Term 4 Week 4
Thinking Skills Advanced
Critical Thinking
Detect Reasoning Errors: Analysing Arguments

Question Number	Answer	Solution
1	A	The mistake Emma has made in her argument is to be identified based on the school's policy. The key concept used here is detecting reasoning errors. Emma's argument, in this case, relies on her interpretation of the school policy that allows parents to contact the principal directly in urgent matters concerning the health and safety of their child. Option **A** correctly identifies the flaw in Emma's reasoning. The school policy clearly states that only urgent matters concerning the health and safety of a child warrant direct contact with the principal. Academic performance, in this case, should be addressed with the class teacher or school counsellor first. Option B does not directly address Emma's mistake. The school policy already defines what constitutes an "urgent matter", and Emma's misunderstanding is about the nature of the issue, not the urgency. Option C is irrelevant to Emma's argument. Emma's decision to discuss the matter with her child or not does not impact her interpretation of the school policy. Option D does not accurately identify the flaw in Emma's argument. While it might be true that the principal may not be able to resolve her child's academic issues, Emma's mistake lies in her misunderstanding of when she can contact the principal directly. Therefore, Option **A** is the correct answer.

2	B	The error in Coach Graham's reasoning is to be identified based on the information given. The key concept used here is detecting reasoning errors. Option A suggests that some of the players might have practised extra outside the team's training hours. This introduces a confounding variable. If some players practised more than others, regardless of the type of shoes they wore, they could potentially perform better, which could skew the results. Option **B** points out that Coach Graham had failed to consider the players' initial skill level before the experiment started. This error could lead to a misinterpretation of the results, falsely attributing the improvement to the new shoes when it could be due to the players' inherent skill. Option C suggests that the players who wore old shoes might perform better in other kinds of sports. While this could be true, it doesn't relate directly to the basketball performance being studied, making it less relevant to the error in Coach Graham's conclusion. Option D proposes that more players may have had jersey numbers between 1 and 12 than between 13 and 24. If there were an uneven number of players in each group, this could affect the averages calculated, potentially leading to incorrect conclusions. Therefore, Option **B** is the correct answer.

3	A	In this problem, the task is to pinpoint the mistake in Alice's assumption concerning her group's eligibility for the "Pride Stone". The key concept involved here is evaluating the errors in the reasoning. Option A is correct because it addresses the main misunderstanding in Alice's statement. Alice is under the impression that their best performance alone will ensure their receipt of the Pride Stone. However, as the rule states, the group must both organise the Great Gathering and execute the best parade performance to be honoured with the Pride Stone. Option B is incorrect because there's no information suggesting that the Agile Antelopes aren't recognised by the Council of Elders. Alice's group's recognition by the council isn't relevant to her misunderstanding. Option C is incorrect because Alice's coordination with other animal groups has nothing to do with her main misunderstanding about the conditions for receiving the Pride Stone. Option D is not valid because the group's experience level isn't the issue here. Alice's misunderstanding revolves around the criteria for receiving the Pride Stone, not the group's performance capabilities. Therefore, Option A is the correct answer.

4	C	The mistake in Dr Baxter's argument about the conditions that should be met for there to be a decrease in flu cases needs to be identified. The key concept used here is detecting reasoning errors. Option A is plausible, as viruses can mutate and adapt to different temperatures. However, this option does not specifically point out the mistake in Dr Baxter's reasoning. Option B is in fact the mistake Dr Baxter is making. He assumes that the only cause for a decrease in flu cases must be a significant increase in average temperature. This assumption is too narrow and overlooks other possible factors. Option C is the correct one. Given the original statement, a decrease in flu cases has historically correlated with a significant increase in average temperature. However, there could be various other factors contributing to the decrease in flu cases, such as effective vaccination programs, increased public health measures, or changes in virus behaviour. Dr Baxter overlooks these possibilities and assumes that because flu cases have decreased, the average temperature must have significantly increased. Option D suggests a situation where the decrease in flu cases is unrelated to the temperature. This is unlikely given the historical data Dr Baxter has, but it does not specifically highlight the mistake in Dr Baxter's reasoning. Therefore, Option C is the correct answer.

5	D	The error in Jacob's reasoning is to be identified based on the information given. The key concept used here is detecting reasoning errors. Option A suggests that Jacob is failing to acknowledge the staff number prerequisite for the grant. This is part of Jacob's mistake. He incorrectly assumed that strong performance in the first two areas could compensate for falling short in the third. Option B points out that Jacob underestimates the importance of meeting all eligibility requirements. This is also part of his error, as he is failing to understand that all criteria must be met to be eligible for the grant. Option C suggests that Jacob is mistakenly considering the criteria to be individually sufficient rather than collectively necessary. This option captures part of Jacob's mistake but doesn't fully express his misunderstanding that all criteria are required. Option D proposes that Jacob has not properly assessed the mandatory nature of all three criteria for the grant. Jacob incorrectly assumed that fulfilling two of the three criteria (years of operation and turnover) would be enough to compensate for not fulfilling the third (employee count), whereas all three criteria are mandatory for eligibility. Therefore, Option **D** is the correct answer.

