age trash heaps. Thus, option 2 which mentions seafarers carrying these snails from Pyrenees to Ireland as edibles can be concluded from the phrase – humans routinely ate these types of snails before the advent of agriculture. Hence, [2].

Q.24) Option 2 is mentioned in the second sentence of the penultimate paragraph. Negate it. Option 3 is mentioned in the first two sentences of the third paragraph and can be negated. Option 4 is true as per the third sentence of the same paragraph and can also be negated. Option 1 is incorrect as the second sentence of the second paragraph clearly states that the similar traits of white-lipped grove snails are not because of convergent evolution. Hence, [1].

Q.25) Option 1 talks about debating whether to have bad Samaritan laws. However, it fails to mention the fact that such rules are already established in many European countries. Thus it can be negated. Since the last three sentences of the paragraph talk about the flaws in the bad Samaritan laws, it cannot be used as a model. Also, option 2 states that bad Samaritan laws have been successfully implemented in Europe. However, this is not implied in option 2 and can be negated. Option 3 correctly paraphrases the passage. Retain it. The paragraph only mentions the drawback of the bad Samaritan laws. It does not mention if these laws are legally sound or that they have been successful. Thus option 4 can be negated. Hence, [3].

Q.26) Statement 1 is the first sentence of the paragraph as it states the recent discovery of the development of songs in birds. This should be followed by statement 4 as it states a prescribed path to the development of the final song in all species. Statement 5 describes this path – subsong, plastic song and then the species song. Statement 2 is the last statement as it talks about how different species have either a single song or a range of songs. Thus, the correct order is 1452. However, statement 3 talks about the sounds of birds as an auditory stimulus which is not in line with the rest of the paragraph as the other sentences talk about the songs of birds and not sound in general. Hence, [3].
Q.27) Statement 1 is the first sentence of the paragraph as it mentions the various apps in smartphones which keep a track of nearly everything. This should be followed by statement 4 as it mentions the there is a market for ‘such apps’ referring to the various apps mentioned in statement 1. There is a clear 5-2 link as statement 5 mentions how sleep tracking apps are a threat to a good night’s sleep and statement 2 mentions a new term coined by researchers to explain this insomnia. Thus the correct order is 1452. However, statement 3 mentions how sleep can be disturbed by worries or a guilty conscience. This is an odd statement to fit in the paragraph as the rest of the paragraph it about mobile apps and its effects on sleep. Hence, [3].

Q.28) This is an easy question. Statement 2 talks about people with progressive diseases wanting to have control over their own lives. This should be followed by statement 3 as it mentions what ‘having control’ means i.e. self-management activities. Statement 1 follows after that as it defines ‘self-management’. Statement 4 is the last sentence of the paragraph as it mentions how self-management support can promote it. Thus the correct order is 2314.

Q.29) This is a difficult question as statements 2, 3 or 4 can equally be considered as the first sentence of the paragraph. We will try to find links between sentences and then arrange them in order. There is a 4-2 link as statement 4 mentions how new institutions emerge in order to help those workers whose jobs were taken away due to automation while statement 2 gives an example of the industrial revolution wherein trade unions helped families to cope the loss of work. This should be followed by statement 1 as it talks about the present era of smart world where Universal Basic Income is used to help workers cope with the loss of their jobs. Statement 2 also states that the Universal Basic Income will be ineffective as large number of people would be unemployed. Statement 3 is the last statement as it states that the growing inequality will be matched by authoritarianism because of the increasing use of technology in our daily lives. Thus the correct order is 4213.

Q.30) Option 1 is incorrect as according to the paragraph, transgenic modification and genome editing are one and the same. Negate it. Option 2 is also incorrect as it mentions transgenic modification and genome editing to be two different processes. As per the second sentence of the paragraph, the editing of endogenous genes is exempted from regulations if the microbes are cultured in a contained environment. However, the penultimate paragraph states that exemption need not be made as there are unforeseen risks involved in the gene-editing. Thus option 3 is correct and can be retained. Though option 4 also states the same thing, it does not give any reason for its exception which is an important point in the paragraph. Thus it can be negated. Hence, [3].

Q.31) The first sentence of the paragraph clearly states that researchers failed to find any link between sport participation and delinquency. Thus option 1 is incorrect. As per the last sentence of the paragraph, latter researchers found it difficult to choose individuals to play sports. Thus option 2 which states that latter researchers found no consistent relationship between sport participation and deviance is incorrect and can be negated. Option 3 correctly summarizes the given paragraph. Retain it. Option 4 cannot be inferred as mentioned in the last sentence of the paragraph. Hence, [3].

Q.32) The paragraph is about how the business-elite would continue to work on their projects instead of altering their own behaviour. Thus statement 3 is the first statement of the paragraph as it states that just as a dieter would do anything to lose weight but will not decrease the amount of food that he eats, business-elite would do many things to save the world but not relinquish the hold on his pet project. This should be followed by statement 2 as it states that the business-elite would fund many programs
but not alter their own behaviour which carries forth the idea mentioned in statement 3. There is a 4-1 link as statement 4 talks about the business-elite focusing on their pet-projects rather than changing their win-win mentality while statement 1 mentions about doing virtuous side projects as long as it does not reduce their profit margins. Thus the correct order is 3241.

Q.33) Both statements 3 and 4 can be used as the first sentence of the paragraph. If we start with statement 4, it talks about the change in normal weather conditions. This should be followed by statement 5 which reiterates the fact that we will be hit by nature’s fury in the due course of time due to these changing conditions. There is a clear 1-2 link as statement 1 states how urban planning must take into account potential natural disasters and statement 2 wants authorities to upgrade mitigation plans irrespective of whether or not any area has been visited by any natural calamity. Thus the correct order is 4512. However, statement 3 is the odd one as it mentions only the statistics of natural calamities after a particular time. Hence, [3].

Q.34) This is again an easy question. Statements 2 and 3 are about phoenixing of companies in general while statements 1 and 4 are related particularly to Australia. Since statement 3 gives is the definition of phoenixing, it is the opening sentence of the paragraph. This should be followed by statement 2 as it states what effect phoenixing has on the economy. Statement 4 then gives the specific example of Australia wherein phoenixing cost the Australian economy between $2.9 to $5.1 billion last year. Statement 1 is the last sentence of the passage as it was the taxpayers who suffered due to phoenixing. Thus the correct order is 3241.
Q.1)

Suppose the base exchange rates of A, B and C w.r.t L are 100m, 120m and m respectively. Therefore we have the following:

<table>
<thead>
<tr>
<th></th>
<th>Base rate</th>
<th>Buying rate</th>
<th>Selling rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>100m</td>
<td>95m</td>
<td>110m</td>
</tr>
<tr>
<td>B</td>
<td>120m</td>
<td>114m</td>
<td>132m</td>
</tr>
<tr>
<td>C</td>
<td>m</td>
<td>0.95m</td>
<td>1.1m</td>
</tr>
</tbody>
</table>

Given: The outlet received 88000 units of L by selling A. Therefore the number of units of A sold = \(\frac{88000}{110m} = \frac{800}{m}\)

From point 3, the number of units of L received by selling B = \(\frac{9}{5} \times 88000 = 158400\)

Therefore the number of units of B sold = \(\frac{158400}{132m} = \frac{1200}{m}\)

From points 5 and 6, the number of units of A bought = \(800 + \frac{800}{m}\)

Therefore, the number of units paid to buy A = \(95m \left(800 + \frac{800}{m}\right) = 76000(1 + m)\)

From point 2, the number of units of L paid to buy B = \(\frac{3}{5} \times 76000(1 + m) = 45600(1 + m)\)

Therefore the number of units of B bought = \(\frac{45600(1+m)}{114m} = 400 + \frac{400}{m}\)

From points 5 and 6, \(\frac{1200}{m} = 400 + \frac{400}{m}\). Solving for m, m = 2.

Therefore we have the following

<table>
<thead>
<tr>
<th></th>
<th>Base rate</th>
<th>Buying rate</th>
<th>Selling rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>200</td>
<td>190</td>
<td>220</td>
</tr>
<tr>
<td>B</td>
<td>240</td>
<td>228</td>
<td>264</td>
</tr>
<tr>
<td>C</td>
<td>2</td>
<td>1.9</td>
<td>2.2</td>
</tr>
</tbody>
</table>

If the number of units of C sold = x, from points 5 and 6, the number of units of C bought = x + 3000.
Therefore, we get, \(1.9(x + 3000) = 2.2x\) or solving for \(x\), \(x = 19000\).

Using the value of \(m\), we get the following table for the number of units of A, B and C bought and sold.

<table>
<thead>
<tr>
<th></th>
<th>Bought</th>
<th>Sold</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1200</td>
<td>400</td>
</tr>
<tr>
<td>B</td>
<td>600</td>
<td>600</td>
</tr>
<tr>
<td>C</td>
<td>22000</td>
<td>19000</td>
</tr>
</tbody>
</table>

Now all the questions can be answered.

Therefore the required answer is 1200.

Q.2)

Suppose the base exchange rates of A, B and C w.r.t L are 100m, 120m and \(m\) respectively. Therefore we have the following:

<table>
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<tr>
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<th>Buying rate</th>
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</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>100m</td>
<td>95m</td>
<td>110m</td>
</tr>
<tr>
<td>B</td>
<td>120m</td>
<td>114m</td>
<td>132m</td>
</tr>
<tr>
<td>C</td>
<td>(m)</td>
<td>0.95m</td>
<td>1.1m</td>
</tr>
</tbody>
</table>

Given: The outlet received 88000 units of L by selling A. Therefore the number of units of A sold = \(\frac{88000}{110m} = \frac{800}{m}\)

From point 3, the number of units of L received by selling B = \(\frac{9}{5} \times 88000 = 158400\)

Therefore the number of units of B sold = \(\frac{158400}{132m} = \frac{1200}{m}\)

From points 5 and 6, the number of units of A bought = \(800 + \frac{800}{m}\)

Therefore, the number of units of L paid to buy A = 95m \(\left(800 + \frac{800}{m}\right) = 76000(1 + m)\)

From point 2, the number of units of L paid to buy B = \(\frac{3}{5} \times 76000(1 + m) = 45600(1 + m)\)

Therefore the number of units of B bought = \(\frac{45600(1+m)}{114m} = 400 + \frac{400}{m}\)
From points 5 and 6, \( \frac{1200}{m} = 400 + \frac{400}{m} \). Solving for \( m \), \( m = 2 \).

Therefore we have the following

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<tr>
<td>C</td>
<td>2</td>
<td>1.9</td>
<td>2.2</td>
</tr>
</tbody>
</table>

If the number of units of C sold = \( x \), from points 5 and 6, the number of units of C bought = \( x + 3000 \). Therefore, we get, \( 1.9(x + 3000) = 2.2x \) or solving for \( x \), \( x = 19000 \).

