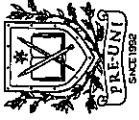# Term 4 Week 3
Thinking Skills Advanced
Critical Thinking
Detect Reasoning Errors: Analogies and Anecdotes

Question Number	Answer	Solution
1	D	In this problem, the task is to determine whose reasoning, Carlos's or Diana's, is correct based on the given information. The key concept involved here is logical reasoning, or the ability to infer conclusions from a set of provided facts or conditions. Carlos's reasoning is incorrect because he assumes exactly 20% (100% – 80%) of the vehicles lack automatic driving technology. From this assumption, he calculates that out of 45 000 vehicles, 20% or 9 000 will not have automatic driving technology (20% of 45 000 = 9 000). However, the problem states "at least 80%" have the technology, meaning the percentage without could be less than 20%, making Carlos's assumption and calculation incorrect. Diana's reasoning is incorrect. She assumes that all accidents involving vehicles without automatic driving technology are caused by human error. However, the given information only states that 90% of accidents involving vehicles in the city are caused by human error, but it does not specify whether those vehicles have automatic driving technology or not. Therefore, Option D is the correct answer.
2	D	In this problem, the task is to evaluate Natalie's and Daniel's reasonings regarding the arrival times of Emily and Sarah at their workplace. The key concept involved here is logical reasoning, or the ability to infer conclusions from a set of provided facts or conditions. Natalie's reasoning is incorrect because she states that Sarah leaves her home at 8:05 AM and will reach work on time. Given that it takes Sarah 20 + 7 = 27 minutes to reach work, she would get to work at 8:05 AM + 27 minutes = 8:32 AM, which is after the required time of 8:30 AM. Daniel's reasoning is incorrect because he insists that Emily "must have left her home exactly at 8:10 AM". However, if Emily had left earlier and given it only takes her 20 minutes to reach work, she could have departed before 8:10 AM and still arrive on time. Daniel's statement implies a strict departure time, not considering the possibility of an earlier departure time. Therefore, Option D is the correct answer.
3	A	In this problem, the task is to evaluate the correctness of Jake's and Sophie's conclusions about Laura's and Josh's musical abilities based on the provided information. The key concepts involved here are logic and comprehension of conditional statements. Jake's reasoning is correct. According to the given statements, anyone who can play the violin can also play the piano, and anyone who can play the piano can also play the guitar. Therefore, if Laura can play the violin, she can also play the piano and, subsequently, the guitar. Sophie's reasoning is incorrect. The provided statements do not confirm that being unable to play the piano means that one can't play the guitar. Although it's stated that anyone who can play the piano can also play the piano and, subsequently, the guitar. Sophie's reasoning is incorrect. The provided statements do not confirm that being unable to play the piano means that one can't play the guitar. Although it's stated that anyone who can play the piano can also play the guitar, this doesn't necessarily mean the opposite is true. Therefore, Option A is the correct answer.

4 **A**	In this problem, the task is to determine whose reasoning, Marco's or Isabella's, is correct based on the given information. The key concept involved here is logical reasoning and understanding cause-effect relationships. Marco's reasoning is correct because he suggests that with a storm warning, many rides at the amusement park might shut down. This statement aligns with the information given that rides often shut down if there's an indication of a storm or heavy rain. Isabella's reasoning isn't necessarily correct because she states that a shut down ride at the amusement park must have been because of a storm warning. While it's possible that a storm warning could have caused the shut down, the information given does not establish this as the only possible reason. Other factors could also lead to a ride shut down. Therefore, Option A is the correct answer.
5 **B**	Based on the information given in the problem, we have to determine whose reasoning is more accurate regarding their team's qualification for the Annual International Coding Challenge. The key concept used here is detecting reasoning errors. Kate claims that the only way their team can qualify for the challenge is if they manage to bring their former teammate back or make a significant open-source contribution. However, Kate doesn't realise that there is another way for their team to qualify, which is as a 'wild card'. Therefore, Kate's reasoning is not correct. Vincent, on the other hand, asserts that if their team can make a significant open-source contribution, it won't matter if they don't manage to get their previous team member back. This conclusion is correct since a significant open-source contribution is a valid way to qualify for the challenge. Therefore, Option B is the correct answer.