6	A	The mistake that John has made in the reasoning about the causes leading to a steady crime rate in a city needs to be identified. The key concept used here is evaluating reasoning and identifying weaknesses. Option **A** is correct because John incorrectly assumes that the steady crime rate asserts that the significant increase in protests must have happened. But this is a mistake in reasoning because there could be other factors that kept the crime rate steady. The steady crime rate does not necessarily imply a significant increase in protests. Option B introduces a potential social consequence of John's statement but doesn't point out a flaw in his reasoning. Option C is plausible as John did not consider that an effective law enforcement strategy can also keep the crime rate steady. However, this option doesn't directly point out John's reasoning error. Option D points out another possible truth, but it doesn't specifically highlight the mistake in John's reasoning about the factors leading to a steady crime rate in a city. Therefore, Option **A** is the correct answer.

7	D	The mistake that Joseph has made in his reasoning about the influences leading to good emotional regulation and social skills in a toddler needs to be identified. The key concept used here is evaluating reasoning and identifying weaknesses. Option A is plausible, as Joseph did not consider that different toddlers might respond to similar care and safety measures in different ways. However, this option doesn't directly point out Joseph's reasoning error. Option B points out a potential error in Joseph's reasoning, but it isn't the fundamental mistake he made. Option C introduces a potential factor influencing a child's development but doesn't point out a flaw in his reasoning. Option **D** is correct because Joseph has assumed that the mere presence of consistent care and safety measures will lead to good emotional regulation and social skills. This is a mistake in reasoning because while these factors may contribute to such development, they don't guarantee it. Therefore, Option **D** is the correct answer.

8	C	The mistake that Peter has made in his reasoning about the effects of being in tune with the latest fashion needs to be identified. The key concept used here is evaluating reasoning and identifying weaknesses. Option A is plausible as Peter did not consider that someone can be in tune with the latest fashion through means other than frequent shopping, such as by engaging with fashion media or attending fashion events. However, this option doesn't directly point out Peter's reasoning error. Option B introduces a potential alternative pathway for a fashion-conscious person to stimulate the economy but doesn't point out a flaw in his reasoning. Option **C** is correct because Peter incorrectly assumes that stimulating the fashion industry does not simultaneously stimulate the economy. But this is a mistake in reasoning because the fashion industry is part of the larger economy, and thus stimulating the fashion industry inherently stimulates the economy. Option D points out another possible truth, but it doesn't specifically highlight the mistake in Peter's reasoning about the effects of being in tune with the latest fashion. Therefore, Option **C** is the correct answer.

9	B	The sentence which shows the mistake that Ms Jensen has made in her reasoning about the capabilities of all people with disabilities is to be identified. The key concept used here is identifying mistakes. Option A introduces a new perspective by highlighting the differences among disabilities, some of which might not impact work performance while others could require specific accommodations. However, this option doesn't directly address Ms Jensen's error in reasoning. Option **B** indeed pinpoints the mistake Ms Jensen is making. She deduces a broad generalisation about all individuals with disabilities based on a single example (the top manager). Her statement is an over generalisation, suggesting that every person with a disability will necessarily excel, which is a hasty conclusion. Option C presents a possibility that many employees without disabilities could also have faced challenges and succeeded. This statement provides a broader perspective but doesn't specifically address Ms Jensen's mistaken reasoning. Option D offers advice that, while valid, doesn't pinpoint the mistake in Ms Jensen's reasoning. It emphasises the importance of supportive workplace environments but doesn't counter Ms Jensen's generalisation. Therefore, Option **B** is the correct answer.

10	C	The sentence which shows the mistake that Alex has made in his reasoning about the relationship between dietary fat and weight loss is to be identified. The key concept used here is identifying errors. Option A introduces a relevant truth about weight gain, asserting that not just fats but also proteins and carbohydrates can contribute to weight gain when consumed excessively, despite their lower caloric density. Option B misrepresents Alex's assumption by suggesting he recognised the satiating property of fats. In reality, Alex did not acknowledge this aspect; he focused solely on the caloric content. Option **C** accurately points out the flaw in Alex's reasoning. He has overlooked the critical roles that fats play in our bodies, and instead, he promotes an approach to weight loss that simplifies the issue to just calorie content. Option D offers an informative point about certain sources of dietary fat, emphasising that some fats provide essential fatty acids which the body cannot produce on its own. Therefore, Option **C** is the correct answer.

11	A	The sentence which shows the mistake Dr Greene has made in reasoning about the relationship between the decline in the frequency of hurricanes and the rise in greenhouse gas emissions needs to be identified. The key concept used here is identifying mistakes. Option A identifies the mistake in Dr Greene's logic. He incorrectly assumes a direct causal relationship where an increase in the frequency of hurricanes automatically is due to the rise in greenhouse gas emissions. This is a reversal of the original cause-and-effect relationship mentioned in the initial claim. Option B offers a plausible consideration, suggesting that there might be short-term variations or other influences on the frequency of hurricanes. This doesn't directly challenge Dr Greene's mistake but offers another way to think about the problem. Option C presents another possible truth regarding the issue at hand. It emphasises that a mere decrease in hurricane frequency doesn't give the complete picture. The intensity or duration of these hurricanes might be influenced by changing climatic conditions due to greenhouse gases. However, this doesn't pinpoint the specific error in Dr Greene's statement. Option D introduces new information about the climate system, which, while insightful, doesn't directly address Dr Greene's flawed reasoning about hurricanes and greenhouse gas emissions. Therefore, Option A is the correct answer.

