

Answer Key Actual CAT Slot - II

Q. No	Key	Q. No	Key	Q. No	Key
1.	C	25.	4	47.	C
2.	A	26.	B	48.	D
3.	D	27.	A	49.	B
4.	B	28.	2	50.	B
5.	A	29.	26	51.	11
6.	B	30.	A	52.	B
7.	A	31.	D	53.	139
8.	4	32.	5100	54.	C
9.	B	33.	3500	55.	C
10.	D	34.	150	56.	A
11.	A	35.	A	57.	340
12.	D	36.	4	58.	2160
13.	C	37.	D	59.	B
14.	D	38.	A	60.	C
15.	A	39.	B	61.	B
16.	C	40.	A	62.	D
17.	A	41.	B	63.	B
18.	A	42.	A	64.	7
19.	D	43.	4	65.	2
20.	C	44.	5	66.	14
21.	B	45.	6	67.	7
22.	2	46.	C	68.	A
23.	A				
24.	A				

Explanation Actual CAT Slot - II

Q. No	Explanation
1.	<p>The text's primary focus is physicists collaborating with experts from other fields to answer questions about our world. Their approaches might have some differences they nevertheless have resulted in benefits (means important findings, which is their objective).</p> <p>Option C includes this core.</p> <p>Option A says they have "buried their differences in research methods applied in other fields", which has not been mentioned. In spite of their differences, they have been somewhat successful.</p> <p>Option B There is no mention of large data sets and mathematical models in physics combined with research methods of other fields.</p> <p>Option D There's no desire to diversify their research. There have been differences in approaches and that have stayed yet some benefits have been seen.</p>
2.	<p>The sentence, "[T]he Europeans did not invent globalisation" hints that if they didn't invent it then it was already there. We need a context that what was there before the Europeans made the big leap. It was the trade that was going on between China and peoples of Southeast Asia.</p> <p>In the first blank, there's no gap. People of Southeast Asia supplied goods to the Chinese and the same thing is mentioned after the blank...these exchanges.</p> <p>Before the second blank, it has been mentioned that the exchanges of the year 1000 opened some of the routes...and after the blank a contrast pair is made with the use of 'Yet' that means something different from what has been said or opposite to what has been said. So, the second blank is not suitable for that sentence.</p> <p>After the third blank, it is given, "they changed and augmented what was already there since 1000". It goes perfectly well with "The Europeans did not invent it but they just changed and made it greater.</p> <p>There's no gap even in the fourth option as the words, "If the globalisation hadn't yet begun..." must have a fixed time before it, which is there in the previous sentence.</p>
3.	<p>The para talks about how states conduct warfare using the DIME model (Diplomacy, information, military, and economics). The states try or do everything before deploying the military. Then the focus shifts to information, how the states monitor telecom data and communications and also use cyber troops on social media to influence public opinion.</p> <p>Option D includes the main focus.</p> <p>Option A is incorrect as it says governments primarily use the DIME model to deploy cyber troops, which is not true. The DIME model includes diplomacy, information, military and economics. Using cyber troops is just further part of the information tool and not all of them.</p> <p>Option B is incorrect as it is also confusing the trajectory of thought in the text and mismatching different parts. Further, the focus is lost amid other details.</p> <p>Option C is incorrect as using the DIME Model and military simultaneously has not been talked about. Military is a part of the DIME model.</p>
4.	<p>We have to select an option that states what would happen if a trader brought white peppercorns from India to medieval Europe. During those time, Europeans thought pepper in India grew on trees guarded by serpents, "The only way to harvest pepper was to burn the trees, which would drive the snakes underground. Of course, this bit of lore would explain the shriveled black peppercorns, but not white, pink or other colors." So, they would doubt the story of pepper harvesting.</p> <p>Option A, C and D are beyond the scope of the given text.</p>
5.	<p>The third paragraph states why the spices were highly prized in Europe, "Medieval purchasers consumed meat much fresher than what the average city-dweller in the developed world of today has at hand. However, refrigeration was not available, and some hot spices have been shown to serve as an anti-bacterial agent. Salting, smoking or drying meat were other means of preservation. Most spices used in cooking began as medical ingredients, and throughout the Middle Ages spices were used as both medicines and condiments. Above all, medieval recipes involve the combination of medical and culinary lore in order to balance food's humeral properties and prevent disease." Spices acted both as medicines as well as condiments. From here it can be inferred that Option B, C and D contributed to a decline in the allure of spices but their increased availability has not much to do with it.</p>
6.	<p>The people who had heard the story of pepper trees being guarded by snakes evokes a sense of fear and its resultant limited supply.</p> <p>Option A, C and D logically follow from these reasons.</p> <p>However, Option B is least likely to be arrived at.</p>