Using the value of \( m \), we get the following table for the number of units of A, B and C bought and sold.

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</tr>
<tr>
<td>B</td>
<td>600</td>
<td>600</td>
</tr>
<tr>
<td>C</td>
<td>22000</td>
<td>19000</td>
</tr>
</tbody>
</table>

Now all the questions can be answered.
Hence [3]

Q.3)

Suppose the base exchange rates of A, B and C w.r.t L are 100m, 120m and m respectively. Therefore we have the following:

<table>
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<td>m</td>
<td>0.95m</td>
<td>1.1m</td>
</tr>
</tbody>
</table>

Given: The outlet received 88000 units of L by selling A. Therefore the number of units of A sold = \( \frac{88000}{110m} = \frac{800}{m} \)
From point 3, the number of units of L received by selling $B = \frac{9}{5} \times 88000 = 158400$.

Therefore the number of units of B sold $= \frac{158400}{132m} = \frac{1200}{m}$.

From points 5 and 6, the number of units of A bought $= 800 + \frac{800}{m}$.

Therefore, the number of units of L paid to buy A $= 95m \left( 800 + \frac{800}{m} \right) = 76000(1 + m)$.

From point 2, the number of units of L paid to buy $B = \frac{3}{5} \times 76000(1 + m) = 45600(1 + m)$.

Therefore the number of units of B bought $= \frac{45600(1+m)}{114m} = 400 + \frac{400}{m}$.

From points 5 and 6, $\frac{1200}{m} = 400 + \frac{400}{m}$. Solving for $m$, $m = 2$.

Therefore we have the following table for the number of units of A, B and C bought and sold.

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If the number of units of C sold = $x$, from points 5 and 6, the number of units of C bought = $x + 3000$.
Therefore, we get, $1.9(x + 3000) = 2.2x$ or solving for $x$, $x = 19000$.
Using the value of $m$, we get the following table for the number of units of A, B and C bought and sold.

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<td>600</td>
</tr>
<tr>
<td>C</td>
<td>22000</td>
<td>19000</td>
</tr>
</tbody>
</table>

Now all the questions can be answered.
Therefore the required answer is 240.
Q.4)

Suppose the base exchange rates of A, B and C w.r.t L are 100m, 120m and m respectively. Therefore we have the following:

<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
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<td>114m</td>
<td>132m</td>
</tr>
<tr>
<td>C</td>
<td>m</td>
<td>0.95m</td>
<td>1.1m</td>
</tr>
</tbody>
</table>

Given: The outlet received 88000 units of L by selling A. Therefore the number of units of A sold = \( \frac{88000}{110m} = \frac{800}{m} \)

From point 3, the number of units of L received by selling B = \( \frac{9}{5} \times 88000 = 158400 \)

Therefore the number of units of B sold = \( \frac{158400}{132m} = \frac{1200}{m} \)

From points 5 and 6, the number of units of A bought = \( 800 + \frac{800}{m} \)

Therefore, the number of units of L paid to buy A = \( 95m \left( 800 + \frac{800}{m} \right) = 76000(1 + m) \)

From point 2, the number of units of L paid to buy B = \( \frac{3}{5} \times 76000(1 + m) = 45600(1 + m) \)

Therefore the number of units of B bought = \( \frac{45600(1+m)}{114m} = \frac{400}{m} + \frac{400}{m} \)

From points 5 and 6, \( \frac{1200}{m} = 400 + \frac{400}{m} \). Solving for m, m = 2.

Therefore we have the following

<table>
<thead>
<tr>
<th></th>
<th>Base rate</th>
<th>Buying rate</th>
<th>Selling rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>200</td>
<td>190</td>
<td>220</td>
</tr>
<tr>
<td>B</td>
<td>240</td>
<td>228</td>
<td>264</td>
</tr>
<tr>
<td>C</td>
<td>2</td>
<td>1.9</td>
<td>2.2</td>
</tr>
</tbody>
</table>

If the number of units of C sold = x, from points 5 and 6, the number of units of C bought = x + 3000.
Therefore, we get, \(1.9(x + 3000) = 2.2x\) or solving for \(x\), \(x = 19000\).

Using the value of \(m\), we get the following table for the number of units of A, B and C bought and sold.

<table>
<thead>
<tr>
<th></th>
<th>Bought</th>
<th>Sold</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1200</td>
<td>400</td>
</tr>
<tr>
<td>B</td>
<td>600</td>
<td>600</td>
</tr>
<tr>
<td>C</td>
<td>22000</td>
<td>19000</td>
</tr>
</tbody>
</table>

Now all the questions can be answered.
Hence [3]

Q.5)

Using the information given in the diagram, we get the following:

<table>
<thead>
<tr>
<th></th>
<th>Promising</th>
<th>Blockbuster</th>
<th>No-hope</th>
<th>Doubtful</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alfa</td>
<td>3 + 6</td>
<td>2 + 4 +</td>
<td>1 + 4</td>
<td></td>
</tr>
<tr>
<td>Bravo</td>
<td>6 +</td>
<td>4</td>
<td>2 + 6</td>
<td></td>
</tr>
<tr>
<td>Charlie</td>
<td>2 + 6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unknown</td>
<td>2 + 9 + 3</td>
<td>4 + 9</td>
<td>1 + 1 + 3</td>
<td>1 + 6 + 9</td>
</tr>
</tbody>
</table>

Note: The numbers in the table represent the area of the boxes in square units.
From statement 1, Alfa and Bravo have two products each in Blockbuster category.
From statement 6, Charlie had higher revenue than Bravo from products in Blockbuster category.
Therefore the product with revenue 9 belongs to Charlie and the product with revenue 4 belongs to Bravo.
From statement 2, Alfa, Charlie and Bravo had 3, 2 and 1 products respectively in No-hope category.
From statement 7, Bravo and Charlie had same revenue from products in No-hope category. Therefore Charlie had revenue \((1 + 3 = 4)\) and the other product with revenue 1 belongs to Alfa.
From statement 4, there were 4 products of Alfa and 3 products of Bravo in the Doubtful category.
From statement 5, the product with revenue 9 belonged to Bravo and the products with revenue 1 and 6 belonged to Alfa in the Doubtful category.
So far we have the following:
From statement 3, each company had one product each in the Promising category. From statement 8, the product with revenue 2 belonged to Alfa, the product with revenue 9 belonged to Charlie and hence the product with revenue 3 belonged to Bravo.

Now we have the following:

<table>
<thead>
<tr>
<th></th>
<th>Promising</th>
<th>Blockbuster</th>
<th>No-hope</th>
<th>Doubtful</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alpha</td>
<td>2</td>
<td>3 + 6</td>
<td>2 + 4 +</td>
<td>1 + 4 + 1 + 6</td>
<td>30</td>
</tr>
<tr>
<td>Bravo</td>
<td>3</td>
<td>6 + 4</td>
<td>4</td>
<td>2 + 6 + 9</td>
<td>34</td>
</tr>
<tr>
<td>Charlie</td>
<td>9</td>
<td>2 + 6 + 9</td>
<td>1 + 3</td>
<td></td>
<td>30</td>
</tr>
<tr>
<td>Total</td>
<td>14</td>
<td>36</td>
<td>15</td>
<td>29</td>
<td></td>
</tr>
</tbody>
</table>

Now all the questions can be answered. Hence [4]

Q.6)

Using the information given in the diagram, we get the following:

<table>
<thead>
<tr>
<th></th>
<th>Promising</th>
<th>Blockbuster</th>
<th>No-hope</th>
<th>Doubtful</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alfa</td>
<td>3 + 6</td>
<td>2 + 4 +</td>
<td>1 + 4</td>
<td></td>
</tr>
<tr>
<td>Bravo</td>
<td>6 +</td>
<td>4</td>
<td>2 + 6</td>
<td></td>
</tr>
<tr>
<td>Charlie</td>
<td>2 + 6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unknown</td>
<td>2 + 9 + 3</td>
<td>4 + 9</td>
<td>1 + 1 + 3</td>
<td>1 + 6 + 9</td>
</tr>
</tbody>
</table>

Note: The numbers in the table represent the area of the boxes in square units.
From statement 1, Alfa and Bravo have two products each in Blockbuster category.
From statement 6, Charlie had higher revenue than Bravo from products in Blockbuster category.
Therefore the product with revenue 9 belongs to Charlie and the product with revenue 4 belongs to Bravo.

From statement 2, Alfa, Charlie and Bravo had 3, 2 and 1 products respectively in No-hope category.
From statement 7, Bravo and Charlie had same revenue from products in No-hope category. Therefore Charlie had revenue \((1 + 3 = 4)\) and the other product with revenue 1 belongs to Alfa.

From statement 4, there were 4 products of Alfa and 3 products of Bravo in the Doubtful category.
From statement 5, the product with revenue 9 belonged to Bravo and the products with revenue 1 and 6 belonged to Alfa in the Doubtful category.

So far we have the following:

<table>
<thead>
<tr>
<th></th>
<th>Promising</th>
<th>Blockbuster</th>
<th>No-hope</th>
<th>Doubtful</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alfa</td>
<td>3 + 6</td>
<td>2 + 4 + 1</td>
<td></td>
<td>1 + 4 + 1 + 6</td>
</tr>
<tr>
<td>Bravo</td>
<td>6 + 4</td>
<td>4</td>
<td></td>
<td>2 + 6 + 9</td>
</tr>
<tr>
<td>Charlie</td>
<td>2 + 6 + 9</td>
<td>1 + 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unknown</td>
<td>2 + 9 + 3</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

From statement 3, each company had one product each in the Promising category.
From statement 8, the product with revenue 2 belonged to Alfa, the product with revenue 9 belonged to Charlie and hence the product with revenue 3 belonged to Bravo.