12	D	The mistake in Orlando's argument about the conditions that should be met to become a featured artist at the Central City Art Gallery needs to be identified. The key concept used here is detecting reasoning errors. Option A is incorrect. Given the original statement, Orlando has held more than the minimum required number of solo exhibitions, which is three. Option B is also incorrect. Orlando has received the prestigious Central City Art Award, meeting the requirement of having at least one grant or award for his work. Option C could potentially happen, but it does not point out John's mistake in his reasoning. Orlando is reasoning based on the conditions given in the original statement, which only mentions solo exhibitions and grants or awards, not any potential other opportunities at other galleries. Option **D** is the correct one. Orlando has fulfilled the requirements to join the Local Artist Development Program. However, joining the program doesn't guarantee that he will be a featured artist at the Central City Art Gallery. He has overlooked the fact that being part of the program is a prerequisite for being considered as a featured artist, but it doesn't guarantee that outcome. Therefore, Option **D** is the correct answer.

13	D	The sentence which shows the mistake that Commander Gray has made in reasoning about the number of astronauts for the mission is to be identified. The key concept used here is identifying mistakes. Option A suggests that the astronaut who received a recommendation might not have met the training hours criterion. This possibility, however, doesn't directly challenge Commander Gray's counting error. Option B claims that meeting multiple criteria would increase the number of astronauts. This is illogical because meeting multiple criteria would mean counting the same astronaut more than once, which would not add new astronauts to the total count. Option C introduces the idea that some astronauts might have surpassed the 100-hour threshold by a large margin. While this is an interesting observation, it doesn't challenge Commander Gray's counting error. Option **D** correctly identifies Commander Gray's mistake. If some astronauts met multiple criteria, they would be double-counted or even triple-counted in their total. This means the actual number of unique astronauts who qualified would be less than 19. Therefore, Option **D** is the correct answer.

14	A	The sentence which shows the mistake that Zachary has made in reasoning about the deployment of 5G technology in the city is to be identified. The key concept used here is identifying mistakes. Option **A** is indeed the mistake Zachary is making. He attempts to confirm his proposition ("for a region to fully utilise 5G technology, it must have a well-developed infrastructure, including a dense network of small cells and fibre optic cables. Additionally, the region's regulatory environment must be conducive to the deployment of 5G technology, with policies that encourage investment and innovation in the telecommunications sector.") by observing two effects (a surge in high-speed data transfer and an increase in the number of devices connected to the internet). His reasoning overlooks other possible causes of these effects. Option B highlights another perspective, suggesting that advancements such as new data compression techniques could also be responsible for improved data transfer speeds. While valid, this viewpoint mainly concentrates on the data speed and not the entirety of Zachary's statement about 5G deployment. Option C presents another potential reason for the increase in connected devices – the rise of smart devices – which doesn't necessarily have to correlate with the deployment of 5G technology. Option D emphasises the importance of referring to concrete data before drawing conclusions. While it is a prudent recommendation, it does not directly call out the logical flaw in Zachary's assumption regarding the causes of the observed phenomena. Therefore, Option **A** is the correct answer.

15	D	The sentence which shows the mistake Byron has made in his reasoning about the average price rise of enchanted herbs and the price surge of Moonshade herbs needs to be identified. The key concept used here is identifying mistakes. Option A brings to light a possible misconception, suggesting that Byron did not understand the distinction between the average price increase of enchanted herbs and the specific appreciation of Moonshade herbs. Option B introduces an unrelated fact about the strategic position of Daleshire and its influence on herb potency. This doesn't directly address Byron's misinterpretation of the data. Option C touches on the distinct properties of Moonshade herbs, hinting at their different pricing dynamics. While it provides insight into why Moonshade herbs might be priced differently, it doesn't directly highlight Byron's error in comparison. Option **D** directly and correctly identifies the mistake in Byron's assumption. He believes that the average price rise of enchanted herbs and the price surge of Moonshade herbs would be the same, despite the given information showing that Moonshade herbs have experienced a 12% annual increase compared to the overall average of 7%. Therefore, Option **D** is the correct answer.

16	A	The sentence that shows the mistake that Professor Malcolm has made in reasoning about the causes leading to an increase in inclusiveness is to be identified. The key concept used here is identifying mistakes. Option **A** highlights the mistake Professor Malcolm is making. He attempts to confirm his proposition by citing a single instance (an increase in inclusiveness). His reasoning neglects other possible factors that might have contributed to this improvement, such as changes in education policies or public awareness campaigns. Option B introduces a potential issue but doesn't directly address Professor Malcolm's reasoning error. Option C presents another important consideration in the availability and accessibility of diverse books in society but does not specifically highlight the mistake in Professor Malcolm's reasoning. Option D points out another possible truth, but it doesn't specifically highlight the mistake in Professor Malcolm's reasoning about the factors leading to an increase in societal inclusiveness. Therefore, Option **A** is the correct answer.