6 **C**	The person whose reasoning is correct is to be determined based on the voting policy of the UN Climate Change Body. The key concept used here is detecting reasoning errors. Alexander claims that a project needs at least 6 votes to be funded. This is true. If the votes are evenly distributed across all projects, each gets 5 votes. So a project which is to be funded needs at least 6 votes. Therefore, Alexander's reasoning is correct. Maria, on the other hand, correctly argues that if a project gets 18 votes, it will be funded. As there are 35 members, if a project gets 18 votes, it will have the majority of votes and will be selected for funding according to the policy. Therefore, Maria's reasoning is correct. Therefore, Option C is the correct answer.
7 **D**	The person whose reasoning is correct is to be determined based on the given information regarding groundwater regulation in Green Town. The key concept used here is detecting reasoning errors. Bill claims that the imposition of water restrictions implies that the groundwater level has fallen below 30 feet. According to the given information, this is the criteria for imposing water restrictions, but it is not sure that it is the only criterion. Therefore, Bill's reasoning is incorrect. Cindy, on the other hand, suggests that the imposition of water restrictions implies there is less than 50% of groundwater remaining compared to ten years ago. However, the given information doesn't provide any direct correlation between water restrictions and the percentage of remaining groundwater compared to ten years ago. Therefore, Cindy's reasoning is not necessarily correct. Therefore, Option D is the correct answer.

		The person whose reasoning is correct is to be determined based on the new WHO guidelines for daily sugar consumption.
		The key concept used here is detecting reasoning errors.
8	D	Adam claims that he might have to cut back on fruits, which are high in sugar, to meet the new WHO guidelines. However, it's important to note that the WHO guidelines refer specifically to "free sugars", which include monosaccharides, disaccharides added to foods, and sugars naturally present in honey, syrups, and fruit juices, but do not include sugars found in whole fruits. Therefore, Adam's reasoning is not correct.
		Ben has stated that he is cutting back on soda and is switching to sugar-free drinks. Despite this being a healthier alternative, we do not know if Ben's free sugar intake is less than 10% of his total energy intake. He could still be eating other foods high in free sugars but limiting his soda intake. Hence, we cannot be for sure that Ben is following the new WHO guidelines. Therefore, Ben's reasoning is incorrect.
		Therefore, Option D is the correct answer.

		The person whose reasoning is correct is to be determined based on the survey regarding the school cafeteria.
		The key concept used here is understanding conditional statements.
9	A	Oscar claims that since the school didn't offer a wider variety of food, that must mean less than sixty percent of the students chose the cafeteria. This interpretation aligns with the original condition: if sixty per cent or more of the students chose the cafeteria, then the school would offer a wider variety of food. The absence of a wider variety of food implies that less than sixty percent chose the cafeteria. So, Oscar's reasoning is correct.
		Eliza, on the other hand, suggests that there must have been more than sixty percent of students who preferred bringing their own lunch. While this might seem logical at first glance, it's not necessarily true based on the information given. For instance, it's possible that exactly fifty percent of students preferred the cafeteria, and fifty percent preferred bringing their own lunch. In this case, there would be less than sixty percent choosing each option, so the school wouldn't need to increase the variety of food. So, Eliza's reasoning is not necessarily correct.
		Therefore, Option A is the correct answer.

10	D	The person whose reasoning is correct based on the scenario about boarding an international flight is to be determined. The key concept used here is detecting reasoning errors. According to the information in the box, airlines allow passengers to board international flights if they meet one of two criteria: they have a valid passport, or they possess a special diplomatic status. Oliver's reasoning is not identical to the provided statement. Despite having a valid passport, he fears he won't be allowed to board the flight, which contradicts the conditions set by the airlines. Sophia's reasoning is incorrect. She believes her diplomatic status, issued on 1st January 2020 and valid for 710 days, allows her to board on 31st December 2021. However, the status actually expires on 11th December 2021, making her ineligible to board on the date she assumes. Both Oliver and Sophia misinterpret the airlines' policy, assuming that both conditions must be met rather than just one of the two. Therefore, Option D is the correct answer.
11	A	The person whose reasoning is correct based on the eligibility for the Senior Citizens Savings Scheme in Country X is to be determined. The key concept used here is detecting the reasoning errors. According to the information in the box, to be eligible for the Senior Citizens Savings Scheme, an individual must be a resident of Country X and be at least 60 years of age. Jacob's reasoning is correct because he understands that despite being a resident of Country X, his age (55 years old) disqualifies him from the scheme as he does not meet the age requirement of at least 60 years. Emily's reasoning is incorrect because she does not recognise that both conditions need to be fulfilled for eligibility. Even though she meets the age requirement, her non-residency in Country X makes her ineligible for the scheme. Therefore, Option A is the correct answer.