Now we have the following:

<table>
<thead>
<tr>
<th></th>
<th>Promising</th>
<th>Blockbuster</th>
<th>No-hope</th>
<th>Doubtful</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alpha</td>
<td>2</td>
<td>3 + 6</td>
<td>2 + 4 + 1</td>
<td>1 + 4 + 1 + 6</td>
<td>30</td>
</tr>
<tr>
<td>Bravo</td>
<td>3</td>
<td>6 + 4</td>
<td>4</td>
<td>2 + 6 + 9</td>
<td>34</td>
</tr>
<tr>
<td>Charlie</td>
<td>9</td>
<td>2 + 6 + 9</td>
<td>1 + 3</td>
<td></td>
<td>30</td>
</tr>
<tr>
<td>Total</td>
<td>14</td>
<td>36</td>
<td>15</td>
<td>29</td>
<td></td>
</tr>
</tbody>
</table>

Now all the questions can be answered.
Hence [3]
Q.7)

Using the information given in the diagram, we get the following:

<table>
<thead>
<tr>
<th></th>
<th>Promising</th>
<th>Blockbuster</th>
<th>No-hope</th>
<th>Doubtful</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alfa</td>
<td>3 + 6</td>
<td>2 + 4 + 1</td>
<td>1 + 4 + 6</td>
<td></td>
</tr>
<tr>
<td>Bravo</td>
<td>6 + 4</td>
<td>4</td>
<td></td>
<td>2 + 6 + 9</td>
</tr>
<tr>
<td>Charlie</td>
<td>2 + 6 + 9</td>
<td>1 + 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unknown</td>
<td>2 + 9 + 3</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: The numbers in the table represent the area of the boxes in square units.

From statement 1, Alfa and Bravo have two products each in Blockbuster category.
From statement 6, Charlie had higher revenue than Bravo from products in Blockbuster category. Therefore the product with revenue 9 belongs to Charlie and the product with revenue 4 belongs to Bravo.
From statement 2, Alfa, Charlie and Bravo had 3, 2 and 1 products respectively in No-hope category.
From statement 7, Bravo and Charlie had same revenue from products in No-hope category. Therefore Charlie had revenue (1 + 3 = 4) and the other product with revenue 1 belongs to Alfa.
From statement 4, there were 4 products of Alfa and 3 products of Bravo in the Doubtful category.
From statement 5, the product with revenue 9 belonged to Bravo and the products with revenue 1 and 6 belonged to Alfa in the Doubtful category.
So far we have the following:

<table>
<thead>
<tr>
<th></th>
<th>Promising</th>
<th>Blockbuster</th>
<th>No-hope</th>
<th>Doubtful</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alfa</td>
<td>3 + 6</td>
<td>2 + 4 + 1</td>
<td>1 + 4 + 6</td>
<td></td>
</tr>
<tr>
<td>Bravo</td>
<td>6 + 4</td>
<td>4</td>
<td></td>
<td>2 + 6 + 9</td>
</tr>
<tr>
<td>Charlie</td>
<td>2 + 6 + 9</td>
<td>1 + 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unknown</td>
<td>2 + 9 + 3</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

From statement 3, each company had one product each in the Promising category.
From statement 8, the product with revenue 2 belonged to Alfa, the product with revenue 9 belonged to Charlie and hence the product with revenue 3 belonged to Bravo.
Now we have the following:

<table>
<thead>
<tr>
<th></th>
<th>Promising</th>
<th>Blockbuster</th>
<th>No-hope</th>
<th>Doubtful</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alpha</td>
<td>2</td>
<td>3 + 6</td>
<td>2 + 4 + 1</td>
<td>1 + 4 + 1 + 6</td>
<td>30</td>
</tr>
<tr>
<td>Bravo</td>
<td>3</td>
<td>6 + 4</td>
<td>4</td>
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<td>Charlie</td>
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<td>1 + 3</td>
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<td>30</td>
</tr>
<tr>
<td>Total</td>
<td>14</td>
<td>36</td>
<td>15</td>
<td>29</td>
<td></td>
</tr>
</tbody>
</table>

Now all the questions can be answered.
Hence [1]

Q.8)

Using the information given in the diagram, we get the following:

<table>
<thead>
<tr>
<th></th>
<th>Promising</th>
<th>Blockbuster</th>
<th>No-hope</th>
<th>Doubtful</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alfa</td>
<td></td>
<td>3 + 6</td>
<td>2 + 4 + 1</td>
<td>1 + 4</td>
</tr>
<tr>
<td>Bravo</td>
<td></td>
<td>6 + 4</td>
<td>4</td>
<td>2 + 6</td>
</tr>
<tr>
<td>Charlie</td>
<td></td>
<td>2 + 6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unknown</td>
<td>2 + 9 + 3</td>
<td>4 + 9</td>
<td>1 + 1 + 3</td>
<td>1 + 6 + 9</td>
</tr>
</tbody>
</table>

Note: The numbers in the table represent the area of the boxes in square units.

From statement 1, Alfa and Bravo have two products each in Blockbuster category.
From statement 6, Charlie had higher revenue than Bravo from products in Blockbuster category.
Therefore the product with revenue 9 belongs to Charlie and the product with revenue 4 belongs to Bravo.

From statement 2, Alfa, Charlie and Bravo had 3, 2 and 1 products respectively in No-hope category.
From statement 7, Bravo and Charlie had same revenue from products in No-hope category. Therefore Charlie had revenue (1 + 3 = 4) and the other product with revenue 1 belongs to Alfa.

From statement 4, there were 4 products of Alfa and 3 products of Bravo in the Doubtful category.
From statement 5, the product with revenue 9 belonged to Bravo and the products with revenue 1 and 6 belonged to Alfa in the Doubtful category.
So far we have the following:

<table>
<thead>
<tr>
<th></th>
<th>Promising</th>
<th>Blockbuster</th>
<th>No-hope</th>
<th>Doubtful</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alfa</td>
<td>3 + 6</td>
<td>2 + 4 + 1</td>
<td></td>
<td>1 + 4 + 1 + 6</td>
</tr>
<tr>
<td>Bravo</td>
<td>6 + 4</td>
<td>4</td>
<td></td>
<td>2 + 6 + 9</td>
</tr>
<tr>
<td>Charlie</td>
<td>2 + 6 + 9</td>
<td>1 + 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unknown</td>
<td>2 + 9 + 3</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

From statement 3, each company had one product each in the Promising category.
From statement 8, the product with revenue 2 belonged to Alfa, the product with revenue 9 belonged to Charlie and hence the product with revenue 3 belonged to Bravo.

Now we have the following:

<table>
<thead>
<tr>
<th></th>
<th>Promising</th>
<th>Blockbuster</th>
<th>No-hope</th>
<th>Doubtful</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alpha</td>
<td>2</td>
<td>3 + 6</td>
<td>2 + 4 + 1</td>
<td>1 + 4 + 1 + 6</td>
<td>30</td>
</tr>
<tr>
<td>Bravo</td>
<td>3</td>
<td>6 + 4</td>
<td>4</td>
<td>2 + 6 + 9</td>
<td>34</td>
</tr>
<tr>
<td>Charlie</td>
<td>9</td>
<td>2 + 6 + 9</td>
<td>1 + 3</td>
<td></td>
<td>30</td>
</tr>
<tr>
<td>Total</td>
<td>14</td>
<td>36</td>
<td>15</td>
<td>29</td>
<td></td>
</tr>
</tbody>
</table>

Now all the questions can be answered.
Hence [3]
Q.9)

We have the following

<table>
<thead>
<tr>
<th></th>
<th>F</th>
<th>R</th>
<th>P</th>
<th>I</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-one</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>40</td>
</tr>
<tr>
<td>Best Ed</td>
<td>40</td>
<td>30</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Cosmopolitan</td>
<td>40</td>
<td>20</td>
<td>20</td>
<td>30</td>
</tr>
<tr>
<td>Dominance</td>
<td>20</td>
<td>20</td>
<td>40</td>
<td>30</td>
</tr>
<tr>
<td>Education Aid</td>
<td>50</td>
<td>50</td>
<td>40</td>
<td>50</td>
</tr>
<tr>
<td>Fancy</td>
<td>50</td>
<td>50</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>Global</td>
<td>30</td>
<td>0</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>High Q</td>
<td>30</td>
<td>20</td>
<td>20</td>
<td>40</td>
</tr>
</tbody>
</table>

From point 2, Best Ed is better than Cosmopolitan. The grades of the two colleges on F and P are the same. If Best Ed is better than Cosmopolitan, the weightage assigned to R must be higher than that assigned for I.

From point 3, Education Aid is better than A-one. The grades of the two colleges on F and R are the same. If Education Aid is better than A-one, the weightage assigned to I must be higher than that assigned for P.

Therefore we have, R>I>P.

From point 1, High Q is better than Best Ed. High Q has worse grades than Best Ed on F and R and has same grade on P and a better grade only on I. We have already figured out that R>I>P. If a better grade only on I reverses the effect of worse grades on F and R, I must be assigned higher weightage than that assigned for F.

Therefore, we have the following two possibilities:
R > I > P > F  or  R > I > F > P.
That means R = 0.4, I = 0.3, P = 0.2 and F= 0.1  or  R = 0.4, I = 0.3, F = 0.2 and P = 0.1 are the two possibilities.

Using the two possibilities, let us calculate the scores of High Q and Best Ed.
Possibility 1: R = 0.4, I = 0.3, P = 0.2, F = 0.1

<table>
<thead>
<tr>
<th></th>
<th>F</th>
<th>R</th>
<th>P</th>
<th>I</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Best Ed</td>
<td>40</td>
<td>30</td>
<td>20</td>
<td>20</td>
<td>26</td>
</tr>
<tr>
<td>High Q</td>
<td>30</td>
<td>20</td>
<td>20</td>
<td>40</td>
<td>27</td>
</tr>
</tbody>
</table>

Possibility 2: R = 0.4, I = 0.3, F = 0.2, P = 0.1

<table>
<thead>
<tr>
<th></th>
<th>F</th>
<th>R</th>
<th>P</th>
<th>I</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Best Ed</td>
<td>40</td>
<td>30</td>
<td>20</td>
<td>20</td>
<td>28</td>
</tr>
<tr>
<td>High Q</td>
<td>30</td>
<td>20</td>
<td>20</td>
<td>40</td>
<td>28</td>
</tr>
</tbody>
</table>

Since High Q is better than Best Ed, possibility 1 is valid and possibility 2 is ruled out.

Therefore, we have R = 0.4, I = 0.3, P = 0.2 and F = 0.1

Now all the questions can be answered.

Hence [4]

Q. 10)

We have the following

<table>
<thead>
<tr>
<th></th>
<th>F</th>
<th>R</th>
<th>P</th>
<th>I</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-one</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>40</td>
</tr>
<tr>
<td>Best Ed</td>
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<td>30</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Cosmopolitan</td>
<td>40</td>
<td>20</td>
<td>20</td>
<td>30</td>
</tr>
<tr>
<td>Dominance</td>
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<td>20</td>
<td>40</td>
<td>30</td>
</tr>
<tr>
<td>Education Aid</td>
<td>50</td>
<td>50</td>
<td>40</td>
<td>50</td>
</tr>
<tr>
<td>Fancy</td>
<td>50</td>
<td>50</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>Global</td>
<td>30</td>
<td>0</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>High Q</td>
<td>30</td>
<td>20</td>
<td>20</td>
<td>40</td>
</tr>
</tbody>
</table>

From point 2, Best Ed is better than Cosmopolitan. The grades of the two colleges on F and P are the same. If Best Ed is better than Cosmopolitan, the weightage assigned to R must be higher than that assigned for I.
From point 3, Education Aid is better than A-one. The grades of the two colleges on F and R are the same. If Education Aid is better than A-one, the weightage assigned to I must be higher than that assigned for P.