17	B	The sentence which shows the mistake that Mr Thompson has made in reasoning about the capabilities of left-handed players is to be identified. The key concept used here is identifying mistakes. Option A offers insight into the varied abilities of left-handed individuals, suggesting that not every left-handed person possesses the same prowess in basketball. This statement highlights individual differences, but it doesn't directly point out Mr Thompson's flawed logic. Option **B** precisely targets Mr Thompson's error. He jumps to a broad conclusion about all left-handed players based on one particular example (the team captain). This is a classic example of over-generalisation, implying that being left-handed automatically grants an advantage in basketball. Option C brings up a valid point that there might be right-handed players who, with the appropriate training and opportunities, can outshine left-handed players. It offers a more balanced view but doesn't directly challenge Mr Thompson's generalisation. Option D, while praising Mr Thompson's recognition of the left-handed captain's achievements, reminds him of the importance of equal opportunity. Though it's a constructive point, it doesn't directly highlight Mr Thompson's logical error. Therefore, Option **B** is the correct answer.

18	A	The sentence which shows the mistake that Paul has made in reasoning about the ways the chefs from his culinary school qualified for the final round is to be identified. The key concept used here is identifying mistakes. Option **A** posits that a chef from Paul's culinary school could have garnered a five-star rating for multiple dishes. This means that the number of dishes with a five-star rating doesn't necessarily correspond one-to-one with the number of chefs. If a chef had two or more dishes each getting a five-star rating, fewer chefs would account for the eight dishes Paul mentioned. Option B, although a valid point, doesn't directly contradict Paul's assumption about the number of chefs and dishes. Option C offers an overarching comment about this year's performance but doesn't clarify the relationship between chefs and their five-star rated dishes. Option D, while showing the potential overlap in qualifications, doesn't confront the assumption Paul made about the majority of chefs qualifying solely because of their five-star dishes. Therefore, Option **A** is the correct answer.

19	A	The sentence which shows the mistake that Smith made in reasoning about the delay in the construction of the skyscraper is to be identified. The key concept used here is identifying mistakes. Option **A** points out that Smith hastily attributes the delay exclusively to an improperly laid foundation. This option highlights potential factors that could cause delays, including supply chain disruptions, adverse weather, and labour-related issues. In essence, the assumption made by Smith is too narrow, neglecting other plausible causes. Option B emphasises the significance of the materials' quality in the construction process. However, while this is a valid consideration, it doesn't directly challenge Smith's sole attribution of the delay to the foundation. Option C suggests that changes in design or safety concerns might also result in construction delays. While this highlights other potential reasons for the delay, it doesn't directly refute Smith's foundation-centric assumption as strongly as Option **A**. Option D brings forward the idea of altering the construction sequence. However, this doesn't directly challenge the assumption that an improperly laid foundation is the sole cause of the delay. Therefore, Option **A** is the correct answer.

20	B	The sentence which shows the mistake that Coach Parker has made in reasoning about the impact of listening to classical music on a player's goal-scoring abilities is to be identified. The key concept used here is identifying mistakes. Option A mentions the possibility that players might already have personal music preferences that they listen to before games, outside of the experiment. This suggests that external factors, beyond Coach Parker's experiment, could influence the players' performance, but it is not the main mistake in his argument. Option **B** is indeed the mistake Coach Parker is making. He assumes that the difference in goal-scoring abilities is solely due to the type of music listened to before the game, neglecting the possibility that players with even jersey numbers might have been better goal-scorers before the experiment began. Option C is plausible as it suggests that the players who listened to rock music might have performed better in defensive roles rather than scoring. However, this option doesn't directly point out Coach Parker's reasoning error. Option D introduces a potential issue about the number of players in each group, which is incorrect as they are in equal numbers. So, it doesn't highlight the mistake in Coach Parker's reasoning about the impact of music on goal-scoring abilities. Therefore, Option **B** is the correct answer.

Term 4 Week 4
Thinking Skills Advanced
Critical Thinking
Challenging Questions

Question Number	Answer	Solution
1	D	The business owner creates an internal contradiction between his argument and the conclusion itself. They say that cupcakes have been the main focus in sales, and that if customer retention rates have been steadily increasing, then cupcakes should be less of a focus to regain lost customers. This is a contradiction, where an increased customer retention rate reflects well on the product's sales. Customer retention rate is the rate at which a customer comes back, so if more customers are coming back because of the cupcakes, then the business shouldn't move on. Therefore, **D** is the correct answer.
2	C	Jeffery's argument is that his new policies would bring a cleaner, more prosperous future for Springfield. His argument is flawed here as he bases his conclusion, a cleaner, more prosperous future, on claims that are inconsistent with one another. Jeffery states that his policies would create steady growth within the economy, and a RISE in environmental degradation. However, a rise in environmental degradation implies a dirtier, unsustainable environment instead, which opposes what Jeffery concludes. Options B and D are incorrect as we are asked to find the mistake that Jeffery has made within his argument. Jeffery creates an argument based on hypotheticals which we cannot conclude if they are considered "flaws" or not. Therefore, **C** is the correct answer.

3	C	Option A is incorrect as we do not know if the weather conditions were ideal and we cannot assume that Reece might not have been there at time most likely to see whales that day. Option B is incorrect as the time of day is not the only factor Reece need to consider to see the whales. The weather conditions also influence this. Option **C** is correct as it points out Reece's mistake in assuming that it was purely because of these two factors that she was able to see a whale. Option D is incorrect as migration of whales to other places in the ocean is a reason for why no whales were seen, not why whales were seen. Therefore, Option **C** is the answer.