12	D	The person whose reasoning is correct based on the eligibility for becoming a certified tour guide in the state of Sunshine is to be determined. The key concept used here is detecting the reasoning errors. According to the information in the box, to become a certified tour guide, an individual must either have extensive experience leading tours in the state's mountainous regions or be knowledgeable about the state's coastal ecosystems. It's not required to fulfil both conditions. Ava's reasoning is incorrect because even though she doesn't know about the state's coastal ecosystems, her extensive experience leading tours in the mountainous regions already fulfils one of the conditions, making her eligible for the certification. Leo's statement is incorrect because the certification requirement specifies knowledge of the state's coastal ecosystems, not just the coastal ecosystems of his area. Since his knowledge is limited to his area and not necessarily the state as a whole, he does not meet either of the conditions for certification. Therefore, Option D is the correct answer.

| 13 | C | The individuals whose reasoning is consistent with the statement in the box are to be identified based on the eligibility for becoming a Park Ranger.

The key concept used here is detecting the reasoning errors.

According to the information in the box, to become a Park Ranger, an applicant must either have a degree in environmental sciences or at least five years of experience working in wildlife conservation. It's not necessary to fulfil both conditions.

Alex's reasoning is consistent with the information because despite not having a degree in environmental sciences, his six years of experience in wildlife conservation meets one of the conditions, making him eligible to apply for the Park Ranger position.

Charlotte's reasoning is also consistent because, despite her lack of formal experience in wildlife conservation, her degree in environmental sciences meets one of the conditions, qualifying her for the position.

Therefore, Option C is the correct answer. |

| 14 | A | The person whose reasoning is consistent with the statement in the box is to be identified based on the eligibility for the Young Entrepreneur Grant in Nation Z.

The key concept in these types of questions is to evaluate the understanding of the given conditions.

According to the information in the box, to be eligible for the Young Entrepreneur Grant, an individual must be a resident of Nation Z and be under 30 years of age. Both conditions must be fulfilled.

Benjamin's reasoning is correct because, even though he is a resident of Nation Z, his age of 35 years does not meet the second condition, making him ineligible for the grant.

Jessica's reasoning is incorrect because, despite being under 30 years of age, her lack of residency in Nation Z does not fulfil the first condition, thus disqualifying her for the grant.

Therefore, Option A is the correct answer. |

| 15 | D | The person whose reasoning is correct is to be determined based on the battery level on a smartphone.

The key concept used here is detecting reasoning errors.

According to the statement, there are two scenarios to a smartphone based on its battery level:
- Battery level below 10%: a low battery warning message is displayed.
- Battery level 5% or below: automatic power-saving, restriction to certain functions.

Racquel's reasoning is incorrect as her phone being on power-saving mode does not necessarily mean her battery level is below 5%. She could have manually turned on power-saving mode.

Steven's reasoning is incorrect because to access all functions on the smartphone a battery level above 5% is enough. He believed that his smart phone had a battery level above 10%, but it could have been 5% to 10% also.

Therefore, Option D is the correct answer. |

16	D	The person whose reasoning is correct is to be determined based on the selection criteria for the next match.

The key concept used here is detecting reasoning errors.

According to the statement, there are two conditions for a player to be selected for the next match:
- The player must be fit.
- The player must have performed well in the previous tournament.

Maxwell's reasoning is incorrect. He believed that his performance in the previous tournament alone was enough to be selected for the next match; he neglected to consider his fitness. His average score of 48 runs also does not guarantee his performance, as there is no context about how many runs a 'good' score is.

Warner's reasoning is incorrect. He believed that his fitness alone was enough to be selected for the next match; he neglected to consider his performance in the previous tournament.

Therefore, Option D is the correct answer. |

17	D	The person whose reasoning is correct is to be determined based on the card received in a football match.

The key concept used here is detecting reasoning errors.

In the information, it is mentioned about the types of cards a player could receive in an on-going match:
- Red card: Player will be immediately suspended and the team has to play with one less player.
- Yellow card: It serves as a caution to the player and too many yellow cards can result in a suspension.

Kye Rowles's reasoning is incorrect because the effect of receiving a card will be applicable for that current match not for the future matches.

Riley McGree's reasoning is incorrect because cards received for previous matches of the season won't be counted for upcoming matches and the only cards received in the ongoing match decides the suspension of the player. There is no information about how many yellow cards are "too many", so either way there is no definite suspension.

Therefore, Option D is the correct answer. |
| 18 | A | The person whose reasoning is correct is to be determined based on the conditions to get a driver's licence.

The key concept used here is detecting reasoning errors.

According to the given information, there are two conditions for an individual to get a driver's licence:
- One must be at least 16 years old.
- One has to pass both a written and practical driving test.

Emma's reasoning is correct because as she is below 16 years she can't apply for a driver's licence.