Therefore we have, R>I>P.

From point 1, High Q is better than Best Ed. High Q has worse grades than Best Ed on F and R and has same grade on P and a better grade only on I. We have already figured out that R>I>P. If a better grade only on I reverses the effect of worse grades on F and R, I must be assigned higher weightage than that assigned for F.

Therefore, we have the following two possibilities:
R > I > P > F or R > I > F > P.
That means R = 0.4, I = 0.3, P = 0.2 and F= 0.1 or R = 0.4, I = 0.3, F = 0.2 and P = 0.1 are the two possibilities.

Using the two possibilities, let us calculate the scores of High Q and Best Ed.

**Possibility 1: R= 0.4, I = 0.3, P =0.2, F = 0.1**

<table>
<thead>
<tr>
<th></th>
<th>F</th>
<th>R</th>
<th>P</th>
<th>I</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Best Ed</td>
<td>40</td>
<td>30</td>
<td>20</td>
<td>20</td>
<td>26</td>
</tr>
<tr>
<td>High Q</td>
<td>30</td>
<td>20</td>
<td>20</td>
<td>40</td>
<td>27</td>
</tr>
</tbody>
</table>

**Possibility 2: R= 0.4, I = 0.3, F =0.2, P = 0.1**

<table>
<thead>
<tr>
<th></th>
<th>F</th>
<th>R</th>
<th>P</th>
<th>I</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Best Ed</td>
<td>40</td>
<td>30</td>
<td>20</td>
<td>20</td>
<td>28</td>
</tr>
<tr>
<td>High Q</td>
<td>30</td>
<td>20</td>
<td>20</td>
<td>40</td>
<td>28</td>
</tr>
</tbody>
</table>

Since High Q is better than Best Ed, possibility 1 is valid and possibility 2 is ruled out. Therefore, we have R = 0.4, I = 0.3, P = 0.2 and F = 0.1

Now all the questions can be answered.
The weight assigned to parameter R is highest and is at 0.4. A college that receives 50 points on all the four parameters scores 50 out of 50. A college that receives 40 on parameter R loses 4 points on R and can score maximum 46. Further, a college that receives 30 or below on parameter R cannot score 45. Therefore we need to consider only three colleges, namely A-one, Education Aid and Fancy.
<table>
<thead>
<tr>
<th></th>
<th>F (0.1)</th>
<th>R (0.4)</th>
<th>P (0.2)</th>
<th>I (0.3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-one</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>40</td>
</tr>
<tr>
<td>Education Aid</td>
<td>50</td>
<td>50</td>
<td>40</td>
<td>50</td>
</tr>
<tr>
<td>Fancy</td>
<td>50</td>
<td>50</td>
<td>40</td>
<td>40</td>
</tr>
</tbody>
</table>

A-one lost $10 \times 0.3 = 3$ points on I.
Education Aid lost $10 \times 0.2 = 2$ points on P.
Fancy lost $10 \times 0.2 + 10 \times 0.3 = 5$ points on P and I.
Therefore, these three colleges receive the accreditation AAA.

Therefore the required answer is 3.

Q.11)

We have the following

<table>
<thead>
<tr>
<th></th>
<th>F</th>
<th>R</th>
<th>P</th>
<th>I</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-one</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>40</td>
</tr>
<tr>
<td>Best Ed</td>
<td>40</td>
<td>30</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Cosmopolitan</td>
<td>40</td>
<td>20</td>
<td>20</td>
<td>30</td>
</tr>
<tr>
<td>Dominance</td>
<td>20</td>
<td>20</td>
<td>40</td>
<td>30</td>
</tr>
<tr>
<td>Education Aid</td>
<td>50</td>
<td>50</td>
<td>40</td>
<td>50</td>
</tr>
<tr>
<td>Fancy</td>
<td>50</td>
<td>50</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>Global</td>
<td>30</td>
<td>0</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>High Q</td>
<td>30</td>
<td>20</td>
<td>20</td>
<td>40</td>
</tr>
</tbody>
</table>

From point 2, Best Ed is better than Cosmopolitan. The grades of the two colleges on F and P are the same. If Best Ed is better than Cosmopolitan, the weightage assigned to R must be higher than that assigned for I.

From point 3, Education Aid is better than A-one. The grades of the two colleges on F and R are the same. If Education Aid is better than A-one, the weightage assigned to I must be higher than that assigned for P.
Therefore we have, R>I>P.

From point 1, High Q is better than Best Ed. High Q has worse grades than Best Ed on F and R and has same grade on P and a better grade only on I. We have already figured out that R>I>P. If a better grade only on I reverses the effect of worse grades on F and R, I must be assigned higher weightage than that assigned for F.

Therefore, we have the following two possibilities:
R > I > P > F or R > I > F > P.
That means R = 0.4, I = 0.3, P = 0.2 and F = 0.1 or R = 0.4, I = 0.3, F = 0.2 and P = 0.1 are the two possibilities.

Using the two possibilities, let us calculate the scores of High Q and Best Ed.

**Possibility 1: R= 0.4, I = 0.3, P =0.2, F = 0.1**

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<tr>
<th></th>
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<td>27</td>
</tr>
</tbody>
</table>

**Possibility 2: R= 0.4, I = 0.3, F =0.2, P = 0.1**

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</table>

Since High Q is better than Best Ed, possibility 1 is valid and possibility 2 is ruled out.
Therefore, we have R = 0.4, I = 0.3, P = 0.2 and F = 0.1

Now all the questions can be answered.
From the answer to the previous question, it can be seen that the highest overall score among the eight colleges is 50 - 2 = 48.
Therefore the required answer is 48.
Q.12)

We have the following

<table>
<thead>
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<th></th>
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<td>40</td>
</tr>
<tr>
<td>Global</td>
<td>30</td>
<td>0</td>
<td>20</td>
<td>20</td>
</tr>
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<td>High Q</td>
<td>30</td>
<td>20</td>
<td>20</td>
<td>40</td>
</tr>
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From point 2, Best Ed is better than Cosmopolitan. The grades of the two colleges on F and P are the same. If Best Ed is better than Cosmopolitan, the weightage assigned to R must be higher than that assigned for I.

From point 3, Education Aid is better than A-one. The grades of the two colleges on F and R are the same. If Education Aid is better than A-one, the weightage assigned to I must be higher than that assigned for P.

Therefore we have, R>I>P.

From point 1, High Q is better than Best Ed. High Q has worse grades than Best Ed on F and R and has same grade on P and a better grade only on I. We have already figured out that R>I>P. If a better grade only on I reverses the effect of worse grades on F and R, I must be assigned higher weightage than that assigned for F.

Therefore, we have the following two possibilities:
R > I > P > F  or  R > I > F > P.
That means R = 0.4, I = 0.3, P = 0.2 and F= 0.1  or  R = 0.4, I = 0.3, F = 0.2 and P = 0.1 are the two possibilities.

Using the two possibilities, let us calculate the scores of High Q and Best Ed.
Possibility 1: R = 0.4, I = 0.3, P = 0.2, F = 0.1

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<td>27</td>
</tr>
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</table>

Possibility 2: R = 0.4, I = 0.3, F = 0.2, P = 0.1

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Since High Q is better than Best Ed, possibility 1 is valid and possibility 2 is ruled out.

Therefore, we have R = 0.4, I = 0.3, P = 0.2 and F = 0.1

Now all the questions can be answered.

We have already figured out that three colleges have overall score of 45 or above. Therefore we need to check for only the remaining five colleges.

The college that earned 0 on R (Global) lost $50 \times 0.4 = 20$ points on R. Therefore it can score maximum 30 points. We need not calculate the overall score of that college further.

There are three colleges that scored 20 on R (Cosmopolitan, Dominance and High Q). They lost $30 \times 0.4 = 12$ points on R.

However, Cosmopolitan and Dominance colleges lost $30 \times 0.3 = 9$ more points on I. Therefore those colleges cannot score more than 30 points.

We have already figured out that High Q and Best Ed had an overall scores of 27 and 26 respectively.

Therefore no college scored between 31 and 40 points.

Hence [1]

Q.13)

is $\equiv 35$ and as $\equiv 56 \Rightarrow s \equiv 5$

$\therefore a \equiv 6$ and $i \equiv 3$

Letters ‘i’ and ‘d’ are common in words ‘bird’ and ‘india’. Numbers ‘1’ and ‘3’ are common in the codes. We know that $i \equiv 3$. Therefore, $d \equiv 1$. Also, $br = 34$

India $\equiv 13366$, $d \equiv 1$  $a \equiv 6$ and $i \equiv 3 \Rightarrow n = 6$
of \equiv 79 \text{ means } o = 7 \text{ or } 9

As peacock \equiv 5688999, code for ‘o’ must be ‘9’. Therefore, ‘f \equiv 7’.

national \equiv 13666689, a \equiv 6, i \equiv 3, o \equiv 9 \text{ and } n = 6 \Rightarrow tl \equiv 19

the \equiv 458 \text{ and } tl \equiv 18 \Rightarrow t \equiv 8 \text{ and hence, } l \equiv 1

Consider designated \equiv 1135556678.

As d \equiv 1, a \equiv 6, i \equiv 3, n \equiv 6, s \equiv 5, t \equiv 8; eeg \equiv 557. Therefore, e \equiv 5 \text{ and } g \equiv 7

Now in peacock \equiv 5688999 we know codes for letters e, a, and o.

Therefore, pcck \equiv 8899 \text{ i.e., } c = 8 \text{ or } 9

If c \equiv 8, 9 codes both ‘p’ and ‘k’. As ‘9’ codes two letters and one of them in ‘o’, it can not be code for both ‘p’ and ‘k’. Hence, ‘c’ must be coded as 9. And 8 must be the code for both ‘p’ and ‘k’.

Thus, we have

\begin{align*}
br &= 34 \\
1 &\equiv d, l \\
3 &\equiv i \\
5 &\equiv s, e \\
6 &\equiv a, n \\
7 &\equiv f, g \\
8 &\equiv t, p, k \\
9 &\equiv o, c
\end{align*}

Now both the questions can be answered

The code for the letter L = 1. Hence, [2].