Term 4 Week 4
Thinking Skills Advanced
Problem Solving
Finding Procedures: Table

Question Number	Answer	Solution
1	D	The total waiting time is to be calculated for Steve based on the information given in the question. The key concept used here is table and graph. To minimise total waiting time, Steve needs to consider both the waiting time for the appointment in Adelaide and the waiting time for the return train to Darwin. Appointment in Adelaide: The appointment is at 12:00 noon. The train that gets Steve to Adelaide closest to 12:00, but not later, departs from Darwin at 9:25 and arrives in Adelaide at 11:45. So, Steve will have to wait for 15 minutes (from 11:45 to 12:00) for the appointment to start. Return to Darwin: The appointment is expected to last 45 minutes, so it will finish at 12:45. The earliest train Steve can catch back to Darwin departs from Adelaide at 13:30, so he will have to wait for 45 minutes (from 12:45 to 13:30) for the train. Therefore, the total waiting time for Steve is 15 minutes (for the appointment) + 45 minutes (for the return train) = 60 minutes. Therefore, Option **D** is the correct answer.

2	C	In this problem, the task is to determine what percentage of the total expenditure on actor salaries over five years was the total expenditure on set construction for the same period in a film production studio. The critical concept involved here is understanding and calculating percentages in the context of budget expenditures. The total expenditure on actor salaries over the five years is: 2 800 + 3 400 + 3 200 + 3 300 + 4 400 = 17 100 (in thousands of dollars) The total expenditure on set construction over the five years is: 900 + 1 100 + 1 000 + 1 300 + 1 514 = 5 814 (in thousands of dollars) The percentage of the total expenditure on actor salaries that the total expenditure on set construction represents is $\frac{5\,814}{17\,100} \times 100 = 34\%$. Therefore, Option **C** is the correct answer.
3	A	In this problem, the task is to determine the ratio of the average number of researchers who joined SpaceX during the years 2020, 2021 and 2022 to the average number of researchers joining NASA during the years 2017, 2018, 2019 and 2020. The key concept used here is calculating the average of a series of numbers and then finding the ratio of these two averages. The average number of researchers joining SpaceX during the years 2020, 2021 and 2022 is $\frac{1.9 + 2.9 + 3.6}{3} = \frac{8.4}{3} = 2.8$. The average number of researchers joining NASA during the years 2017, 2018, 2019 and 2020 is $= \frac{3.4 + 1.7 + 3.9 + 5.4}{4} = \frac{14.4}{4} = 3.6$. The ratio of the average number of researchers joining SpaceX to the average number of researchers joining NASA is 2.8 : 3.6 = 7 : 9. Therefore, Option **A** is the correct answer.

4	C	In this problem, the task is to find the percentage of the male population in Hospital D is more than the doctor population in Hospital C. The key concept used here is the calculation of percentage increase. The number of doctors in Hospital C is $\frac{72}{100} \times 600 = 432$. The male population in Hospital D is $\frac{5}{5+4} \times 720 = \frac{5}{9} \times 720 = 400$. The difference between the number of doctors in Hospital C and the male population in Hospital D is $432 - 400 = 32$. Thus, the percentage of doctor population in Hospital C is more than the male population in Hospital D by: $\frac{\text{Number of doctors in Hospital C} - \text{Male population in Hospital D}}{\text{Male population in Hospital D}} \times 100 = \frac{32}{100} \times 100 = 8\%$ Therefore, Option **C** is the correct answer.

5	D	The percentage difference between the total preferences for the top two flavours and the bottom three flavours is to be identified based on the given information. The key concept used here is finding procedures by using tables & graphs. First, let's compute the total preferences for the top two flavours and the bottom three flavours: Top two flavours (vanilla and chocolate) = 16 + 12 = 28 Bottom three flavours (strawberry, mint chocolate, and others) = 4 + 3 + 5 = 12 The difference between the top two and the bottom three = 28 − 12 = 16 Percentage difference = (Difference ÷ Total preferences for all flavours) × 100 Total preferences for all flavours = 28 + 12 = 40 Therefore, the percentage difference = (16 ÷ 40) × 100 = 40%. Therefore, Option **D** is the correct answer.

6	D	The percentage by which men are more than women is to be calculated. The key concept used here is tables. First find the number of women in each company. **TechGlobe**: Ratio = 5 : 3 Let the common factor be x. Difference = $5x - 3x = 2x$ $2x = 240$ $x = 120$ Number of women = $3x = 3 \times 120 = 360$ **InnoCorp**: Ratio = 8 : 7 Let the common factor be y. Difference = $8y - 7y = y$ $y = 100$ Number of women = $7y = 7 \times 100 = 700$ **EcoSolutions**: Ratio = 12 : 9 Let the common factor be z. Difference = $12z - 9z = 3z$ $3z = 360$ $z = 120$ Number of women = $9z = 9 \times 120 = 1\,080$ **GlobalTech**: Ratio = 20 : 14 Let the common factor be w. Difference = $20w - 14w = 6w$ $6w = 660$ $w = 110$ Number of women = $14w = 14 \times 110 = 1\,540$ Total number of women = Number of women in TechGlobe + Number of women in InnoCorp + Number of women in EcoSolutions + Number of women in GlobalTech Total number of women = 360 + 700 + 1 080 + 1 540 = 3 680 The total difference between the number of men and women across all companies is given as 240 + 100 + 360 + 660 = 1 360. Percentage difference = (1 360 ÷ 3 680) × 100 = 36.96% = 37% approx. Therefore, Option **D** is the correct answer.