7.	<p>The conclusion, “India was colonised for its spices and gold” is not directly supported by the passage. The East has been mentioned but direct reference to India being colonised for this is not there.</p> <p>Option B can be concluded from the last paragraph. Refer to the line, “Spices never had the enduring allure or power of gold and silver or the commercial potential of new products such as tobacco, indigo or sugar.”</p> <p>For Option C and D, refer to the line, “Still, demand was great enough to inspire the voyages of Christopher Columbus and Vasco Da Gama, launching the first fateful wave of European colonialism.”</p>
8.	<p>The correct order here is 1532 and option 4 is the odd-one out. This order flows from a general statement about the UK’s leadership, to the benefits of cultivated meat, to the current status of the technology, and finally, the need for continued investment.</p> <p>Sentence 1 sets the stage by introducing the UK’s leadership in the development of cultivated meat and highlights an important milestone, the approval of cultivated pet food.</p> <p>Sentence 5 follows logically, explaining the potential benefits of cultivated meat, particularly in terms of reducing the negative impacts of traditional animal agriculture, which is a key motivator for developing this technology.</p> <p>Sentence 3 provides a specific update on the status of cultivated meat applications, mentioning that the first UK applications for human consumption are under review by the Food Standards Agency.</p> <p>Sentence 2 concludes the paragraph by suggesting that government investment in research and infrastructure is essential for realizing the full benefits of cultivated meat.</p>
9.	<p>The sentence to be fitted in is, “Yet each day the flock produced eggs with calcareous shells though they apparently had not ingested any calcium from land which was entirely lacking in limestone.” The sentence starts with ‘Yet’. It means something totally different or opposite should come before it as it makes for a contrast pair. In blank 1, the previous sentence just talks about Louis Kervran’s childhood and him noticing a strange fact in his father’s poultry yard.</p> <p>In blank 2, the sentence that comes before it and after it both talk about mica. There seems to be no gap.</p> <p>In blank 3, the sentence that comes before it states the hens consumed mica and not calcium and the sentence starting with ‘Yet’ makes for a contrast pair. The observation, “why the chickens selected the mica, or why each time a bird was killed for the family cooking pot no trace of the mica could be found in its gizzard”, makes for an interesting contrast as chickens had mica but what they delivered was calcium. The sentence that follows offers an explanation for it. So, nothing is required in Blank 4.</p>
10.	<p>We have to pick the option that is not a reason why academics choose to review other scholars work. Option A, B and C can be traced to these lines, “Some do it as a way to keep abreast with developments in their field; some simply see it as a duty to the discipline” and “In recent years, some scientists have begun posting their reviews online, mainly to claim credit for their work.”</p> <p>Option D is neither directly stated nor it can be derived as a reason for...</p>
11.	<p>Option A can be inferred throughout the passage from the author’s line of thought and especially from the last line, “But the norm should shift from opacity in all cases to opacity only when necessary.”</p> <p>Option B, C and D can’t be inferred – peer review data has been mentioned but in a different context; option C and D are clearly beyond what has been stated.</p>
12.	<p>Here, we have to pick an option that is not the reason for making peer review data public. Option A, B and C are mentioned in the passage. Refer to lines, “Sharing peer review data could help journals stamp out fraud, inefficiency, and systemic bias in academic publishing.....”; “Peer review data could also help root out bias. Last year, a study based on peer review data for nearly 24,000 submissions to the biomedical journal eLife found that women and non- Westerners were vastly underrepresented among peer reviewers”; and “Openly publishing peer review data could perhaps also help journals address another problem in academic publishing: fraudulent peer reviews.”</p> <p>However, Option D does not favour making peer review data public as it talks about the problem of selecting appropriately qualified peer reviewers.</p>
13.	<p>Here, we need to pick an option that does not carry the reason why some are supposed to making peer reviews public. Option A, B and D can be found in the passage as reasons. Refer to lines, “Opponents of open peer review commonly argue that confidentiality is vital to the integrity of the review process; referees may be less critical of manuscripts if their reports are published, especially if they are revealing their identities by signing them. Some also hold concerns that open reviewing may deter referees from agreeing to judge manuscripts in the first place, or that they’ll take longer to do so out of fear of scrutiny....”</p>
14.	<p>It’s not given anywhere or hinted at that technological advances in the past have always had innocuous or beneficial outcomes. They may have it sometimes. Refer to lines in the first para, “Sometimes those consequences are innocuous ones, or even beneficial.”</p> <p>For Option A, refer to lines, “as it becomes increasingly possible for individuals or small groups to create new scientific advances through chemistry or biotechnology or materials science setting off unintended consequences that reverberate on a global scale”.</p>

	For Option B and C, refer to lines, “Ethyl (leaded fuel) and Freon belonged to the same general class of secondary effect: innovations whose unintended consequences stem from some kind of waste by-product that they emit. But the potential health threats of Ethyl (unleaded fuel) were visible in the 1920s, unlike, say, the long-term effects of atmospheric carbon build up in the early days of the Industrial Revolution...” So, the author supports Option A, B and D.
15.	The first paragraph focuses on what economists sometimes call ‘externalities’ or the unintended consequences and secondary effects. The para also carries an example to support it. The printing press leads to a chain of effects. Option B is incorrect as it’s not about judging an invention or about holistic impacts. Option C is incorrect as there’s is no mention that the secondary effects of most major technological advances have been beneficial. The author has used the word ‘sometimes’. Option D is incorrect as the word ‘entire’ here makes it a bit extreme and secondly, there’s no mention of evaluating it by the boost it gives to generating further technological advancements.
16.	By externalities, the author means unintended consequences or secondary effects. We need to pick an option that is not a secondary effect but it should be the primary invention. Here, the invention of Air Conditioners for a specific purpose is primary. Refer to the lines, “When Willis Carrier hit upon the idea of air-conditioning, the technology was primarily intended for industrial use: ensuring cool, dry air for factories that required low-humidity environments.” Option A, B and D are secondary effects. For option A, refer to the last paragraph. For option B, refer to lines, “Edison famously thought his phonograph, which he sometimes called "the talking machine," would primarily be used to take dictation....But then later innovators... discovered a much larger audience willing to pay for musical recordings made on descendants of Edison's original invention. In other cases, the original innovation comes into the world disguised as a plaything...” For option D, “In other cases, the original innovation comes into the world disguised as a plaything...the way the animatronic dolls of the mid-1700s inspired Jacquard to invent the first "programmable" loom...”
17.	These inventors had their own individual objectives. The hardly had any idea regarding the externalities. The secondary effects or unintended consequences might have taken place after a big span of time like the Industrial Revolution and its effects on the environment. Consider the words, “Oftentimes the secondary effects seem to belong to an entirely different sphere of society”; “Sometimes the unintended consequence comes about when consumers use an invention in a surprising way. Edison famously thought his phonograph, which he sometimes called "the talking machine," would primarily be used to take dictation....But then later innovators... discovered a much larger audience willing to pay for musical recordings made on descendants of Edison's original invention.” Option B is incorrect as the unintended consequences were largely beneficial is not supported by the passage. Option C is incorrect as “inventions being used for entirely different purposes” is not right in all the cases that have been mentioned. Option D is incorrect as the author is not trying to prove that past inventions mostly resulted in creation of new inventions.
18.	Option A is supported by the lines, “...Penteriani's team believes 50% could have been avoided if humans reacted differently. A 2017 study co-authored by Penteriani found that engaging in risky behaviour around large carnivores increases the likelihood of an attack.” Two of the most common risky behaviours are parents leaving their children to play outside unattended and walking an unleashed dog, according to the study. Wilkinson says 66% of coyote attacks involve a dog. “[People] end up in a situation where their dog is being chased, or their dog chases a coyote, or maybe they're walking their dog near a den that's marked, and the coyote wants to escort them away,” says Wilkinson. Option B is incorrect as attempting to photograph wild animals from within secured areas would not exacerbate the attacks. Option C is incorrect as addressing the impact of climate change would also not increase the attacks as climate change is also cited to be one of the reasons behind the increasing number of attacks. Option D is incorrect as implementing food waste management strategies would likely decrease the attacks.
19.	Option D is inconsistent with the passage, which mentions that climate change plays a part in escalating human-carnivore conflicts, although the exact correlation is still being studied. It highlights that scarcity of resources due to climate change leads to more frequent encounters between humans and carnivores, which could increase conflict. Therefore, stating that climate change has negligible effects directly contradicts this information. Option A: “Predatory attacks by carnivores are a common occurrence and have steadily increased over the past few decades.” This statement is incorrect because the passage states that predatory attacks are rare, accounting for only 17% of attacks in North America since 1955. Therefore, it would be inconsistent with the passage to say they are common or steadily increasing.