Q.14)

is \equiv 35 \text{ and as } \equiv 56 \Rightarrow s \equiv 5

\therefore a \equiv 6 \text{ and } i \equiv 3

Letters ‘i’ and ‘d’ are common in words ‘bird’ and ‘india’. Numbers ‘1’ and ‘3’ are common in there codes. We know that i \equiv 3. Therefore, d \equiv 1. Also, br = 34

India \equiv 13366, d \equiv 1, a \equiv 6 \text{ and } i \equiv 3 \Rightarrow n = 6

of \equiv 79 \text{ means } o = 7 \text{ or } 9

As peacock \equiv 5688999, code for ‘o’ must be ‘9’. Therefore, ‘f \equiv 7’.

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If c \equiv 8, 9 codes both ‘p’ and ‘k’. As ‘9’ codes two letters and one of them in ‘o’, it can not be code for both ‘p’ and ‘k’. Hence, ‘c’ must be coded as 9. And 8 must be the code for both ‘p’ and ‘k’.
Thus, we have
br = 34 and
1 ≡ d, l
3 ≡ i
5 ≡ s, e
6 ≡ a, n
7 ≡ f, g
8 ≡ t, p, k
9 ≡ o, c

Now both the questions can be answered
The code for the letter B = 3 or 4. Hence, [4].

Q.15)

is ≡ 35 and as ≡ 56 ⇒ s ≡ 5
∴ a ≡ 6 and i ≡ 3
Letters ‘i’ and ‘d’ are common in words ‘bird’ and ‘india’. Numbers ‘1’ and ‘3’ are common in there codes. We know that i ≡ 3. Therefore, d ≡ 1. Also, br = 34
India ≡ 13366, d ≡ 1 a ≡ 6 and i ≡ 3 ⇒ n = 6
of ≡ 79 means o = 7 or 9
As peacock ≡ 5688999, code for ‘o’ must be ‘9’. Therefore, ‘f ≡ 7’.
national ≡ 13666689, a ≡ 6, i ≡ 3, o ≡ 9 and n = 6 ⇒ tl ≡ 19
the ≡ 458 and tl ≡ 18 ⇒ t ≡ 8 and hence, l ≡ 1
Consider designated ≡ 1135556678.
As d ≡ 1 a ≡ 6, i ≡ 3, n ≡ 6, s ≡ 5, t ≡ 8; eeg ≡ 557. Therefore, e ≡ 5 and g ≡ 7
Now in peacock ≡ 5688999 we know codes for letters e, a, and o.
Therefore, pck ≡ 8899 i.e., c = 8 or 9
If c ≡ 8, 9 codes both ‘p’ and ‘k’. As ‘9’ codes two letters and one of them in ‘o’, it can not be code for both ‘p’ and ‘k’. Hence, ‘c’ must be coded as 9. And 8 must be the code for both ‘p’ and ‘k’.

Thus, we have
br = 34 and
1 ≡ d, l
3 ≡ i
5 ≡ s, e
6 ≡ a, n
7 ≡ f, g
8 ≡ t, p, k
9 ≡ o, c

Now both the questions can be answered
Only for 8 and 9, the complete list of letters associated is identified. Hence, [1].
Q.16)

is \equiv 35 and as \equiv 56 \Rightarrow s \equiv 5
\therefore a \equiv 6 and i \equiv 3

Letters 'i' and 'd' are common in words 'bird' and 'india'. Numbers '1' and '3' are common in their codes. We know that i \equiv 3. Therefore, d \equiv 1. Also, br = 34

India \equiv 13366, d \equiv 1 \ a \equiv 6 and i \equiv 3 \Rightarrow n = 6

of \equiv 79 means o = 7 or 9

As peacock \equiv 5688999, code for 'o' must be '9'. Therefore, 'f \equiv 7'.

national \equiv 13666689, a \equiv 6, i \equiv 3, o \equiv 9 and n = 6 \Rightarrow tl \equiv 19

the \equiv 458 and tl \equiv 18 \Rightarrow t = 8 and hence, l \equiv 1

Consider designated \equiv 1135556678.

As d \equiv 1 \ a \equiv 6, i \equiv 3, n \equiv 6, s \equiv 5, t \equiv 8; eeg \equiv 557. Therefore, e \equiv 5 and g \equiv 7

Now in peacock \equiv 5688999 we know codes for letters e, a, and o.

Therefore, pcck \equiv 88999 i.e., c = 8 or 9

If c \equiv 8, 9 codes both 'p' and 'k'. As '9' codes two letters and one of them is 'o', it can not be code for both 'p' and 'k'. Hence, 'c' must be coded as 9. And 8 must be the code for both 'p' and 'k'.

Thus, we have

br = 34 and
1 \equiv d, l
3 \equiv i
5 \equiv s, e
6 \equiv a, n
7 \equiv f, g
8 \equiv t, p, k
9 \equiv o, c

Now both the questions can be answered
(X, Y, Z) can be coded with the same digit. (I, B, M) can have code as '3'. (S, E, Z) can be coded with number '5'. As 'S' and 'E' are coded 5, only one more letter has code 5. Thus, (S, U, V) cannot be coded with the same digit. Hence, [2].
Q.17)

From points 1 and 2, the number of tickets bought by Young people = 80, the number of tickets bought by the middle aged people = 40 and the number of tickets bought by the old people = 20.

Using points 3 & 4, we get the following

<table>
<thead>
<tr>
<th></th>
<th>Platinum</th>
<th>Gold</th>
<th>Economy</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Old</td>
<td>20 - 2y</td>
<td>y</td>
<td>y</td>
<td>20</td>
</tr>
<tr>
<td>Middle-aged</td>
<td>x+2y-20</td>
<td>43-x-y</td>
<td>17-y</td>
<td>40</td>
</tr>
<tr>
<td>Young</td>
<td>x</td>
<td>42-x</td>
<td>38</td>
<td>80</td>
</tr>
<tr>
<td>Total</td>
<td>2x</td>
<td>85-2x</td>
<td>55</td>
<td>140</td>
</tr>
</tbody>
</table>

Now all the questions can be answered.

We have, $20 - 2y = x + 2y - 20$. Therefore, $x + 4y = 40$. Therefore, $x = 40 - 4y = 4(10 - y)$ or $2x = 8(10 - y)$. Therefore, $x$ is a multiple of 8. Out of the given options, 32 is a possible answer. Hence [1]

Q.18)

From points 1 and 2, the number of tickets bought by Young people = 80, the number of tickets bought by the middle aged people = 40 and the number of tickets bought by the old people = 20.

Using points 3 & 4, we get the following

<table>
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<td>140</td>
</tr>
</tbody>
</table>

Now all the questions can be answered.

We have, $20 - 2y = 17 - y$ or $y = 3$. Therefore the number of old visitors buying Gold tickets = 3. Therefore the required answer is 3.
Q.19)

From points 1 and 2, the number of tickets bought by Young people = 80, the number of tickets bought by the middle aged people = 40 and the number of tickets bought by the old people = 20.

Using points 3 & 4, we get the following

<table>
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<tr>
<th></th>
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Now all the questions can be answered.

We have, \( y > 42 - x \) or \( x + y > 42 \). Now, the number of middle-aged visitors buying Gold tickets = \( 43 - (x + y) \). Since \( x + y > 42 \), the number of middle-aged visitors buying Gold tickets = 0. Therefore the required answer is 0.

Q.20)

From points 1 and 2, the number of tickets bought by Young people = 80, the number of tickets bought by the middle aged people = 40 and the number of tickets bought by the old people = 20.

Using points 3 & 4, we get the following

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Now all the questions can be answered.

Option 1: The numbers of Middle-aged and Young visitors buying Gold tickets were equal i.e. \( 43 - x - y = 42 - x \) or \( y = 1 \). No condition precludes the possibility of \( y \) having a value of 1.
Option 2: The numbers of Old and Middle-aged visitors buying Platinum tickets were equal i.e. $20 - 2y = x + 2y - 20$ or $x + 4y = 40$. This is possible.

Option 3: The numbers of Gold and Platinum tickets bought by Young visitors were equal i.e. $x = 42 - x$ i.e. $x = 21$. This is possible.

Option 4: The numbers of Old and Middle-aged visitors buying Economy tickets were equal i.e. $y = 17 - y$. This is not possible because in that case $y$ will not be a natural number.

Hence [4]

Q.21)

Suppose the total sales of the four models was 100 in 2016. Accordingly, we can fill the following table:

<table>
<thead>
<tr>
<th></th>
<th>Sales</th>
<th>Price</th>
<th>Profitability %</th>
<th>Profit (in thousand rupees)</th>
<th></th>
<th>Sales</th>
<th>Price</th>
<th>Profitability %</th>
<th>Profit (in thousand rupees)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Azra</td>
<td>40</td>
<td>15,000</td>
<td>10%</td>
<td>60</td>
<td>49</td>
<td>15,000</td>
<td>10%</td>
<td>$49 \times 1.5 = 73.5$</td>
<td></td>
</tr>
<tr>
<td>Bysi</td>
<td>25</td>
<td>20,000</td>
<td>30%</td>
<td>150</td>
<td>28</td>
<td>20,000</td>
<td>30%</td>
<td>168</td>
<td></td>
</tr>
<tr>
<td>cxqi</td>
<td>15</td>
<td>30,000</td>
<td>40%</td>
<td>180</td>
<td>42</td>
<td>18,000</td>
<td>20%</td>
<td>$42 \times 3.6 = 151.2$</td>
<td></td>
</tr>
<tr>
<td>Dipq</td>
<td>20</td>
<td>25,000</td>
<td>30%</td>
<td>150</td>
<td>21</td>
<td>25,000</td>
<td>30%</td>
<td>$21 \times 7.5 = 157.5$</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td></td>
<td></td>
<td>140</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Now all the questions can be answered.
Hence [2]
Q.22)

Suppose the total sales of the four models was 100 in 2016. Accordingly, we can fill the following table:

<table>
<thead>
<tr>
<th></th>
<th>Sales</th>
<th>Price</th>
<th>Profitability %</th>
<th>Profit (in thousand rupees)</th>
<th></th>
<th>Sales</th>
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<tbody>
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<td>140</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Now all the questions can be answered.
Hence [1]

Q.23)

Suppose the total sales of the four models was 100 in 2016. Accordingly, we can fill the following table:

<table>
<thead>
<tr>
<th></th>
<th>Sales</th>
<th>Price</th>
<th>Profitability %</th>
<th>Profit (in thousand rupees)</th>
<th></th>
<th>Sales</th>
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<td>100</td>
<td>140</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Now all the questions can be answered.
Hence [2]
Q.24)

Suppose the total sales of the four models was 100 in 2016. Accordingly, we can fill the following table:

<table>
<thead>
<tr>
<th></th>
<th>Sales</th>
<th>Price (in thousand rupees)</th>
<th>Profitability %</th>
<th>Profit (in thousand rupees)</th>
<th></th>
<th>Sales</th>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

Now all the questions can be answered. Hence [2]

Q.25)

From Ganeshan’s statement, there were two candidates in room 102. From Erina’s statement, she was the only candidate in her room. However, from Balram’s statement, there were at least three candidates in the room 101. Therefore, there were 4 candidates in room 101, 2 candidates in room 102 and 1 candidate in room 103.