Jackson's reasoning is incorrect because the tests will be conducted after applying for the driver's licence.
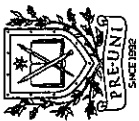
Therefore, Option A is the correct answer. |

Term 4 Week 3
Thinking Skills Advanced
Critical Thinking
Challenging Questions

Question Number	Answer	Solution
1	B	Farah is incorrect – just because the team does not have green on their uniform, it does not mean they cannot represent Iceland. The only thing that can be deduced from the box is that if there is a team with green in their uniform, they must represent Iceland. This does not prevent other non-green teams from representing Iceland too. Minnie is correct – her reasoning reflects what the box is saying exactly. Hence, the answer is **B**.
2	C	According to the criteria, Emily's statement will be true. As Emily began her revision early and was familiar with the types of questions that could appear, the conclusion that she can perform her best can be drawn. Melissa's statement is also correct for one reason. Melissa's personal best is not the same as the best possible marks (which is interpreted to mean 100%). She could also have not revised early for every previous test. Therefore, the correct answer is C.
3	A	For glue to be considered excellent, it needs to attach different surfaces together successfully. Since acrylic and wood are different surfaces and it attached for a long time, Eileen's glue can be considered excellent. However, Cody's glue bonded paper to paper, which are not different surfaces. Since we do not know if it can adhere to different types of surfaces, we cannot draw any conclusion on if it is excellent. Therefore, only Eileen's reasoning is correct. The correct answer is **A**.

19	D	The error in the participants' reasoning is to be identified based on the conditions given for the annual Timekeeper's Convention. The key concept used here is detecting reasoning errors. Faye's reasoning is not correct because she has restored more than two mechanical clocks from the 1800s and featured one of her restoration projects in the local historical society. However, she has studied only two types of ancient timekeeping methods, which is less than the required minimum. Russell's reasoning is not correct because although he has studied more than three types of ancient timekeeping methods and restored more than two mechanical clocks from the 1800s, we don't know if he has had at least one restoration project featured in a local museum or historical society. Therefore, Option **D** is the correct answer.
20	A	The error in the participants' reasoning is to be identified based on the effects given for the introduction of FM radio. The key concept used here is detecting reasoning errors. Nina's reasoning is correct because the effect of FM radio was a collapse in the market for audio cassettes as it provided an alternative way of listening to music without the need to purchase cassettes. Victor's reasoning is not correct because the introduction of FM radio led to a decline in the audio cassettes market, not growth, because people now had an alternative way of listening to music without needing to buy cassettes. Therefore, Option **A** is the correct answer.

Term 4 Week 3
Thinking Skills Advanced
Problem Solving
Finding Procedures: Simple Number Operations

Question Number	Answer	Solution
1	B	The amount of money Jake has is to be calculated if the money is divided according to the ratio they saved in. The key concept used here is ratio and proportion. From the problem, we understand that the savings ratio of Jake to Ethan is 1 : 2. Therefore, the total savings of $900 should be divided into 3 parts (1 part for Jake + 2 parts for Ethan). We can calculate the value of each part by dividing the total amount by the number of parts: $900 ÷ 3 = $300 per part. As Jake's share of the savings is 1 part, his amount would be: 1 × $300 = $300 Therefore, Jake has saved $300. Therefore, Option **B** is the correct answer.

2	D	The amount of money Robert originally had before giving away is to be calculated. The key concept used here is fractions and reverse calculation. From the problem, we understand that Robert has $1 500 000 left after giving away a part of his fortune in the following order: Let's denote the original amount of money Robert had as x. • After giving $\frac{1}{2}$ of his fortune to his wife, he has $\frac{1}{2} \times x$ left. • After giving $\frac{1}{3}$ of the remaining fortune to his son, he has $\frac{2}{3} \times (\frac{1}{2} \times x)$ left, which simplifies to $\frac{1}{3} \times x$. • After giving $\frac{1}{4}$ of what remains after that to his daughter, he has $\frac{3}{4} \times (\frac{1}{3} \times x)$ left, which simplifies to $\frac{1}{4} \times x$. This remaining amount equals $1 500 000 as per the problem, which we can now solve for x: $\frac{1}{4} \times x = \$1\,500\,000$ Multiplying both sides by 4 to solve for x, we get: $x = 4 \times \$1\,500\,000$ $x = \$6\,000\,000$ So, Robert originally had $6 000 000 before he started giving it away. Therefore, Option **D** is the correct answer.

4   **A**

The monthly income (in kg of fruits) of Apple and Berry is to be determined based on the given information.

The key concept used here is simple number operations.