	<p>Option B: "Human efforts to avoid risky behaviours around large carnivores have proven effective in reducing conflict incidents."</p> <p>This statement is consistent with the passage, which refers to a 2017 study by Penteriani that found 50% of carnivore-human conflicts could have been avoided if humans had reacted differently, especially by avoiding risky behaviors like leaving children unattended or walking an unleashed dog.</p> <p>Option C: "Carnivores lose their instinctive fear of humans when consistently exposed to human food sources."</p> <p>This statement is consistent with the passage, which describes how carnivores that come to associate humans with food (e.g., from campsites or rubbish bins) lose their instinctive fear of humans, leading to dangerous situations where the animals are often put down.</p>																									
20.	<p>For option C, "The diversity and interspersion of working landscapes with carnivore habitats in rural areas increase the statistical probability of encounters between humans and carnivores", refer to the lines in the last paragraph, "There are a lot of working landscapes in the Global South that are really heterogeneous, that are interspersed with carnivore habitats, forests and savannahs, which creates a lot more opportunity for these encounters, just statistically."</p> <p>Option A goes against the passage as low-income countries are more prone to human-carnivore conflict.</p> <p>Option B is incorrect as it's not homogenous but it's heterogeneous landscapes that are more likely to experience such conflicts.</p> <p>Option D is incorrect as it also goes against what is mentioned in the passage.</p>																									
21.	<p>For option B "The reduction in carnivores' instinctive fear response, resulting from their reliance upon human-provided food", refer to lines, "Carnivores that recognise humans as a means to get food, are a different story. As they become more reliant on human food they might find at campsites or in rubbish bins, they become less avoidant of humans."</p> <p>Option A, C and D state reasons that could lead to more conflicts between animals and humans rather than lead to 'habituation' (becoming used to something), which is asked in the question.</p>																									
22.	<p>The theme of the paragraph is gender and whether it is a social or a biological construct.</p> <p>Sentence 1 introduces the idea that gender is neither purely biological nor purely social, setting up the context for the discussion.</p> <p>Sentence 3 acknowledges people's discomfort with the idea that gender may not be purely social.</p> <p>Sentence 4 adds that researchers studying the biological aspects of gender face political opposition, connecting to the earlier sentence on discomfort.</p> <p>Sentence 5 elaborates on the political preference for viewing gender as a social construct, explaining why such pushback occurs.</p> <p>"We should be complacent in the face of sexism" is taking the line of thought in a different direction.</p> <p>So, the correct order is 1345 and sentence 2 is the odd-one out.</p>																									
23.	<p>The sentence, "Science has officially crowned us superior to our early-rising brethren" hints at there's something to be happy about. It also suggests that the early-rising brethren were considered superior earlier.</p> <p>The sentence before the first blank is just an introduction and doesn't call for the announcement. However, after the blank, a context has been made and it's taken to the peak with the words "we are having the last laugh". Now is the time to announce why, which is answered in the sentence to be filled in. The sentences before and after blank three talk about a study and there's no gap here. The sentences after that are further elaborating the study and why it's reliable.</p>																									
24.	<p>The paragraph talks about how freedom is essential for comedians and when they are denied it, their creativity is stifled.</p> <p>Option A carries the crux of the paragraph.</p> <p>Option B is incorrect as it is shifting the focus of the paragraph, "They must go where no one has gone before."</p> <p>Option C is incorrect as it doesn't talk about freedom that is essential for comedians to move on.</p> <p>Option D is incorrect as this option too is missing the theme that is freedom is essential for the comedians to survive.</p>																									
25 - 29.	<p>Let each of the ten slots is represented by the letters A to J as shown below-</p> <table border="1" style="margin-left: 40px;"> <thead> <tr> <th></th> <th>Column 1</th> <th>Column 2</th> <th>Column 3</th> <th>Column 4</th> </tr> </thead> <tbody> <tr> <td>Row 1</td> <td>A</td> <td>B</td> <td>C</td> <td>D</td> </tr> <tr> <td>Row 2</td> <td></td> <td>E</td> <td>F</td> <td>G</td> </tr> <tr> <td>Row 3</td> <td></td> <td></td> <td>H</td> <td>I</td> </tr> <tr> <td>Row 4</td> <td></td> <td></td> <td></td> <td>J</td> </tr> </tbody> </table> <p>Now considering point 1 and 2, A, E, H, J < B, F, I < C, G < D So, definitely the value of D = 10</p>		Column 1	Column 2	Column 3	Column 4	Row 1	A	B	C	D	Row 2		E	F	G	Row 3			H	I	Row 4				J
	Column 1	Column 2	Column 3	Column 4																						
Row 1	A	B	C	D																						
Row 2		E	F	G																						
Row 3			H	I																						
Row 4				J																						

The value of C or G = 8 or 9
 The value of B, F or I = 5, 6 or 7
 The value of A, E, H or J = 1, 2, 3 or 4
 From point 3, 1 is placed either in the same row or in the same column as 10
 So, either A = 1 or J = 1
 From point 4, neither 2 nor 3 is placed in the same row or in the same column as 10.
 So, A, B, C, G, I and J cannot have value 2 or 3.
 So, E, F or H can have value 2 or 3, but F cannot have value 2 or 3.
 So, either E or H = 2 or 3. So, A or J have value 1 or 4.
 Also, from point 6, 4 and 6 are placed in the same row.
 So, J cannot have value 4 as that is the only slot in Row 4.
 So, A = 4 and J = 1
 So, the value of B = 6 (only possibility) as C cannot have value 6
 Now, from point 5, neither 7 nor 8 is placed in the same row or in the same column as 9.
 So, if G = 9, either F or I has to be 7 which is placed in the same row or column of G, not possible. So, C is definitely 9 and G is 8 and I is 7 and F is 5
 Regarding E and H, we have following two possibilities-

Case I: If E = 2 and H = 3

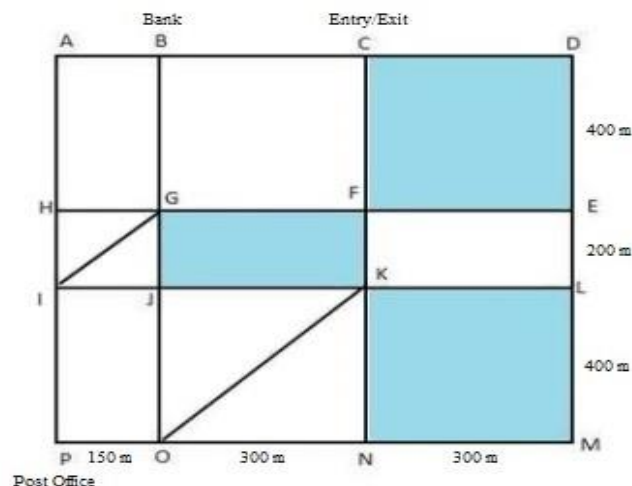
	Column 1	Column 2	Column 3	Column 4
Row 1	4	6	9	10
Row 2		2	5	8
Row 3			3	7
Row 4				1