7	C	Based on the given information it is to be identified which type of battery, after adding up the sales from all seven years, ended up being the company's best-seller. The key concept used here is finding procedures by using tables & graphs. The total sales (in thousands) of all the seven years for various batteries are as: For 4AH = 75 + 90 + 96 + 105 + 90 + 105 + 115 = 676 For 7AH = 144 + 126 + 114 + 90 + 75 + 60 + 85 = 694 For 32AH = 114 + 102 + 75 + 150 + 135 + 165 + 160 = 901 For 35AH = 102 + 84 + 105 + 90 + 75 + 45 + 100 = 601 For 55AH = 108 + 126 + 135 + 75 + 90 + 120 + 145 = 799 So, sales are maximum for 32AH batteries. Therefore, Option **C** is the correct answer.
8	A	The percentage of highest scoring student to the total scores of all together is to be determined based on the given information. The key concept used here is finding the correct procedure to analyse the tabular data. Total score of Lisa = 23 + 23 + 20 + 25 = 91 Total score of Grace = 22 + 20 + 21 + 20 = 83 Total score of Henry = 21 + 25 + 23 + 21 = 90 Total score of Ava = 25 + 20 + 23 + 18 = 86 Total score of all together = 91 + 83 + 90 + 86 = 350 Based on this information, Lisa earned the highest total score across all four rounds. The percentage of Lisa's score to the total scores of all together = (91 ÷ 350) × 100% = 26% Therefore, Option **A** is the correct answer.

9	D	The player(s) that win the prize with least total time is to be identified. The key concept used here is finding the correct procedure to analyse the tabular data. Total time take by each player is tabulated below: | | Round 1 | Round 2 | Round 3 | Total | | Alice | 15 | 14 | 12 | 41 | | Bob | 12 | 13 | 13 | 38 | | Charlie | 13 | 13 | 13 | 39 | | David | 14 | 12 | 15 | 41 | | Emma | 15 | 13 | 14 | 42 | | Frank | 11 | 14 | 13 | 38 | | Grace | 17 | 15 | 14 | 46 | | Henry | 16 | 14 | 12 | 42 | Based on the above information, Bob and Frank have the least time records. | | Round 1 | Round 2 | Round 3 | | Bob | 12 | 13 | 13 | | Frank | 11 | 14 | 13 | In round 1: Frank finished before Bob. In round 2: Bob finished before Frank. In round 3: There is a tie. Both Bob and Frank have won once; hence their final result is tied. Both Bob and Frank will receive the prize. Therefore, Option **D** is the correct answer.

10	A	The difference between the average population of all the cities and the average population of the three most populated cities is to be calculated based on the table given in the question. The key concept used here is tables. Calculate the average population of all the cities: Total Population = Sum of populations of all cities = 1 000 000 + 1 500 000 + 2 200 000 + 800 000 + 1 300 000 = 6 800 000 Average Population of all cities = Total Population ÷ Number of cities = 6 800 000 ÷ 5 = 1 360 000 Identify the top three most populated cities and calculate their average population: Top three most populated cities: City C, City B, and City E Average Population of the Top Three Cities = (Population of City C + Population of City B + Population of City E) ÷ 3 = (2 200 000 + 1 500 000 + 1 300 000) ÷ 3 = 1 666 667 (to the nearest integer) Next, calculate the difference between the average population of all cities and the average population of the top three cities: Difference = Average Population of the Top Three Cities − Average Population of all cities = 1 666 667 − 1 360 000 = 306 667 Therefore, Option **A** is the correct answer.

11	C	The contestant(s) that would win the prize with the highest average score according to given information is to be identified. The key concept used here is finding the correct procedure to analyse the tabular data. Average score of each participant is tabulated below: (table) Based on the above information, Eva got the highest average points and will receive the prize. Therefore, Option C is the correct answer.

	Judge 1		Judge 2		Judge 3		Total	Average
	Round 1	Round 2	Round 1	Round 2	Round 1	Round 2		
Alex	9.1	9.5	8.7	8.9	9.6	9.1	54.9	9.15
Beth	8.5	8.7	9.3	9	7.9	8.5	51.9	8.65
Carla	7.6	8.1	9.5	9.3	9.7	9.6	53.8	8.97
Dylan	8.2	8.8	9.4	9.6	9.1	8.5	53.6	8.93
Eva	8.9	9.3	8.7	9.5	9.7	9.1	55.2	9.20

12	B	The task is to determine the percentage that the Addee Tops bottles from manufacturer A represent of the Nikel Bott bottles from manufacturer D. The key concept used here is table & graphs. The total number of bottles manufactured by company A is: $\frac{15}{100} \times 40\,000 = 6\,000$ The total number of bottles manufactured by company D is: $\frac{27}{100} \times 40\,000 = 10\,800$ The number of Addee Tops bottles produced by company A is: $\frac{2}{3+2} \times 6\,000 = 2\,400$ The number of Nikel Bott produced by company D is: $\frac{20}{20+7} \times 10\,800 = 8\,000$ Thus, the required percentage of the Nikel Bott bottles produced by manufacturer D is represented by the number of Addee Tops caps made by manufacturer A is $\frac{2\,400}{8\,000} \times 100 = 30\%$. Therefore, Option B is the correct answer.