Let the monthly income of Apple = $3p$ kg of fruits.
The monthly income of Berry = $4p$ kg of fruits.

Similarly, let the monthly expenditures of Apple = $2q$ kg of fruits.
The monthly expenditures of Berry = $3q$ kg of fruits.

Income minus expenditures equals savings.
For Apple: $3p - 2q = 30$
For Berry: $4p - 3q = 30$

Multiply the first equation by 3 and the second by 2.
For Apple: $9p - 6q = 90$
For Berry: $8p - 6q = 60$

Subtract the second equation from the first to get $p = 30$.

Substitute $p = 30$ in the first original equation ($3p - 2q = 30$):
$3 \times 30 - 2q = 30$
$90 - 2q = 30$
$-2q = 30 - 90$
$-2q = -60$
$2q = 60$
$q = \dfrac{60}{2}$
$q = 30$

Hence,
The monthly income of Apple is $3p = 3 \times 30 = 90$ kg of fruits.
The monthly income of Berry is $4p = 4 \times 30 = 120$ kg of fruits.

Therefore, Apple – 90 kg and Berry – 120 kg is the correct answer.

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

---

3   **C**

The number of valid votes received by the second candidate in a high school election is to be determined based on the given information.

The key concept used here is simple number operations.

The total number of votes cast = 15 200
The number of invalid votes = 15% of 15 200 = 0.15 × 15 200 = 2 280
The number of valid votes = Total votes – invalid votes
= 15 200 – 2 280 = 12 920

As the first candidate received 55% of the valid votes, the number of votes that the first candidate got = 0.55 × 12 920 = 7 106.

Therefore,
Number of votes that the second candidate got = 12 920 – 7 106
= 5 814

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

6	B	The profit made by Sophie is to be determined based on the given information.
		The key concept used here is simple number operations.
		Sophie's total cost to make a batch of 100 cupcakes is $50.
		She sells each cupcake for $1.50. She sold 80 cupcakes. Her total income from selling the cupcakes = 80 × $1.50 = $120. The selling price is greater than the cost price. Therefore, Sophie made a profit.
		To find the overall profit, subtract the total cost price from the total selling price (income).
		Profit = Total Selling Price − Total Cost Price Profit = $120 − $50 = $70
		So, Sophie made a profit of $70.
		Therefore, Option **B** is the correct answer.

5	A	The speed of the stream is to be determined based on the given information.
		The key concept used here is simple number operations.
		Let the speed of the boat in still water be 'b' km/h and the speed of the stream be 'c' km/h.
		The downstream speed of the boat (going with the stream) is '$b + c$' km/h. The upstream speed of the boat (going against the stream) is '$b − c$' km/h.
		From the given information, these expressions can be written: Downstream speed: $b + c = 27$ Upstream speed: $b − c = 17$
		These two equations can be solved to find the values of 'b' and 'c'.
		Add the two equations together to find 'b': $(b + c) + (b − c) = 27 + 17$ $\quad 2b = 44$ $\quad b = 44 \div 2$ $\quad b = 22$
		Speed of the boat in still water = $b = 22$ km/h Substitute $b = 22$ km/h into the downstream speed equation. $22 + c = 27$ $\quad c = 27 − 22$ $\quad c = 5$ km/h
		Therefore, the speed of the stream is 5 km/h.
		Therefore, Option **A** is the correct answer.

	In this problem, the task is to calculate the total time James would take to paint a wall, taking into consideration both his painting speed and his break times.
	The key concept used here is simple number operations.
	The total area of the wall is 40 feet × 8 feet = 320 square feet.
	The rate at which James paints the wall is 2 square feet per minute. So, in 30 minutes, James covers 60 square feet of wall.
9 C	Since the total area of the wall is 320 square feet, he completes 5 full cycles of 45 minutes (30 minutes of work and 15 minutes of break) to cover 300 square feet of the wall. This takes him 5 × 45 = 225 minutes.
	However, 20 square feet of the wall remain to be painted.
	At a rate of 2 square feet per minute, he will cover this in an additional $\dfrac{20\text{ square feet}}{2\text{ square feet per minute}} = 10$ minutes.
	Therefore, the total time it will take James to paint the entire wall, including breaks, is 225 minutes + 10 minutes = 235 minutes.
	Therefore, Option C is the correct answer.