Case II: If E = 3 and H = 2

	Column 1	Column 2	Column 3	Column 4
Row 1	4	6	9	10
Row 2		3	5	8
Row 3			2	7
Row 4				1

25. The row number which has the least sum of numbers is placed in row 4
26. Statement I. 10 is placed in a slot in Row 1, true
 Statement II. 1 is placed in a slot in Row 4, true
 Hence, both statement I and II are true
27. Statement I. 2 is placed in a slot in Column 2, may be or may not be true
 Statement II. 3 is placed in a slot in Column 3, may be or may not be true
 Hence, neither statement I nor II is true
28. For 2 slots (Row 2, Column 2 and Row 3, Column 3) in the grid where the placement of numbers cannot be determined with certainty
29. The sum of the numbers placed in Column 4 = $10 + 8 + 7 + 1 = 26$

30-33.



In right angled triangle KNO, $KN^2 + ON^2 = KO^2$



	<p>KN = ML = 400 m and ON = 300 m So, $KO^2 = 400^2 + 300^2 = 250000$ $\Rightarrow KO = 500$ m Similarly, in right angled triangle GJI, $IG^2 = GJ^2 + IJ^2 = 200^2 + 150^2 = 62500$ $\Rightarrow IG = 250$ m</p>												
30.	<p>The shortest path required would be L – K – O – P – I – G – B – C – F – E – L The minimum distance walked = LK + KO + OP + PI + IG + GB + BC + CF + FE + EL $= 300 + 500 + 150 + 400 + 250 + 400 + 300 + 400 + 300 + 200 = 3200$ m</p>												
31.	<p>The possible path would be C – D – E – F – K – L – M – N – K – J – G – F – C The distance walked = $300 + 400 + 300 + 200 + 300 + 400 + 300 + 400 + 300 + 200 + 300 + 400$ $= 3800$ m</p>												
32.	<p>The possible path would be A – B – G – F – C – D – E – L – M – N – K – J – O – P – I – H – A The maximum distance walked = $150 + 400 + 300 + 400 + 300 + 400 + 200 + 400 + 300 + 400 + 300 + 400 + 150 + 400 + 200 + 400 = 5100$</p>												
33.	<p>The possible path would be C – D – E – F – K – N – O – P – I – J – G – B – C The maximum distance walked = $300 + 400 + 300 + 200 + 400 + 300 + 150 + 400 + 150 + 200 + 400 + 300 = 3500$ m</p>												
34.	<p>From the Bar Chart, the total sum of ratings given on Day 2 by all the buyers $= 5 \times 1 + 10 \times 2 + 5 \times 3 + 20 \times 4 + 10 \times 5 = 170$ Total number of ratings given by buyers on Day 2 = $5 + 10 + 5 + 20 + 10 = 50$ So, the average rating on Day 2 = $\frac{170}{50} = 3.4$ Let the number of ratings given by buyers on Day 1 = x Sum of ratings on Day 1 = $3x$ Also given, $\frac{(3x + 170)}{(x + 50)} = 3.1$ Solving, $3x + 170 = 3.1x + 155$ $\Rightarrow x = 150$ The number of buyers gave ratings on Day 1 = 150</p>												
35.	<p>On Day 3, The total number of buyers gave ratings = 100 Let the number of buyers gave product ratings of 1 = $10y$ = ratings of 2 So, the number of buyers gave product ratings of 3 = $20y$ Also, the modes of the product ratings were 4 and 5 Let the number of buyers gave product ratings of 4 = $10z$ = ratings of 5 Solving, $10y + 10y + 20y + 10z + 10z = 100$ $\Rightarrow 4y + 2z = 10$ $\Rightarrow 2y + z = 5$ Now, $10z$ to be mode, $z = 3$ and $y = 1$ (only possibility)</p> <table border="1"> <thead> <tr> <th>Rating</th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> </tr> </thead> <tbody> <tr> <th>Buyers</th> <td>10</td> <td>10</td> <td>20</td> <td>30</td> <td>30</td> </tr> </tbody> </table> <p>Total sum ratings on Day 3 = $10 \times 1 + 10 \times 2 + 20 \times 3 + 30 \times 4 + 30 \times 5 = 360$ The daily average rating on Day 3 = $\frac{360}{100} = 3.6$</p>	Rating	1	2	3	4	5	Buyers	10	10	20	30	30
Rating	1	2	3	4	5								
Buyers	10	10	20	30	30								
36.	<p>On Day 3, The total number of buyers gave ratings = 100 Let the number of buyers gave product ratings of 1 = $10y$ = ratings of 2 So, the number of buyers gave product ratings of 3 = $20y$ Also, the modes of the product ratings were 4 and 5 Let the number of buyers gave product ratings of 4 = $10z$ = ratings of 5 Solving, $10y + 10y + 20y + 10z + 10z = 100$ $\Rightarrow 4y + 2z = 10$ $\Rightarrow 2y + z = 5$ Now, $10z$ to be mode, $z = 3$ and $y = 1$ (only possibility)</p> <table border="1"> <thead> <tr> <th>Rating</th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> </tr> </thead> <tbody> <tr> <th>Buyers</th> <td>10</td> <td>10</td> <td>20</td> <td>30</td> <td>30</td> </tr> </tbody> </table> <p>The median of all the ratings given on Day 3 will be the average of 50th and 51st value which is same = 4</p>	Rating	1	2	3	4	5	Buyers	10	10	20	30	30
Rating	1	2	3	4	5								
Buyers	10	10	20	30	30								
37.	<p>From the Bar Chart, the total sum of ratings given on Day 2 by all the buyers $= 5 \times 1 + 10 \times 2 + 5 \times 3 + 20 \times 4 + 10 \times 5 = 170$</p>												