13	C	The non-defective robot figurines sold by seller RoboRealm are to be identified. The key concept used here is table & graphs. For RoboRealm, the total number of robot figurines sold is 840, out of which 480 are metal robots. This means that 840 − 480 = 360 are wooden robots. Now, 10% of the metal robots, which is $\frac{10}{100} \times 480 = 48$, are defective. Also, 20% of the wooden robots, amounting to $\frac{20}{100} \times 360 = 72$, are defective. Thus, RoboRealm has 48 (defective metal robots) + 72 (defective wooden robots) = 120 defective robot figurines. Thus, the total number of non-defective robot figurines sold by RoboRealm is 840 (total figurines) − 120 (defective figurines) = 720 non-defective robot figurines. Therefore, Option **C** is the correct answer.

14	B	The food the health-conscious individual chooses for the lowest calorie intake is to be identified. The key concept used here is tables. **Calculating calories**: the total calories for each food type must be calculated. The formula for calculating total calories is: Total calories = (Protein × 4) + (Carbohydrates × 4) + (Fat × 9) Calculate the total calories for each food type per 100 gram: Cake – Total calories = (10 × 4) + (30 × 4) + (5 × 9) = 40 + 120 + 45 = 205 calories Pizza – Total calories = (15 × 4) + (20 × 4) + (8 × 9) = 60 + 80 + 72 = 212 calories Burger – Total calories = (12 × 4) + (25 × 4) + (6 × 9) = 48 + 100 + 54 = 202 calories **Calculating total calorie intake**: calculate the total calorie intake for each food type by considering the quantity. The formula for calculating total calorie intake is: Total calorie intake = Total calories × (Quantity ÷ 100) Calculate the total calorie intake for each food type: Cake – Total calorie intake = 205 calories × (150 ÷ 100) = 307.5 calories Pizza – Total calorie intake = 212 calories × (120 ÷ 100) = 254.4 calories Burger – Total calorie intake = 202 calories × (130 ÷ 100) = 262.6 calories Among the three food types, pizza has the lowest total calorie intake at 254.4 calories, considering the nutritional values and specified quantities. Therefore, for the lowest calorie intake, while considering protein, carbohydrates, fat, and quantity, the health-conscious individual should choose pizza. Therefore, Option **B** is the correct answer.

15 C

The percentage of total sales of all products in the year 2020 to the total number of sales of all products in the years 2021 and 2023 together is to be determined.

The key concept used here is table & graphs.

The total number of sales of all products for every year will be:

Year	Product A	Product B	Product C	Total
2019	1 100	1 650	2 300	5 050
2020	950	1 800	2 250	5 000
2021	1 200	1 350	2 300	4 850
2022	1 250	1 150	2 550	4 950
2023	1 250	1 450	2 450	5 150

The total sales of all products in the year 2020 = 5 000

The total sales of all products in the years 2021 and 2023 together = 4 850 + 5 150 = 10 000

The percentage of total sales of all products in the year 2020 to the total sales of all products in the years 2021 and 2023 together will be:
= (5 000 ÷ 10 000) × 100%
= 50%

Therefore, Option **C** is the correct answer.

16 C

The time that has the highest average temperature of all the days is to be determined.

The key concept used here is table & graphs.

To find the average temperature at a particular time, add all the temperatures of each day in that time period and then divide the total value by 7.

Day	8:00 am	12:00 pm	4:00 pm	8:00 pm
Monday	24	29	32	28
Tuesday	23	31	30	27
Wednesday	25	29	30	27
Thursday	25	30	32	28
Friday	26	31	30	29
Saturday	25	32	31	29
Sunday	23	30	29	31
Total	171	212	214	199
Average	24.428	30.285	30.571	28.429

Based on the above analysis, at 4:00 pm, the average temperature is the highest compared to the other time periods.

Therefore, Option **C** is the correct answer.

17	C	The shop that must be chosen to get the cheapest deal is to be identified. The key concept used here is tables. Firstly, calculate the discount amount and the final price after the discount for each shop. For Bargain Bazaar: Discount = $\frac{10}{100} \times 500 = \$50$ Price after discount = \$500 − \$50 = \$450 For Discount Den: Discount = $\frac{15}{100} \times 450 = \$67.5$ Price after discount = \$450 − \$67.5 = \$382.5 For Economart: Discount = $\frac{20}{100} \times 600 = \$120$ Price after discount = \$600 − \$120 = \$480 For the Thrifty Trio: Discount = $\frac{12}{100} \times 550 = \$66.$ Price after discount = \$550 − \$66 = \$484 Finally, add any additional costs to the price after the discount for each shop. Final price at Bargain Bazaar = \$450 + \$50 = \$500 Final price at Discount Den = \$382.5 + \$75 = \$457.5 Final price at Economart = \$480 + \$30 = \$510 Final price at Thrifty Trio = \$484 + \$60 = \$544 Based on these calculations, Discount Den offers the table lamp at the lowest price of \$457.5. Hence, Mr Green should choose Discount Den for the best deal. Therefore, Option C is the correct answer.