	In this problem, the task is to determine the number of flowering trees planted in the town park, given the total number of trees planted and the relationship between the number of flowering and non-flowering trees.
	The key concept used here is simple number operations.
	Let's denote the number of flowering trees as 'f' and the number of non-flowering trees as 'n'.
7 D	The problem states that the number of non-flowering trees is six less than four times the number of flowering trees, which can be written as $n = 4f - 6$.
	Also, the total number of trees planted in the town is 124. This leads to another equation $f + n = 124$.
	Substitute the first equation into the second to solve for 'f'. $124 = f + 4f - 6$ $130 = 5f$ $f = 26$
	So, the number of flowering trees planted in the town park is 26.
	Therefore, Option D is the correct answer.
	In this problem, the task is to calculate the time taken for two high-speed bullet trains, moving in opposite directions, to be completely clear of each other from the moment they meet.
	The key concept used here is simple number operations.
	The total length of the trains is 252 m + 198 m = 450 m.
8 B	The relative speed of the trains (since they're moving in opposite directions) is the sum of their speeds is 144 km/h + 108 km/h = 252 km/h, which is $252 \times \dfrac{1\,000}{3\,600} = 252 \times \dfrac{5}{18} = 70$ m/s.
	The time taken to cover 450 m at the rate of 70 m/s is $\dfrac{450}{70} \approx 6.43$ seconds.
	Therefore, Option B is the correct answer.

10	B	In this problem, the task is to determine the maximum number of batches of chocolate chip and oatmeal raisin cookies that Emily can bake using the available ingredients. The key concept involved here is arithmetic operations. For chocolate chip cookies, 4 pounds of chocolate chips are available and $\frac{1}{4}$ pounds of chocolate chips are required per batch. So, the maximum number of batches of chocolate chip cookies is 4 pounds ÷ $\frac{1}{4}$ pounds per batch = 16 batches. For oatmeal raisin cookies, 3 pounds of raisins are available and $\frac{1}{3}$ pounds of raisins are required per batch. So, the maximum number of batches of oatmeal raisin cookies is 3 pounds ÷ $\frac{1}{3}$ pounds per batch = 9 batches. Therefore, Option **B** is the correct answer.

11	C	The new cost of the materials is to be calculated based on the information given in the question. The key concept used here is simple number operations. Let's break down the cost of each ingredient before any price changes: Flour: 30% of $500 = $\frac{30}{100}$ × 500 = $150 Sugar: 20% of $500 = $\frac{20}{100}$ × 500 = $100 Milk: 15% of $500 = $\frac{15}{100}$ × 500 = $75 Butter: 10% of $500 = $\frac{10}{100}$ × 500 = $50 Eggs and decorations: 25% of $500 = $\frac{25}{100}$ × 500 = $125 Now, let's consider the changes in the prices of flour and butter: The price of flour has increased by 20%, so the new cost of flour is $150 + (20% of $150) = $150 + ($\frac{20}{100}$ × 150) = $150 + $30 = $180. The price of butter has decreased by 10%, so the new cost of butter is $50 − (10% of $50) = $50 − ($\frac{10}{100}$ × 50) = $50 − $5 = $45. The costs of sugar, milk, eggs and decorations remain unchanged. So, the total cost of the raw materials after the price changes would be $180 (flour) + $100 (sugar) + $75 (milk) + $45 (butter) + $125 (eggs and decorations) = $525. Therefore, the new cost of the raw materials to make a cake, considering the changes in the prices of flour and butter, would be $525. Therefore, Option C is the correct answer.

13	C	The number of remote-controlled cars sold is to be calculated based on the information given in the question. The key concept used here is simple number operations. Let's solve it step by step. Step 1: Calculation of the marked price Jack purchased each car for $50 and marked them up by 40%. So the marked price (MP) is given by: MP = cost price + markup = $50 + 40% of $50 = $50 + $20 = $70 Step 2: Calculation of the Sale Price He offered a discount of 10% on the marked price. So the price at which he sold the cars (Sale Price, SP) is calculated as: SP = MP − discount = $70 − 10% of $70 = $70 − $7 = $63 Step 3: Calculation of the Number of Cars Sold Jack used all the money from the sales to purchase new-model cars costing $84 each. So, let's find out how many cars he sold: Money spent on new cars = Number of new cars × cost of each new car = 75 × $84 = $6 300 The total money he made from selling the old models was $6 300. Number of cars sold = $\frac{\text{Total money earned}}{\text{Sale price of each car}}$ = $\frac{\$6\ 300}{\$63}$ = 100 cars So he managed to sell 100 remote-controlled cars. Therefore, Option C is the correct answer.