Total number of ratings given by buyers on Day 2 = $5 + 10 + 5 + 20 + 10 = 50$

So, the average rating on Day 2 = $\frac{170}{50} = 3.4$

Let the number of ratings given by buyers on Day 1 = x

Sum of ratings on Day 1 = $3x$

Also given, $\frac{(3x + 170)}{(x + 50)} = 3.1$

Solving, $3x + 170 = 3.1x + 155$

$\Rightarrow x = 150$

On Day 3,

The total number of buyers gave ratings = 100

Let the number of buyers gave product ratings of 1 = $10y$ = ratings of 2

So, the number of buyers gave product ratings of 3 = $20y$

Also, the modes of the product ratings were 4 and 5

Let the number of buyers gave product ratings of 4 = $10z$ = ratings of 5

Solving, $10y + 10y + 20y + 10z + 10z = 100$

$\Rightarrow 4y + 2z = 10 \Rightarrow 2y + z = 5$

Now, 10z to be mode, $z = 3$ and $y = 1$ (only possibility)

Rating	1	2	3	4	5
Buyers	10	10	20	30	30

Total sum ratings on Day 3 = $10 \times 1 + 10 \times 2 + 20 \times 3 + 30 \times 4 + 30 \times 5 = 360$

The cumulative average rating of Day 2 = 3.1 (given)

The cumulative average rating of Day 3 = $\frac{(450 + 170 + 360)}{(150 + 50 + 100)} = \frac{49}{15}$

Percentage change from Day 2 to Day 3 = $(\frac{49}{15} - 3.1)/3.1 \times 100 \approx 5.38\%$

Hence, the cumulative average of Day 3 increased by a percentage between 5% and 8% from Day 2.

38-41.

The corresponding values of PAT and ES can be directly noted

For PRD

In 2019, let the area corresponding to firm D = $P\%$, then the area corresponding to

$C = B = 9P\%$, $A = F = 4P\%$ and $E = 16P\%$

Similarly, in 2023, $D = C = F = A = 4P\%$ and $B = E = 9P\%$

The rest of the given information can be gathered as follows-

Year \rightarrow	2019			2023		
Firm \downarrow	PAT (Rs. Crores)	ES	PRD (%)	PAT (Rs. Crores)	ES	PRD (%)
A	3000	800	4P	3900	1300	4P
B	2800	1000	9P	3800	1000	9P
C	2400	600	9P	3000	800	4P
D	3900	600	P	2400	800	4P
E	2400	1200	16P	3500	1400	9P
F	2500	800	4P	3200	1000	4P

38.

Let A, B, C and E be the ARG of the respective firms from 2019 to 2023

For A, $3900 = 3000 \left(\frac{1+A}{100} \right)^4$

So, $\left(\frac{1+A}{100} \right)^4 = \frac{3900}{3000} = 1.3$

Considering, rest of the factors same and we need to compare and not required the actual value, we need not to solve further

For B, $\left(\frac{1+B}{100} \right)^4 = \frac{3800}{2800} \approx 1.36$

For C, $\left(\frac{1+C}{100} \right)^4 = \frac{3000}{2400} \approx 1.25$



	<p>For E, $\left(\frac{1+E}{100}\right)^4 = \frac{3500}{2400} \approx 1.46$</p> <p>Hence, firm E had the highest ARG</p>
39.	<p>The amount of money spent by firm C on R&D in 2019 = $\frac{9P}{100} \times 2400$</p> <p>The amount of money spent by firm C on R&D in 2023 = $\frac{4P}{100} \times 3000$</p> <p>Required ratio = $\frac{9P}{100} \times 2400 : \frac{4P}{100} \times 3000$</p> <p>= 9 : 5</p>
40.	<p>PAT per employee in 2023 among A, C, E and F,</p> <p>Firm A = $\frac{3900}{1300} = 3$</p> <p>Firm C = $\frac{3000}{800} = 3.75$</p> <p>Firm E = $\frac{3500}{1400} = 2.5$</p> <p>Firm F = $\frac{3200}{1000} = 3.2$</p> <p>Hence, firm C had the maximum PAT per employee in 2023 among the firms A, C, E and F</p>
41.	<p>PRD per employee in 2023 among the firms C, D, E and F</p> <p>Firm C = $(4P/100 \times 3000)/800 = 0.15P$</p> <p>Firm D = $(4P/100 \times 2400)/800 = 0.12P$</p> <p>Firm E = $(9P/100 \times 3500)/1400 = 0.225P$</p> <p>Firm F = $(4P/100 \times 3200)/1000 = 0.128P$</p> <p>Hence, firm D had the least PRD per employee in 2023 among the firms C, D, E and F</p>
42-46.	<p>Considering Yuki trained only even numbered players, so Yuki would not be training odd numbered player. Similarly, Zara trained only odd numbered players, so Zara would not be training even numbered players.</p> <p>From point 2, Player 1 and Player 4 were trained by same coach, this is not possible for Yuki and Zara, so both of them are trained by Xena</p> <p>From point 3, Player 5 and Player 7 were trained by same coach, which is possible either for Xena or Zara. But if Xena coaches player 5 and player 7, the only possible player left for Zara to coach would be player 3, but it is given that each coach trained at least two players. So, Zara coached player 5 and player 7.</p> <p>From point 2, Player 2, Player 3 and Player 5 trained by different coaches. So, player 3 wouldn't be coached by Zara as Zara coached player 5. So, player 3 must be coached by Xena and player 2 must be coached by Yuki.</p> <p>From point 3, Player 5 and Player 7 got the same rating = r (let) and rest all 6 players got unique ratings. Also, from point 4, the average ratings of all the players = 4</p> <p>So, the sum total of ratings of all the 8 players = $8 \times 4 = 32$</p> <p>Sum of 7 unique integer values from 1 to 7 = 28</p> <p>So, the value of same rating, $r = 32 - 28 = 4$</p> <p>From point 5, player 2 got the highest rating = 7</p> <p>From point 6, average of the ratings of the players trained by Zara = $\frac{(4+4)}{2} = 4$</p> <p>So, average of the ratings of the players trained by Yuki = $4 + 2 = 6$ and average of the ratings of the players trained by Xena = $\frac{6}{2} = 3$</p> <p>Let the sum total of the ratings of Xena = X and the number of players coached</p> <p>From point 7, player 4's rating = $2 \times$ player 8's rating and player 4's rating < player 5's rating = 4</p> <p>So, only possibility that player 4's rating = 2 and player's 8 rating = 1</p>

The information till here can be gathered as follows-

Player	Xena	Yuki	Zara	Rating
1	✓	×	×	
2	×	✓	×	7
3	✓	×	×	
4	✓	×	×	2
5	×	×	✓	4
6			×	
7	×	×	✓	4
8			×	1
Sum total of the ratings (S)			8	28
Number of players coached (n)			2	
Average of the Ratings (= S/n)	3	6	4	

Now, let the number of the players coached by Xena = m

So, the sum total of the ratings of the players coached by Xena = $3 \times m = 3m$

Also, the number of the players coached by Yuki = $8 - 2 - m = 6 - m$

So, the sum total of the ratings of the players coached by Yuki = $6 \times (6 - m) = 36 - 6m$

Also we know, $3m + 36 - 6m + 8 = 32$

Solving, $m = 4$

So, the number of the players coached by Yuki = $6 - m = 2$ and the sum total of the ratings of the players coached by Yuki = $36 - 6m = 12$

Now one among the 2 players coached by Yuki is player 2 who had a rating of 7, so the other player must have rating $12 - 7 = 5$. So, that player must be player 6 who had a rating of 5.