Using the given statements, we can generate the following:

<table>
<thead>
<tr>
<th>Room 101</th>
<th>Room 102</th>
<th>Room 103</th>
</tr>
</thead>
<tbody>
<tr>
<td>Akil (7.10)</td>
<td>Ganeshan</td>
<td>Erina (7.45)</td>
</tr>
<tr>
<td>Divya</td>
<td>Chitra (7.30)</td>
<td></td>
</tr>
<tr>
<td>Balaram</td>
<td></td>
<td></td>
</tr>
<tr>
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<td></td>
</tr>
</tbody>
</table>

Now all the questions can be answered. Hence [2]
Q.26)

From Ganeshan’s statement, there were two candidates in room 102. From Erina’s statement, she was the only candidate in her room. However, from Balram’s statement, there were at least three candidates in the room 101. Therefore, there were 4 candidates in room 101, 2 candidates in room 102 and 1 candidate in room 103.

Using the given statements, we can generate the following:

<table>
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<td></td>
</tr>
<tr>
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<td></td>
</tr>
</tbody>
</table>

Now all the questions can be answered. Hence [3]

Q.27)

From Ganeshan’s statement, there were two candidates in room 102. From Erina’s statement, she was the only candidate in her room. However, from Balram’s statement, there were at least three candidates in the room 101. Therefore, there were 4 candidates in room 101, 2 candidates in room 102 and 1 candidate in room 103.

Using the given statements, we can generate the following:

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<td></td>
</tr>
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</table>

Now all the questions can be answered. Hence [3]
From Ganeshan’s statement, there were two candidates in room 102. From Erina’s statement, she was the only candidate in her room. However, from Balram’s statement, there were at least three candidates in the room 101. Therefore, there were 4 candidates in room 101, 2 candidates in room 102 and 1 candidate in room 103.

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<td></td>
</tr>
<tr>
<td>Fatima (7.40)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Now all the questions can be answered. If Ganeshan entered before Divya, Balaram entered at 7.25 am. Hence [4]
Q.29)

Using the information given in the set, we can construct the following venn diagram:

Since 10 students who play G enrolled in at least one other sport, the number of students who enrolled only in G = 17 - 10 = 7. Therefore x = 7. Also from statement 1, the number of students who enrolled in all the three sports = \( \frac{7+1}{2} = 4 \).

As 17 students enrolled in G, the number of students who did not enrol in G = 39 - 17 = 22. Therefore, \( x + 1 + z + y + z = 22 \). We know that \( x = 7 \) and \( y = 4 \). Therefore we have the following: \( 8 + 4 + 2z = 22 \) or \( z = 5 \).
From statement 5, $6 - w > w$ or $w = 0 \text{ or } 1 \text{ or } 2$.

Now first two questions can be answered.
The required answer is $6 - 2 = 4$. 
Q.30)

Using the information given in the set, we can construct the following venn diagram:

Since 10 students who play G enrolled in at least one other sport, the number of students who enrolled only in G = 17 - 10 = 7. Therefore x = 7. Also from statement 1, the number of students who enrolled in all the three sports = \( \frac{7+1}{2} = 4 \).

As 17 students enrolled in G, the number of students who did not enrol in G = 39 - 17 = 22. Therefore, \( x + 1 + z + y + z = 22 \). We know that \( x = 7 \) and \( y = 4 \). Therefore we have the following: \( 8 + 4 + 2z = 22 \) or \( z = 5 \).
From statement 5, \(6 - w > w\) or \(w = 0\) or 1 or 2.

Now first two questions can be answered.

If the ratio of the numbers of students enrolled in K and L are in the ratio 19:22, \(\frac{18 + w}{23 - w} = \frac{19}{22}\). Therefore \(w = 1\). Therefore total enrollment in L = \(23 - 1 = 22\).

Hence [3]
Q.31)

Using the information given in the set, we can construct the following venn diagram:

Since 10 students who play G enrolled in at least one other sport, the number of students who enrolled only in G = 17 - 10 = 7. Therefore x = 7. Also from statement 1, the number of students who enrolled in all the three sports = \(\frac{7+1}{2} = 4\).

As 17 students enrolled in G, the number of students who did not enrol in G = 39 - 17 = 22. Therefore, \(x + 1 + z + y + z = 22\). We know that \(x = 7\) and \(y = 4\). Therefore we have the following: \(8 + 4 + 2z = 22\) or \(z = 5\).
From statement 5, $6 - w > w$ or $w = 0$ or $1$ or $2$.

Now first two questions can be answered.

Out of 4 students who are enrolled in all the three, suppose ‘a’ students dropped out of L and ‘b’ students dropped out of K. Therefore the number of students who dropped out of G = 4 - a - b. Therefore we have the following:
If the number of students enrolled in K reduced by 1 that means out of the 4 students who had enrolled in all the three, one student dropped out of K i.e. \( b = 1 \).

Now, if the number of students enrolled in G was 6 less than the number of students enrolled in L, we have the following:

\[
(7 + w + a + 6 - w + b) + 6 = 6 - w + b + 9 - a - b + 8 \\
\Rightarrow 19 + a + b = 23 - w - a \\
\Rightarrow 2a + b + w = 4
\]

Since \( b = 1 \), the only solution for the equation \( 2a + b + w = 4 \) is \( a = 1 \), \( b = 1 \) and \( w = 1 \).

Now both the questions can be answered.

The required number of students = \( w + a = 2 \). Therefore the required answer is 2.
Q.32)

Using the information given in the set, we can construct the following venn diagram:

Since 10 students who play G enrolled in at least one other sport, the number of students who enrolled only in G = 17 - 10 = 7. Therefore x = 7. Also from statement 1, the number of students who enrolled in all the three sports = \( \frac{7+1}{2} = 4 \).

As 17 students enrolled in G, the number of students who did not enrol in G = 39 - 17 = 22. Therefore, \( x + 1 + z + y + z = 22 \). We know that \( x = 7 \) and \( y = 4 \). Therefore we have the following: \( 8 + 4 + 2z = 22 \) or \( z = 5 \).
From statement 5, $6 - w > w$ or $w = 0$ or $1$ or $2$.

Now first two questions can be answered.

Out of 4 students who are enrolled in all the three, suppose ‘a’ students dropped out of L and ‘b’ students dropped out of K. Therefore the number of students who dropped out of $G = 4 - a - b$. Therefore we have the following:
If the number of students enrolled in K reduced by 1 that means out of the 4 students who had enrolled in all the three, one student dropped out of K i.e. $b = 1$.

Now, if the number of students enrolled in G was $6$ less than the number of students enrolled in L, we have the following:

$$(7 + w + a + 6 - w + b) + 6 = 6 - w + b + 9 - a - b + 8$$

$\therefore 19 + a + b = 23 - w - a$

$\therefore 2a + b + w = 4$

Since $b = 1$, the only solution for the equation $2a + b + w = 4$ is $a = 1$, $b = 1$ and $w = 1$.

Now both the questions can be answered.
The required number of students $= 6 - w + b = 6 - 1 + 1 = 6$. Hence $[2]$
Q.1)

The first number in the terms are 7, 11, 15, ..., 95, which form an AP with a = 7 and d = 4. The nth term for this AP is \( T_n = 3 + 4n \) and the number of terms is \( n = \frac{95 - 7}{4} + 1 = 23 \).

The second number in the terms are 11, 15, 19, ..., 99, which form an AP with a = 11 and d = 4. The nth term for this AP is \( T_n = 7 + 4n \) and the number of terms is \( n = \frac{99 - 11}{4} + 1 = 23 \).

Therefore the required sum is:

\[
\sum_{n=1}^{23} (3 + 4n)(7 + 4n) = \sum_{n=1}^{23} (16n^2 + 40n + 21) = 16 \sum_{n=1}^{23} n^2 + 40 \sum_{n=1}^{23} n + 21 \sum_{n=1}^{23} 1
\]

\[
= 16 \times \frac{23 \times 24 \times 47}{6} + 40 \times \frac{23 \times 24}{2} + 21 \times 23
\]

\[
= 69184 + 11040 + 483
\]

\[
= 80707
\]

Hence [4]

Alternatively,

The given series is: \( 7 \times 11 + 11 \times 15 + 15 \times 19 + 19 \times 23 + 23 \times 27 + 27 \times 31 + 31 \times 35 \ldots \)

The unit’s place of the term 7 \( \times \) 11 is 7.

The unit’s place of the term 11 \( \times \) 15 is 5.

The unit’s place of the term 15 \( \times \) 19 is 5.

The unit’s place of the term 19 \( \times \) 23 is 7.

The unit’s place of the term 23 \( \times \) 27 is 1.

The unit’s place of the sum of these 5 terms is 5.

After 23 \( \times \) 27, the same unit’s place repeat in that order up to 83 \( \times \) 87.

Thus up-to 83 \( \times \) 87, the series of five terms each appears four times. Therefore the sum of all the terms up-to 83 \( \times \) 87 is 4 \( \times \) 5 = 20 or 0.

Now, we are left with three terms 87 \( \times \) 91 + 91 \( \times \) 95 + 95 \( \times \) 99. The unit’s place in the sum of these three terms is 7 + 5 + 5 = 17 (or 7).

There is only one option 80707 that ends in 7.

Hence [4]
Q.2)

The sum of the coefficients of \( n^3 - 11n^2 + 32n - 28 \) is not zero. Similarly the sum of the odd coefficients of \( n^3 - 11n^2 + 32n - 28 \) is not equal to its even coefficients. Therefore it is not divisible by \((n-1)\) and \((n+1)\).

If we put \( n = 2 \), \( n^3 - 11n^2 + 32n - 28 = 8 - 44 + 64 - 28 = 0. \) Therefore \((n-2)\) is a factor of the polynomial \( n^3 - 11n^2 + 32n - 28 \).

We have,
\[
 n^3 - 11n^2 + 32n - 28 = (n - 2)(n^2 - 9n + 14) = (n - 2)(n - 7)(n - 2) = (n - 2)^2(n - 7).
\]
Therefore \( n = 2 \) and \( n = 7 \) are the two roots of the equation \( n^3 - 11n^2 + 32n - 28 = 0. \)

Also, at \( n = 0 \), \( n^3 - 11n^2 + 32n - 28 = -28 < 0. \) Therefore the curve touches the x-axis at 2 and intersects the x-axis at 7.