12	B	The number of casual and formal shirts sold is to be calculated based on the information given in the question. The key concept used here is simple number operations. Let's denote: The number of casual shirts sold as 'C'. The number of formal shirts sold as 'F'. Also, the cost of one casual shirt is $20, and the cost of one formal shirt is $30. The total number of shirts sold is 100. So, we have C + F = 100. For every 2 casual shirts sold, they sold 3 formal shirts. So the ratio of C : F is 2 : 3. This is 2 + 3 = 5 parts which represents 100 shirts. Therefore, 1 part = 100 ÷ 5 = 20 shirts. C = 2 × 20 = 40 F = 3 × 20 = 60 Hence, there are 40 casual shirts and 60 formal shirts. Therefore, Option B is the correct answer.

14	C	The number of strawberry pastries and chocolate pastries is to be determined based on the information given in the question.
		The key concept used here is simple number operations.
		Eva has 1 kg of sugar (which is 1 000 grams) and 800 grams of flour.
		Let's denote the number of strawberry pastries as S and the number of chocolate pastries as C.
		It is known that she made 15 more chocolate pastries than strawberry pastries, so we can write that as $C = S + 15$.
		Now let's set up equations based on the amount of sugar and flour used.
		For sugar: $25S$ (sugar for strawberry pastries) $+ 30C$ (sugar for chocolate pastries) $= 1 000$
		By substituting C from the first equation into the sugar equation, we get:
		$25S + 30(S + 15) = 1 000$
		$25S + 30S + 450 = 1 000$
		$55S = 550$
		$S = 10$
		Substituting $S = 10$ into the first equation, we get $C = 10 + 15 = 25$.
		So, Eva made 10 strawberry pastries and 25 chocolate pastries.
		Therefore, Option C is the correct answer.

15	A	The overall profit percentage is to be calculated based on the information given in the question.
		The key concept used here is simple number operations.
		Let's start by calculating the total cost price (CP).
		The total cost of the vases is $(10 \times \$900) = \$9\ 000$.
		The total cost of the paintings is $(15 \times \$600) = \$9\ 000$.
		So, the total cost price (CP) of all the art = $\$9\ 000 + \$9\ 000 = \$18\ 000$.
		Next, let's calculate the total selling price (SP).
		The selling price of the vases (at a 15% loss):
		$\$9\ 000 - (\frac{15}{100} \times \$9\ 000) = \$7\ 650$
		The selling price of the paintings (at a 30% profit):
		$\$9\ 000 + (\frac{30}{100} \times \$9\ 000) = \$11\ 700$
		So, the total selling price (SP) of all the art:
		$\$7\ 650 + \$11\ 700 = \$19\ 350$
		Now, let's find the overall profit or loss percentage. Since SP > CP, it's a profit.
		$Profit = SP - CP = \$19\ 350 - \$18\ 000 = \$1\ 350$
		The profit percentage is given by:
		$(\frac{Profit}{CP} \times 100)\% = (\frac{\$1\ 350}{\$18\ 000} \times 100)\% = 7.5\%$
		Therefore, Option A is the correct answer.

18	D	The length of the total journey is to be calculated based on the information given in the question.
		The key concept used here is simple number operations.
		Let the total length be S.
		According to the given information:
		• The man travelled two-fifths of his journey by train: $\frac{2}{5}$ S km
		• He covered one-third of the journey by bus: $\frac{1}{3}$ S km
		• He traversed one-fourth of the journey by car: $\frac{1}{4}$ S km
		• The remaining 3 km of the journey was on foot: 3 km
		The sum of these distances should equal the total length of the journey: $\frac{2}{5}S + \frac{1}{3}S + \frac{1}{4}S + 3 = S$
		Solve for S: $\frac{24}{60}S + \frac{20}{60}S + \frac{15}{60}S + 3 = S$
		Combine the terms with S: $\frac{59}{60}S + 3 = S$
		Subtract $\frac{59}{60}$ S from both sides of the equation: $3 = \frac{1}{60}S$ $S = 180$ km
		So, the total journey is of 180 km.
		Therefore, Option **D** is the correct answer.

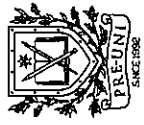|		
16	A	The number of times Rita rolled an even sum using two dice is to be determined.
		The key concept used here is finding the correct procedure and number operations involved to analyse the data.
		Let n be the number of times Rita rolls an even sum, then $(20 - n)$ times she rolls an odd sum.
		Points scored for even sum rolled = $10n$ Points lost for odd sum rolled = $5(20 - n)$
		Total points: $10n - 5(20 - n) = 50$ $10n - 100 + 5n = 50$ $15n = 150$ $n = 10$
		Therefore, Option **A** is the correct answer.
17	D	The number of questions Linda answered correctly is to be determined.
		The key concept used here is finding the correct procedure and number operations involved to analyse the data.
		Let n be the number of questions Linda answered correctly, then $(30 - n)$ questions she answered incorrectly.
		Scores achieved for correct answer = $3n$ Scores lost for incorrect answer = $2(30 - n)$
		Total scores: $3n - 2(30 - n) = 65$ $3n - 60 + 2n = 65$ $5n = 125$ $n = 25$
		Therefore, Option **D** is the correct answer.