So, player 8 must be coached by Xena along with player 1, player 3 and player 4 and the rating of player 1 and player 3 would be either 3 or 6 in any order.

The rest of the information can be gathered as follows-

Player	Xena	Yuki	Zara	Rating
1	✓	×	×	3/6
2	×	✓	×	7
3	✓	×	×	6/3
4	✓	×	×	2
5	×	×	✓	4
6	×	✓	×	5
7	×	×	✓	4
8	✓	×	×	1
Sum total of the ratings (S)	12	12	8	32
Number of players coached (n)	4	2	2	
Average of the Ratings (= S/n)	3	6	4	

42. Zara coached exactly 2 players (Player 5 and Player 7)

43. The rating of player 7 = 4

44. The rating of player 6 = 5

45. For 6 players the ratings can be determined with certainty

46. The players trained by Xena are Player 1, Player 3, Player 4 and Player 8

47. In 2022,

Let the sum of employees (1-10) = a

Let the sum of employees (11-30) = b

Let the sum of employees (31-40) = c

Given $a + b = 30 \times 40000 = 12$ lakhs and $b + c = 30 \times 60000 = 18$ lakhs

Also given, $a + c = 20 \times 50000 = 10$ lakhs

Adding all 3 equations, $2(a + b + c) = 40$ lakhs

$\Rightarrow a + b + c = 20$ lakhs

Solving, $a = 2$ lakhs, $b = 10$ lakhs and $c = 8$ lakhs

Now, if average is increased by certain percentage, sum will also increased by the same percentage

In 2023,



	<p>Sum of employees (1-10) = 2 lakhs \times 2 = 4 lakhs and sum of employees (31-40) = 8 lakhs \times 3 = 24 lakhs Sum of employees (11-30) = 10 lakhs (remains unchanged) Total sum = 4 + 10 + 24 = 38 lakhs The new average of all employees in 2023 = 3800000/40 = 95000</p>
48.	<p>Remainder $\frac{[3^1]}{11} = 3$ Remainder $\frac{[3^2]}{11} = 9$ Remainder $\frac{[3^3]}{11} = 5$ Remainder $\frac{[3^4]}{11} = 4$ Remainder $\frac{[3^5]}{11} = 1$</p> <p>So, the remainder cycle $\frac{3^n}{11}$ is of 5 (3, 9, 5, 4, 1)</p> <p>Hence, remainder $\frac{[3^{333}]}{11} = \text{remainder } \frac{[3^3]}{11} = 5$</p>
49.	<p>Since m and n are natural numbers and $n > 1$ $m^n = 2^{25} \times 3^{40}$ $m^n = (2^5)^5 \times (3^8)^5$ $m^n = (32)^5 \times (6561)^5$ $m^n = (209952)^5$ So, $m = 209952$ and $n = 5$ $\Rightarrow m - n = 209947$</p>
50.	<p>Let the initial water = w and initial acid = a Given, a = 50% (a + w + 2) $\Rightarrow a = w + 2$ Also, a + 15 = 80% (a + 15 + w + 2) $\Rightarrow 5a + 75 = 8a + 60$ $\Rightarrow a = 5$ and $w = 3$ Hence, initially water : acid = 3 : 5</p>
51.	<p>$(x + 6\sqrt{2})^{\frac{1}{2}} - (x - 6\sqrt{2})^{\frac{1}{2}} = 2\sqrt{2}$ Squaring both sides, $(x + 6\sqrt{2}) + (x - 6\sqrt{2}) - 2(x + 6\sqrt{2})^{\frac{1}{2}}(x - 6\sqrt{2})^{\frac{1}{2}} = 8$ $2x - 2[x^2 - (6\sqrt{2})^2]^{\frac{1}{2}} = 8$ $x - 4 = [x^2 - 72]^{\frac{1}{2}}$ Again squaring both sides, $x^2 + 16 - 8x = x^2 - 72$ Solving, $x = 11$</p>
52.	<p>Amount received by Anil = $22000 \left(1 + \frac{(4/2)}{100}\right)^{6 \times 2} = 22000 (1.02)^{12}$ Let the amount invested by Sunil = P Amount received by Sunil = $P \left(1 + \frac{(4/2)}{100}\right)^{5 \times 2} \left(1 + \frac{10}{100}\right)^1 = P (1.02)^{10} (1.1)$ Given, $22000 (1.02)^{12} = P (1.02)^{10} (1.1)$ Solving, P = Rs 20808</p>
53.	<p>Given, A + V = W/150 and V + S = W/100 Let work, W = 300 units</p>