Therefore the smallest integer for which \( n^3 - 11n^2 + 32n - 28 > 0 \) is 8.

Therefore the required answer is 8.

Q.3)

From observation, \( N^N = 2^{160} = 32^{32} \) or \( N = 32. \)

Now, \( N^2 + 2^N = 32^2 + 2^32 = (2^5)^2 + 2^{10} + 2^{32} = 2^{10}(1 + 2^{22}). \)

Therefore the largest value of \( x = 10. \)

Therefore the required answer is 10.

Q.4)

Given numbers are \( a_1, a_2, a_3, \ldots, a_{51}, 100. \) If the arithmetic mean of these 52 numbers is 'x', we have
\[
a_1 + a_2 + a_3 + \ldots + a_{51} + 100 = 52x.
\]

Given: the arithmetic mean of \( a_2, a_3, a_4, \ldots, a_{51}, 100 \) is 'x+1'.
\[
a_2 + a_3 + \ldots + a_{51} + 100 = 51(x + 1) = 51x + 51
\]
\[
\therefore \ a_1 = x - 51
\]

Using options:

If \( a_1 = 48 \) or \( x = 99. \) Therefore, \( a_2 + a_3 + \ldots + a_{51} = 52 \times 99 - 48 - 100 = 5000. \) We cannot find 50 unique numbers greater than 48 but less than 100 such that they add up to 5000.

If \( a_1 = 45 \) or \( x = 96. \) Therefore, \( a_2 + a_3 + \ldots + a_{51} = 52 \times 96 - 45 - 100 = 4847. \) We cannot find 50 unique numbers greater than 45 but less than 100 such that they add up to 4847.

If \( a_1 = 23 \) or \( x = 74. \) Therefore, \( a_2 + a_3 + \ldots + a_{51} = 52 \times 74 - 23 - 100 = 3725. \) We can find 50 unique numbers greater than 23 but less than 100 such that they add up to 3725.

Hence [2]
Q.5)  
Given: \( a^2 + b^2 = 97 \). If \( a^2 = b^2 = 48.5 \), then \( |a| = |b| < 7 \). Therefore any or neither or a and b can be negative. Therefore the product of a and b must follow \(-49 < ab < 49\). Out of the given options, 64 definitely lies outside this range. Hence [4]

Q.6)  
The time taken by pump A alone to fill the tank completely = \( t \) hours. 
The time taken by pump B alone to fill the tank completely = ‘t - 2’ hours. 
On Wednesday, pump A was used for ‘t-3’ hours and pump B was used for 2 hours to completely fill the tank. 
Therefore we have, \( \frac{t-3}{t} + \frac{2}{t-2} = 1 \)

\[ \therefore (t - 3)(t - 2) + 2t = t(t - 2) \]

\[ \therefore t^2 - 5t + 6 + 2t = t^2 - 2t \]
Solving for \( t \), \( t = 6 \). 
Therefore pump A takes 6 hours and pump B takes 4 hours to completely fill the tank. Both the tanks are started at 2 pm.
If the capacity of the tank is 12 litres, in one hour A fills 2 litres and B fills 3 litres. Therefore if both pumps A and B are used, they will together fill the tank in \( \frac{12}{2+3} = 2.4 \) hours = 2 hours and 24 minutes.
Therefore on Thursday, the tank will be completely full at 4.24 pm. 
Hence [4]

Q.7)  
Suppose the mixture from drum 1 = 300x litres and the mixture from drum 2 = 400x litres. Therefore, we have the following

<table>
<thead>
<tr>
<th></th>
<th>Paint A</th>
<th>Paint B</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drum A</td>
<td>216x</td>
<td>84x</td>
<td>300x</td>
</tr>
<tr>
<td>Drum B</td>
<td></td>
<td></td>
<td>400x</td>
</tr>
<tr>
<td>Total</td>
<td>455x</td>
<td>245x</td>
<td>700x</td>
</tr>
</tbody>
</table>

Therefore the volume of Paint A in Drum B = \( 455x - 216x = 239x \) and the volume of Paint B in Drum B = \( 245x - 84x = 161x \).
Therefore the required ratio is 239:161. 
Hence [4]
Q.8)

When a 20% solution is mixed with x% solution in the ratio 1:3, the resultant concentration (in %) of the solution is

\[
\begin{align*}
\text{solution} &= \frac{20(1) + x(3)}{1+3} = \frac{2x + 20}{4} = 0.75x + 5
\end{align*}
\]

When this solution is mixed with 20% solution having equal volume, the resultant concentration (in %) of the solution is

\[
\begin{align*}
\text{solution} &= \frac{0.75x + 5 + 20}{2} = \frac{3}{8}x + 12.5
\end{align*}
\]

\[
\therefore \frac{3}{8}x + 12.5 = 31.25
\]

Solving for x, x = 50.

Hence [2]

Q.9)

Area of parallelogram = Base × Height

\[
\therefore 48 = 8 \times \text{Height}
\]

\[
\therefore \text{Height} = 6 \text{ cm}
\]

If the parallelogram is a rectangle, AD is its height. In that case, s = 6.

Otherwise, using Pythagoras theorem, AD > 6 or s > 6.

Therefore, s ≥ 6.

Hence [2]
Q.10)

For \(n=1, A_1 = 0\)
For \(n=2, A_2 = 1225 = 35 \times 35\)
Also, \(6^{2n} - 35n - 1 = (36^n - 1) - 35n\). The term in the bracket \(36^n - 1\) is always divisible by \((36 - 1)\) or by 35. Similarly 35n is also always divisible by 35. Therefore each term in the set A is divisible by 35. However, not all positive multiples of 35 are present in set A.
For \(n=1, B_1 = 35(1 - 1) = 0\)
For \(n=2, B_2 = 35(2 - 1) = 35\) and so on.
Thus all whole number multiples of 35 are present in set B.
Thus every member of set A is present in every member of set B but at least one member of set B is not present in set A.
Hence [1]

Q.11)

The graph of the function \(52 - 2x^2\) will be of ‘inverted U’ shape, while the graph of the function \(y = 5x\) will be a straight line with a positive slope. Therefore, the minimum value of the required function will be obtained at a point of intersection of \(52 - 2x^2\) and \(y = 5x\).
Therefore, \(52 - 2x^2 = 5x\) or \(2x^2 + 5x - 52 = 0\).
\[\therefore (x - 4)(2x + 13) = 0\]
\[\therefore x = 4\text{ or } x = -\frac{13}{2}\]
Since \(x\) is a positive real number, \(x = 4\).
At \(x = 4, 5x = 52 - 2x^2 = 20\)
Therefore the required answer is 20.

Q.12)

\[\log_s(pqr) = \log_s p + \log_s q + \log_s r\]
Given: \(p^3 = s^6\) or \(p = s^2\). Therefore, \(\log_s p = 2\).
On similar lines, \(\log_s q = \frac{3}{2}\) and \(\log_s r = \frac{6}{5}\)
Therefore, \(\log_s(pqr) = \log_s p + \log_s q + \log_s r = \frac{47}{10}\)
Hence [1]
Q.13)

Suppose the original scores of Amal and Bimal are 11x and 14x respectively. Suppose ‘y’ is the increase in their marks. Therefore the new marks of Amal and Bimal are ‘11x+y’ and ‘14x+y’ respectively.

Therefore, we have \( \frac{11x+y}{14x+y} = \frac{47}{56} \)

\[ \therefore 616x + 56y = 658x + 47y \]

Solving for x and y, we get 14x = 3y

Therefore Bimal’s old marks = 14x = 3y and his new marks = 14x+y = 4y. Therefore the required ratio = 4:3.

Hence [1]

Q.14)

The triangle formed by joining the endpoints of the chord of a circle with the center of the circle is an isosceles triangle because the two sides of the triangle (radii of the circle) are congruent. If the angle subtended by the chord at the center of the circle is 60 degrees, the triangle is an equilateral triangle. Therefore the side of the triangle and the radius of the circle is equal to the side of the triangle = 5 cm.

Now we have the following

\[ \text{OP is perpendicular to the chord AB. Therefore P is the midpoint of chord AB. Further, OA and OP are the radii of the circle. Therefore triangles OAP and OBP are congruent. Therefore triangle OAP and OBP are 30-60-90 triangles.} \]

We have, \( \cos 30 = \frac{\sqrt{3}}{2} = \frac{AP}{OA} = \frac{AP}{5} \). Therefore, \( AP = \frac{5}{2} \sqrt{3} \). Therefore, \( \therefore (AB) = 2 \times \frac{5}{2} \sqrt{3} = 5 \sqrt{3} \)

Hence [1]
Q.15)

If ‘x’ is the digit in the ten’s place and ‘y’ is the digit in the unit’s place of the two digit number, we have the following:

\[10x + y > 3(10y + x)\]

\[\therefore x > \frac{29}{7}y\]

When \(y = 1\), \(x = 5, 6, 7, 8, 9\) (Total 5 values)

When \(y = 2\), \(x = 9\) (Total 1 value)

Therefore the required answer is 5+1 = 6.

Hence [1]

Q.16)

Suppose ‘R’ and ‘G’ are the number of units of work completed by Ramesh and Ganesh everyday. Therefore the total quantum of work to be completed = \(16(R + G) = 16R + 16G\)

For the first 7 days, both work at 100% efficiency and for the remaining 10 days, only Ramesh works at 70% efficiency. Therefore the total quantum of work to be completed = \(7(R + G) + 10(0.7R + G) = 14R + 17G\)

\[\therefore 16R + 16G = 14R + 17G\]

or \(G = 2R\).

When Ramesh fell sick, the total quantum of work could have been done in 9 more days with both working at 100% efficiency. Since Ganesh is twice as efficient as Ramesh is, if Ganesh had worked alone, he would have been able to finish the work in \(9 \times \frac{3}{2} = 13.5\) days.

Hence [3]

Q.17)

We have,

\[
\frac{1}{\log_{100}2} - \frac{1}{\log_{100}3} + \frac{1}{\log_{100}5} + \frac{1}{\log_{100}5} - \frac{1}{\log_{100}20} + \frac{1}{\log_{100}25} - \frac{1}{\log_{100}50} = \log_{100}2 - \log_{100}3 + \log_{100}5 - \log_{100}20 + \log_{100}25 + \log_{100}50
\]

\[
= \log_{100}\left(\frac{2 \times 5 \times 20 \times 50}{4 \times 10 \times 25}\right) = \log_{100}(10) = \frac{1}{2}
\]

Hence [4]
Q.18)

We have to maximize the value of $2a - 6b$. Therefore let us look for the largest possible value of $a$ and the smallest possible value of $b$.