18	A	The minimum number of different animal photos that must be captured in the last round to ensure victory is to be identified. The key concept used here is tables. Firstly, calculate the total number of photos clicked by each participant in the first two rounds. • Leo: 60 + 65 = 125 • Maria: 65 + 60 = 125 • Noah: 70 + 60 = 130 • Olivia: 60 + 70 = 130 • Parker: 75 + 70 = 145 • Quinn: 50 + 70 = 120 • Ryan: 70 + 65 = 135 • Stella: 60 + 70 = 130 Next, identify the photographer with the first and second-highest totals: From the calculated totals, it is clear that Parker, with a total of 145 photos, and Ryan, with a total of 135 photos, hold the first and second positions, respectively. Next, calculate the maximum potential total for Ryan. If Ryan captures the maximum number of photos allowed in the final round, which is 50, his total will reach 135 (current total) + 50 (potential addition) = 185 photos. Finally, determine the minimum number of photos Parker needs to capture to ensure his win. To secure victory, Parker must capture at least one more photo than Ryan's maximum potential total. Therefore, the minimum number of photos Parker needs to capture in the final round is (Ryan's potential maximum total of 185) + 1 = 186 photos. However, as Parker already has 145 photos, he only needs to capture 186 − 145 = 41 different animal photos in the final round to ensure his victory. This will bring his total to one more than Ryan's maximum possible total, thereby securing Parker's win in the competition. Therefore, Option A is the correct answer.

19	B	The restaurant that should be chosen to get the most cost-effective deal is to be determined. The key concept used here is tables and calculations based on percentages and additional costs. Firstly, calculate the discount amount and the final price after the discount for each restaurant. For Noodle Nirvana: Discount = $\frac{20}{100} \times 400 = \$80$ Price after discount = \$400 − \$80 = \$320 For Biryani Bistro: Discount = $\frac{15}{100} \times 350 = \$52.5$ Price after discount = \$350 − \$52.5 = \$297.5 For Taco Town: Discount = $\frac{25}{100} \times 450 = \$112.5$ Price after discount = \$450 − \$112.5 = \$337.5 For Pasta Place: Discount = $\frac{18}{100} \times 375 = \$67.5$. Price after discount = \$375 − \$67.5 = \$307.5 Next, add the service charges to the price after the discount for each restaurant. Final price at Noodle Nirvana = \$320 + \$30 = \$350 Final price at Biryani Bistro = \$297.5 + \$45 = \$342.5 Final price at Taco Town = \$337.5 + \$20 = \$357.5 Final price at Pasta Place = \$307.5 + \$40 = \$347.5 Based on these calculations, Biryani Bistro offers the catering service at the lowest price of \$342.5. Hence, Mrs Ruby should choose Biryani Bistro for the most affordable deal. Therefore, Option **B** is the correct answer.

20	D	The train that will get Theodore to Vista View the quickest is to be identified. The key concept used here is tables. Firstly, calculate the total time each train will take to reach Vista View, considering the expected delay. Travel time = Arrival Time − Departure Time + Expected Delay For Train P: Travel time = (11:00 am − 9:00 am) + 15 minutes = 2 hours and 15 minutes For Train Q: Travel time = (12:10 pm − 10:00 am) + 20 minutes = 2 hours and 30 minutes For Train R: Travel time = (12:30 pm − 10:30 am) + 10 minutes = 2 hours and 10 minutes For Train S: Travel time = (1:10 pm − 11:00 am) + 25 minutes = 2 hours and 35 minutes Finally, identify the train with the shortest total time to Vista View. Upon analysing the total travel times, it is clear that Train R, with a total time of 2 hours and 10 minutes, will get Theodore to Vista View the fastest. Therefore, Theodore should choose Train R for his journey to arrive in Vista View in the shortest possible time. Therefore, Option **D** is the correct answer.

Term 4 Week 4
Thinking Skills Advanced
Problem Solving
Challenging Questions

Question Number	Answer	Solution
1	D	The person that takes the shortest amount of time is Caitlyn ($5 \div 28 \approx 0.18$ hrs). The person that takes the longest amount of time is Peter ($13 \div 20 \approx 0.65$ hrs). The latest time that Caitlyn can leave the house is: $0.18 \times 60 \approx 10.8$ minutes $\rightarrow$ 10 minutes 9:00 − 10 mins = 8:50 am The latest time that Peter can leave the house is: $0.65 \times 60 = 39$ minutes 9:00 − 39 mins = 8:21 am Therefore, the difference in time is 29 minutes. The answer is **D.**
2	B	The person with the fastest speed is coming first. Ryan has the fastest speed. The person in second place is Jordan. Ryan should take $100 \div 5.5 \approx 18$ seconds to finish the race. So far, Jordan has run $50 \div 5 = 10$ seconds. So, he must finish in 7 more seconds. Therefore, he has to run at a new speed of $50 \div 7 \approx 7.14$ m/sec. The difference between his old and new speeds is $7.14 - 5 = 2.14$ m/sec. Hence, the answer is **B.**

3	D	Converting all the times into seconds, we get: $3.4 \times 60 = 204$ s $2.8 \times 60 = 168$ s $3 \times 60 = 180$ s $2.5 \times 60 = 150$ s To find the overall average of the four experiments, we need to divide the total amount of copper by the total time she took. Let's assume that the amount of copper she needs to extract in the fourth experiment is x. $\frac{10 + 26 + 24 + x}{204 + 168 + 180 + 150} = \frac{60 + x}{702} = 0.2$ $60 + x = 0.2 \times 702 = 140.4$ $x = 140.4 - 60 = 80.4$ g Therefore, the answer is **D.**