	<p>$A + V = 2$ units/day and $V + S = 3$ units/day Also, $75A + 135V + 45S = 300$ $\Rightarrow 75A + 75V + 15V + 45V + 45S = 300$ $\Rightarrow 75 \times 2 + 15V + 45 \times 3 = 300$ $\Rightarrow V = 1$ unit/day $\Rightarrow A = 1$ unit/day and $S = 2$ units/day Now A works every day, while V works on every 2nd day and S works on every 3rd day, that makes the cycle of 6 days Work done by A on 1st day = 1 unit Work done by A and V on 2nd day = 1 + 1 = 2 units Work done by A and S on 3rd day = 1 + 2 = 3 units Work done by A and V on 4th day = 1 + 1 = 2 units Work done by A on 5th day = 1 unit Work done by A, V and S on 6th day = 1 + 1 + 2 = 4 units Work completed in 6 days = 1 + 2 + 3 + 2 + 1 + 4 = 13 units After that the cycle will repeat Work done in $(6 \times 23 = 138)$ days = 299 Next day, work done by A = 1 unit Hence, total number of days = 139</p>
54.	<p>Let the usual time taken = t hours Given, distance, $d = 60 \times (t + 3.5)$ Next day, $2d/3$ of the distance covered in $t/3$ of the time Remaining distance, $d/3 = 40 \times 2t/3$ $\Rightarrow d = 80t$ $\Rightarrow 80t = 60t + 210$ $\Rightarrow t = 10.5$ hours The usual scheduled arrival time = 9 AM + 10.5 hrs = 7:30 PM</p>
55.	<p>$f(xy) = f(x)f(y) + f(x) + f(y)$ Given, $f(p) = 1$ where p is a prime number $\Rightarrow f(2) = 1$ and $f(5) = 1$ $\Rightarrow f(10) = f(2 \times 5) = f(2)f(5) + f(2) + f(5) = 1 \times 1 + 1 + 1 = 3$ $\Rightarrow f(100) = f(10 \times 10) = f(10)f(10) + f(10) + f(10) = 3 \times 3 + 3 + 3 = 15$ $\Rightarrow f(10000) = f(100 \times 100) = f(100)f(100) + f(100) + f(100) = 15 \times 15 + 15 + 15 = 255$ Now, $f(4) = f(2 \times 2) = f(2)f(2) + f(2) + f(2) = 1 \times 1 + 1 + 1 = 3$ $\Rightarrow f(16) = f(4 \times 4) = f(4)f(4) + f(4) + f(4) = 3 \times 3 + 3 + 3 = 15$ Now, $f(160000) = f(10000 \times 16) = f(10000)f(16) + f(10000) + f(16)$ $= 255 \times 15 + 255 + 15 = 4095$</p>
56.	$\frac{1}{5} \left(\frac{1}{5} - \frac{1}{7} \right) + \left(\frac{1}{5} \right)^2 \left[\left(\frac{1}{5} \right)^2 - \left(\frac{1}{7} \right)^2 \right] + \left(\frac{1}{5} \right)^3 \left[\left(\frac{1}{5} \right)^3 - \left(\frac{1}{7} \right)^3 \right] + \dots \infty$ $= \left(\frac{1}{5} \right)^2 - \left(\frac{1}{5} \right) \left(\frac{1}{7} \right) + \left(\frac{1}{5} \right)^4 - \left(\frac{1}{5} \right)^2 \left(\frac{1}{7} \right)^2 + \left(\frac{1}{5} \right)^6 - \left(\frac{1}{5} \right)^3 \left(\frac{1}{7} \right)^3 + \dots \infty$ $= \left(\frac{1}{5} \right)^2 + \left(\frac{1}{5} \right)^4 + \left(\frac{1}{5} \right)^6 + \dots \infty - \left[\left(\frac{1}{5} \right) \left(\frac{1}{7} \right) + \left(\frac{1}{5} \right)^2 \left(\frac{1}{7} \right)^2 + \left(\frac{1}{5} \right)^3 \left(\frac{1}{7} \right)^3 + \dots \infty \right] = \frac{\left(\frac{1}{5} \right)^2}{1 - \left(\frac{1}{5} \right)^2} - \frac{\left(\frac{1}{5} \right) \left(\frac{1}{7} \right)}{1 - \left(\frac{1}{5} \right) \left(\frac{1}{7} \right)}$ $= \frac{1}{24} - \frac{1}{34} = \frac{5}{408}$
57.	<p>At the beginning, let the total number of fruits = $5x$ \Rightarrow Mangoes at the beginning = 40% of $5x = 2x$ Let the Apples at the beginning = $5a \Rightarrow$ Bananas at the beginning = $3x - 5a$ At the end of the day, Mangoes sold = $\frac{2x}{2} = x$, Bananas sold = 96 and Apples sold = 40% of $5a = 2a$ Given, $x + 96 + 2a = 50\%$ of $5x$ $\Rightarrow 1.5x = 2a + 96$ $\Rightarrow 3x = 4a + 192$ The smallest possible value of $a = 3$ (at least 1 fruit of each type)</p>

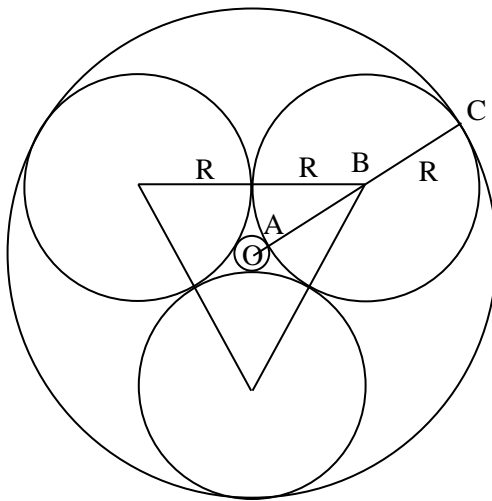


Solving, $x = 68$ (smallest)
Hence, the smallest possible total number of fruits at the beginning = $5x = 340$

58. Let the cost price of Bina = $100x$
Given, $100x - 19\%$ of $100x = \text{Rs } 4860$
 $\Rightarrow x = 60$
So, the cost price of Bina = $100x = \text{Rs } 6000$
Certain Price = $6000 + 17\%$ of $6000 = \text{Rs } 7020$
Profit of Shyam = $7020 - 4860 = \text{Rs } 2160$

59. The given shape can be drawn as follows. Due to symmetry, the center of both the circles X and Y coincides at O (let)

Let the radius of e circles of equal radii = R
Let the radius of smaller circle $Y = OA$
And radius of larger circle $X = OC = OA + AC = OA + 2R$
Also, joining the center of 3 circles having radius R forms an equilateral triangle with each side = $2R$



Now, OB is circum-radius of equilateral triangle thus formed

$$OB = OA + AB = OA + R = \frac{2}{\sqrt{3}} \times R$$

$$\Rightarrow OA = 2R/\sqrt{3} - R = (2 - \sqrt{3})R/\sqrt{3}$$

$$\text{Also, } OC = OA + 2R = (2 - \sqrt{3})R/\sqrt{3} + 2R = (2 + \sqrt{3})R/\sqrt{3}$$

$$\text{Required ratio} = OC : OA = (2 + \sqrt{3})R/\sqrt{3} : (2 - \sqrt{3})R/\sqrt{3}$$

$$= (2 + \sqrt{3})^2 : (2 - \sqrt{3})(2 + \sqrt{3}) = 7 + 4\sqrt{3} : 1$$

60. $|x| + x + y = 15$ and $x + |y| - y = 20$

Case I $x \geq 0$ and $y \geq 0$ $2x + y = 15$ and $x = 20$ $\Rightarrow y = -25$ (not possible)	Case III $x < 0$ and $y \geq 0$ $y = 15$ and $x = 20$ (not possible)
Case II $x \geq 0$ and $y < 0$ $2x + y = 15$ and $x - 2y = 20$ $4x + 2y = 30$ and $x - 2y = 20$ $\Rightarrow x = 10$ and $y = -5$ $\Rightarrow x - y = 10 - (-5) = 15$	Case IV $x < 0$ and $y < 0$ $y = 15$ and $x - 2y = 20$ $\Rightarrow x = 50$ and $y = 15$ (not possible)