If $2x^2 - ax + 2 > 0$ for all value of $x$, the graph of $2x^2 - ax + 2$ is above the x-axis or the roots of the quadratic equations $2x^2 - ax + 2 = 0$ are imaginary or its discriminant is less than 0. Therefore, we have $a^2 - 16 < 0$ or $a^2 < 16$ or $-4 < a < 4$. Therefore the largest possible value of $a$ is 3.

If $x^2 - bx + 8 \geq 0$, the discriminant of the equation is less than or equal to zero. Therefore, $b^2 - 32 \leq 0$ or $-4\sqrt{2} \leq b \leq 4\sqrt{2}$ or $-5.64 \leq b \leq 5.64$. Therefore the smallest possible value of $b$ is -5.

Therefore the maximum possible value of $2a - 6b = 2(3) - 6(-5) = 36$.

Therefore the required answer is 36.

Q.19)

The speeds of both the cars in the three legs of the journey are equal. Therefore the second car will reach point B as many minutes after the first car as it started after the first car.

For the first 50 km of the journey, the speed of the cars is 100 kmph. Therefore, the first car reaches a distance of 20 km from point A after $\frac{20}{100} = 0.2$ hours $= 0.2 \times 60 = 12$ minutes.

When the first car reaches point B, the second car is 12 minutes away from point B. The speed of the car in the last 50 km distance is 25 kmph. Therefore the distance of the second car from point B $= 25 \times \frac{12}{60} = 5$ km.

Therefore the required answer is 5.

Q.20)

As the AM of $x$, $y$, and $z$ is 80, $x + y + z = 80 \times 3 = 240$ ............ (I)

As the AM of $x$, $y$, $z$, $u$, and $v$ is 75, $x + y + z + u + v = 75 \times 5 = 375$ ... (II)

Subtracting equation (I) from (II), we get

$u + v = 135$

$\therefore \frac{x + y}{2} + \frac{y + z}{2} = 135$

$\therefore x + 2y + z = 270$ ................. (III)

Solving equations (I) and (III), we get $y = 30$.

Therefore $x + z = 210$.

Now, since $x \geq z$, the minimum value of $x = 105$.

Therefore the required answer is 105.
Q.21)
The set \((P \Delta Q) = \{1, 4, 5, 6\}\).
The set \((R \Delta S) = \{1, 2, 3, 4, 7, 8, 10\}\)
Therefore the set \((P \Delta Q) \Delta (R \Delta S) = \{2, 3, 5, 6, 7, 8, 10\}\). Thus there are 7 elements in the set.
Hence [4]

Q.22)
Suppose the inlet pipes of type A fill in water at the rate ‘a’ units per minute and the inlet pipes of type B fill in water at the rate ‘b’ units per minute.
Therefore we have the following
\[
30(10a + 45b) = 60(8a + 18b)
\]
\[
\therefore 300a + 1350b = 480a + 1080b
\]
\[
\therefore 180a = 270b
\]
\[
\therefore a = 1.5b
\]
Total capacity of the tank = \(300a + 1350b = 300(1.5b) + 1350b = 1800b\)
If 7 inlet pipes of type A and 27 inlet pipes of type B are opened, the volume of water filled in every minute = \(7a + 27b = 7(1.5b) + 27b = 37.5b\)
Therefore the number of minutes taken to fill the tank = \(\frac{1800}{37.5} = 48\)
Therefore the required answer is 48.

Q.23)
We have, \(4^n > 17^{19}\)
Taking logs on both sides to the base 4, \(n \log_4 4 > 19 \log_4 17\)
Now, \(17 > 4^2\). Therefore, \(\log_4 17 > 2\). Also, \(\log_4 4 = 1\)
Therefore, \(n > 38\).
Hence [3]
Q. 24)

The area of the semicircle = \(72\pi\) sq. cm. If \(r\) is the radius of the semi-circular portion removed, we get

\[ \pi \times \frac{r^2}{2} = 72\pi. \]

Therefore \(r = 12\) cm. Therefore the diameter of the semi-circle = \(AB = 24\) cm.

Area of rectangle \(ABCD = 768\) sq. cm. Therefore the length of side \(AC = \frac{768}{24} = 32\) cm.

![Diagram of rectangle and semicircle]

The perimeter of the leftover portion = Perimeter of the semicircle + \(l(AD) + l(DC) + l(CB)\)

\[ = 12\pi + 32 + 24 + 32 = 88 + 12\pi \]

Hence [1]

Q. 25)

If both cars travel towards east, they meet in 7 hours. Therefore the faster car starting from A covers the distance of separation of 350 km in 7 hours. Therefore, \(a - b = \frac{350}{7} = 50\)

Therefore the required answer is 50.
Q.26)

The area of the triangle is 32 sq units. Therefore \( \frac{1}{2} \times BC \times \text{Height of the triangle} = 32 \). Therefore Height of the triangle = \( \frac{2 \times 32}{8} = 8 \) cm.

Side BC lies on the line \( x = 4 \) or it is parallel to y-axis. Therefore the height of the triangle will be parallel to x axis. In order to minimize the distance of point A from the origin, point B should be \( (4,4) \) and point C should be \( (4,-4) \), as shown.

Therefore point A is \( (-4,0) \) and the distance of point A from the origin = 4 units. 
Hence [2]
Q.27)

The number of matches played in a group of ‘n’ people $= \frac{n(n-1)}{2}$

The number of girl vs girl matches in junior level = 153. Therefore, $\frac{n(n-1)}{2} = 153$ or $n = 18$. Therefore there are 18 girls at junior level.

The number of boy vs boy matches in senior level = 276. Therefore, $\frac{n(n-1)}{2} = 276$ or $n = 24$. Therefore there are 24 boys at senior level.

Therefore, we have

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>Boys</th>
<th>Girls</th>
</tr>
</thead>
<tbody>
<tr>
<td>Junior</td>
<td>43</td>
<td>25</td>
<td>18</td>
</tr>
<tr>
<td>Senior</td>
<td>51</td>
<td>24</td>
<td>27</td>
</tr>
</tbody>
</table>

Therefore, the number of boys vs girls matches $= 25 \times 18 + 24 \times 27 = 1098$

Therefore the required answer is 1098.

Q.28)

Originally, the volume of alcohol = 4 times the volume of water. Therefore, original percentage of alcohol = 80% and original volume of water = 20%.

When 10% of the mixture is removed and replaced with water, the percentage of alcohol remained in the mixture $= 80\% \times \left(\frac{9}{10}\right)^2 = 64.8\%$.

Therefore the percentage of water in the mixture $= (100 - 64.8)\% = 35.2\%$.

Hence [3]
Q.29)

We have the following:

![Diagram of cars moving on a line]

The cars 3 and 1 meet at point Q. Therefore, the car 3 covers 100 km in the time the car 1 covers 200 km. Therefore the ratio of the speeds of cars 3 and 1 is 1:2.

The cars 2 and 3 meet at point P. Therefore, the car 2 covers 100 km in the time the car 3 covers 200 km. Therefore the ratio of the speeds of cars 3 and car 2 is 2:1.

Combining the two statements, the ratio of the speeds of cars 2 and 1 is 1:4.

Hence [3]

Q.30)

The only difference in the two situations is that in the second situation, Gopal lent Rs. Y more to Ishan than in the first situation. Therefore the additional interest retained by Gopal = 0.1Y.

Therefore 0.1Y = 150 or Y = 1500.

Now, Ankit lent Gopal Rs. X at 8% interest. Therefore the interest retained by Ankit = Rs. 0.08X.

Gopal lent Ishan Rs. (X + 1500) at 10% interest.

Therefore the interest retained by Gopal = 0.1X + 150 - 0.08X = 0.02X + 150

Therefore, 0.08X = 0.02X + 1500 or X = 2500.

Therefore the value of X + Y = 4000.

Therefore the required answer is 4000.

Q.31)

Suppose l = length of the rectangle and b = breadth of the rectangle.

Therefore, the area of the rectangle = lb and the perimeter of the rectangle = 2(l + b)

Therefore, \( \frac{lb}{(l+b)^2} = \frac{1}{25} \) i.e. \( \frac{lb}{(l+b)^2} = \frac{4}{25} \)

Substituting the options, we can see that only option [3] i.e. 1:4 matches.

Hence [3]
Q.32) Since points P and Q lie on the circumference of the circle drawn with BC as diameter, angles BPC and BQC are right angled triangles.

Now, area of triangle $ABC = \frac{1}{2} \times AB \times PC = \frac{1}{2} \times AC \times BQ$

Therefore, $BQ = \frac{AB \times PC}{AC} = \frac{30 \times 20}{25} = 24$

Therefore the required answer is 24.

Q.33)

For $n = 2$, $t_1 + t_2 = 39$
For $n = 3$, $t_1 + t_2 + t_3 = 58$
For $n = 4$, $t_1 + t_2 + t_3 + t_4 = 81$
For $n = 5$, $t_1 + t_2 + t_3 + t_4 + t_5 = 108$
For $n = 6$, $t_1 + t_2 + t_3 + t_4 + t_5 + t_6 = 139$

Therefore, $t_3 = 19, t_4 = 23, t_5 = 27, t_6 = 31$ and so on. Thus $t_k = 7 + 4k$

If $t_k = 103$, $7 + 4k = 103$ or $k = 24$.
Therefore the required answer is 24.
Q.34)

Suppose the concentrations of the solutions A, B and C are ‘a’, ‘b’ and ‘c’ respectively. If the three solutions are mixed in the ratio 1:2:3, the resultant solution has 20% concentration.
Therefore, we have
\[
\frac{a+2b+3c}{1+2+3} = 20 \text{ or } a + 2b + 3c = 120 \ldots (I)
\]
If the three solutions are mixed in the ratio 3:2:1, the resultant solution has 30% concentration.
Therefore, we have
\[
\frac{3a + 2b + c}{3+2+1} = 30 \text{ or } 3a + 2b + c = 180 \ldots (II)
\]
Multiplying equation (I) by 3, we get
\[
3a + 6b + 9c = 360 \ldots (III)
\]
From equations (II) and (III),
\[
4b + 8c = 180 \text{ or } b + 2c = 45 \ldots (IV)
\]
The only solution for a, b and c that satisfies the given condition of the two solutions and equation (IV) is a = 45, b = 15 and c = 15.
Since b = c = 15, no matter what ratios they are mixed in, the resultant solution will have concentration 15%.
Therefore the ratio of D’s concentration to A’s concentration = \[
\frac{15}{45} = \frac{1}{3}
\]
Hence [1]