20	D	The number of soldiers who were sent to reinforce the other fort is to be calculated.
		The key concept used here is simple number operations.
		Let the number of soldiers left = x
		After 4 days, for 1 200 soldiers, the food would last for = 28 − 4 = 24 days.
		The food would last for 1 200 soldiers = 24 days.
		Amount of food = 1 200 × 24 and for 1 200 − x soldiers = 32 days
		$\qquad\qquad\qquad = (1\,200 - x) \times 32$
		As the amount of food is the same, therefore,
		$(1\,200 - x) \times 32 = 1\,200 \times 24$
		$1\,200 \times 32 - 32x = 1\,200 \times 24$
		$\qquad\qquad 32x = 1\,200 \times 32 - 1\,200 \times 24$
		$\qquad\qquad 32x = 1\,200 \times 8$
		$\qquad\qquad\quad x = 300$
		So, 300 soldiers left the fort.
		Therefore, Option **D** is the correct answer.

19	A	The time taken to cover the initial part of the journey at a speed of 60 km/h is to be calculated.
		The key concept used here is simple number operations.
		Let the time travelled at 60 km/h be t hours.
		Time travelled at the increased speed = $(8 - t)$ hours.
		Then, $t(60) + (8 - t)(75) = 555$
		$\qquad 60t + 75 \times 8 - 75t = 555$
		$\qquad\quad 75 \times 8 - 15t = 555$
		$\qquad\quad 600 - 555 = 15t$
		$\qquad\qquad\quad 15t = 45$
		$\qquad\qquad\qquad t = 3$ hours
		So, the time taken to cover the initial part of the journey at a speed of 60 km/h is 3 hours.
		Therefore, Option **A** is the correct answer.

Question Number	Answer	Solution
2	C	Students need to first extract and categorise the information because the large amount of numbers given can cause confusion. It is recommended that students break down the cost into employees and material as done below. To solve this question students, need to determine the total cost for the production of 250 dresses, then the unit cost. Employees Designers: $3 \times 2\,500 \times 4 = \$30\,000$ Pattern cutter: $1 \times 1\,500 \times 4 = \$6\,000$ Models: $2 \times 2\,000 \times 4 = \$16\,000$ Material Material Cost: $\$29 \times 250 = \$7\,250$ Total Cost Cost: $30\,000 + 6\,000 + 16\,000 + 7\,250 = \$59\,250$ Unit Price: $\$59\,250 \div 250 = \$237$ Therefore, Option C is the correct answer.

Term 4 Week 3
Thinking Skills Advanced
Problem Solving
Challenging Questions

Question Number	Answer	Solution
1	D	The ticket costs 15 dollars per person. When there was a promotion, the ticket only cost 12 dollars a person. As the question tells that if there are more than 10 people, everyone gets a discount, it is known that the original amount of people is more than 10. However, because the promotion ended, and ticket prices return to 15 dollars, it is known that Bill is now missing the amount of cash for 3 people. This amount is $3 \times 15 = 45$ dollars. However, before Bill was able to invite these 3 people due to the 3-dollar discount per person. As a result, it is known that the original group was all able to go because this 3-dollar discount covered the original 45 dollars that would otherwise be in excess. Therefore, the original group had $45 \div 3 = 15$ people, and now the group that is going is $15 - 3 = 12$ people. Hence, the correct answer is D.

3	D	First let's figure out how long the race is by Yuma's time. If Yuma goes slow for half the time, that means she is going at a slow speed for 15 mins (0.25 hrs). Using the formula, distance = speed × time. Yuma goes slow for $0.25 \times 30 = 7.5$ km and Yuma goes fast for $0.25 \times 90 = 22.5$ km. Therefore, the race is 30 km. Now let's calculate the time it takes for Trent to complete the race. Trent goes slow for half the distance of the race which is 15 km. To figure out how long it takes him let's use the formula: time = distance ÷ speed. Trent goes slow for $15 \div 30 = 0.5$ hrs = 30 mins and goes fast for $\dfrac{15}{90}$ $= \dfrac{1}{6}$ hrs = 10 mins. Therefore, it takes Trent 40 mins to complete the race. Hence, Yuma wins the race by 10 minutes.