Hence, $x - y = 15$

61. Given, $3x^2 + \lambda x - 1 = 0$
 $\alpha + \beta = -\lambda/3$ and $\alpha\beta = -1/3$
 $\frac{1}{\alpha^2} + \frac{1}{\beta^2} = 15$
 $\frac{\alpha^2 + \beta^2}{\alpha^2\beta^2} = 15$
 $\frac{(\alpha + \beta)^2 - 2\alpha\beta}{(\alpha\beta)^2} = 15$
 $\frac{(-\lambda/3)^2 - 2(-1/3)}{(-1/3)^2} = 15$

$$\begin{aligned} \Rightarrow \lambda^2 + 6 &= 15 \\ \Rightarrow \lambda &= \pm 3 \\ (\alpha^3 + \beta^3)^2 &= [(\alpha + \beta)^3 - 3\alpha\beta(\alpha + \beta)]^2 \\ &= [(-\lambda/3)^3 - 3(-1/3)(-\lambda/3)]^2 \\ &= (-\lambda^3/27 - \lambda/3)^2 \\ &= (\pm 2)^2 = 4 \end{aligned}$$

62.

$$\begin{aligned} \frac{1}{x+5} &\leq \frac{1}{2x-3} \\ \frac{1}{x+5} - \frac{1}{2x-3} &\leq 0 \\ \frac{2x-3-x-5}{(x+5)(2x-3)} &\leq 0 \\ \frac{x-8}{(x+5)(2x-3)} &\leq 0 \\ \frac{(x+5)(2x-3)(x-8)}{(x+5)^2(2x-3)^2} &\leq 0 \\ (x+5)(2x-3)(x-8) &\leq 0 \\ \text{such that } x &\neq -5 \text{ or } \frac{3}{2} \text{ as it makes denominator zero} \\ \text{Now using wavy curve method,} \\ x < -5 \text{ or } \frac{3}{2} < x &\leq 8 \end{aligned}$$

63.

Let the present age of Rajesh and Garima be R and G respectively
Also, let Rajesh's age was same as present age of Garima x years ago
 $\Rightarrow x = R - G \Rightarrow G = R - x$

$$\frac{R-x}{G-x} = \frac{3}{2}$$

$$\Rightarrow 2G = 3G - 3x$$

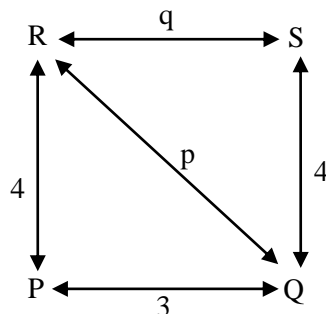
$$\Rightarrow G = 3x \text{ and } R = 4x$$

Now, Garima's age becomes present age of Rajesh

$$\text{Required ratio} = \frac{R+x}{G+x} = \frac{5x}{4x} = \frac{5}{4}$$

64.

Given, paths between P and Q = 3, Q and S = 4 and P and R = 4
Let the number of paths between Q and R = p and R and S = q



Given, paths between P to Q to S + paths between P to R to S + paths between P to Q to R to S = $3 \times 4 + 4 \times q + 3 \times p \times q = 62$
 $\Rightarrow 4q + 3pq = 50$
 $\Rightarrow q(4 + 3p) = 50$
Possible values, $q = 2$ and $p = 7$ or $q = 5$ and $p = 2$
Also, paths between Q to R + paths between Q to P to R + paths between Q to S to R = $p + 3 \times 4 + 4 \times q = 27$
 $\Rightarrow p + 4q = 15$
Now, $q = 2$ and $p = 7$ satisfies
Hence, the number of direct paths between Q and R = $p = 7$



65. The given vertices are (1, 2), (7, 2) and (1, 10)
 The distance between (1, 2) and (7, 2) = 6 units
 The distance between (1, 2) and (1, 10) = 8 units
 The distance between (7, 2) and (1, 10) = 10 units
 So, the sides of the given triangle satisfies the Pythagoras Theorem, therefore forms a right angled triangle
 Area of the right angled triangle = $\frac{1}{2} \times 6 \times 8 = 24$ units
 Also, the area of the triangle = $r \times s$
 where r is the in-radius and s is the semi-perimeter, $s = \frac{(6+8+10)}{2} = 12$
 Hence, $r \times 12 = 24 \Rightarrow r = 2$ units

66. $\frac{\log_8(a+b)}{\log_2 c} + \frac{\log_{27}(a-b)}{\log_3 c} = \frac{2}{3}$
 $\frac{1}{3} \frac{\log_2(a+b)}{\log_2 c} + \frac{1}{3} \frac{\log_3(a-b)}{\log_3 c} = \frac{2}{3}$
 $\frac{\log_2(a+b)}{\log_2 c} + \frac{\log_3(a-b)}{\log_3 c} = 2$
 $\log_c(a+b) + \log_c(a-b) = 2$
 $\Rightarrow a^2 - b^2 = c^2$
 $\Rightarrow a^2 = b^2 + c^2$
 To maximize the value of a, we need to maximize the value of b and c
 Also, $a > 10 \geq b \geq c$
 So, a^2 (maximum) = $10^2 + 10^2 = 200$
 Hence, the maximum integral value of a = 14

67. $4x^2 + 4y^2 - 4xy - 6y + 3 = 0$
 $4x^2 + y^2 + 3y^2 - 4xy - 6y + 3 = 0$
 $4x^2 + y^2 - 4xy + 3y^2 - 6y + 3 = 0$
 $(2x - y)^2 + 3(y - 1)^2 = 0$
 $\Rightarrow 2x - y = 0$ and $y - 1 = 0$
 $\Rightarrow y = 1$ and $x = \frac{1}{2}$
 $4x + 5y = 4 \times \frac{1}{2} + 5 \times 1 = 7$

68. Given perimeter of trapezium ABCD = 6
 $\Rightarrow AB + BC + CD + DA = 6$
 Let BC = y and DA = x
 $\Rightarrow 2 + y + 1 + x = 6$
 $\Rightarrow x + y = 3$
 Since, AB//CD and CD = 1/2 AB
 \Rightarrow D is mid-points of AE
 and C is mid-point of BE
 So, DE = x = AD
 And CE = y = BC
 Perimeter of AEB
 = AB + BE + AE
 = 2 + 2y + 2x
 = 2 + 2(x + y)
 = 8 units

