TOPIC 1: INTEGERS AND FINITE SYSTEMS:

APPLICATION OF INTEGERS PART ONE (AGES):

1. A man was born in 20 BC and died in 45 AD. How old was the man by the time he died?

Age= Death Year-Birth year

+45 - (-20)

+45+20

= +65

AD for (+)

BC for (-)

(-) × (-) = (+)

He was 65 years old by the time he died.

2. Mr. Lizard was born in 23 BC and died at the age of 53 years. In which year did he die?

Death year = Birth year + Age

-23 + ($^{+}$53)

-23+53

= +30

Note that

AD for (+)

BC for (-)

(+) × (+) = (+)

He died in 30AD

1. Roy was born in 15 BC. He was elected as the area member of parliament in 35AD. At what age was he elected as the area member of parliament?

2. A woman was born in 13 BC and died in 74 AD. How old was she when she died?

3. Betty was born in 15 BC and died at the age of 67 years. In which year was she born?

4. Dribareo who was 53 years was born in 41 BC. In which year did she die?

5. Let's take it that you were born in 2006 and we are in 2024, how old are you?

6. Assuming that you are 26 years old in 2018. Find your birth year using the knowledge of integers you have learnt.

APPLICATION OF INTEGERS PART TWO (TEMPERATURE):

1.The temperature of Tororo was +35^{0}C. It rose by +3^{0}C. What is the new temperature?

The word Rose means positive (+)

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New temperature = Initial temperature + Temperature Rise

$^{+}35^{0}c + {}^{+}3^{0}c$	$^{+}35^{0}c + 3^{0}c$
$^{+}35^{0}c + (^{+}3^{0}c)$	$= {}^{+}38^{0}c$

The new temperature is $^{+}38^{0}c$

2. The temperature of the place was $+5^{0}c$ in the morning. It declined by $+3^{0}c$. What is the new temperature now?

New temperature = Initial temperature – Decline in temperature

$^{+}50c - {}^{+}3^{0}c$	$^{+}5^{0}c – 3^{0}c$
$^{+}5^{0}c – (^{+}3^{0}c)$	$= {}^{+}2^{0}c$

The new temperature is $^{+}2^{0}c$

3. Patrick bought water from a fridge at $-15^{0}c$. He waited when the water was at $+5^{0}c$ and drank it. What was the difference in the temperature of the water by the time he drank it?

Temperature difference = Final temperature – Initial temperature

$+5^{0}c - -15^{0}c$	$+5^{0}c + 15^{0}c$
$+5^{0}c – (-15^{0}c)$	$= +20^{0}c$

The difference in water temperature was $^{+}20^{0}c$

General Activity:

1.The temperature of the place was $-15^{0}c$ in the morning. It rose to $+12^{0}c$ by noon. Find the temperature range.

2. The temperature of Kampala town was $13^{0}c$. After it rained, the temperature dropped by $4^{0}c$. Find the new temperature of Kampala.

3. The temperature of a place reduced from $-34^{0}c$ to $-55^{0}c$. Find the decrease in the temperature.

4. The temperature of Nagongera town council increased from $-5^{0}c$ to $+15^{0}c$. Find the temperature rise. 5. Oketcho moved 6 steps forward, then 3 steps backward, and 2 more steps forward. How many steps did he move forward?

6. A frog fell into a pit that was 30m deep. Each day, it climbs 3m but falls back 2m at night. How many days will it take to come out of the pit?

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7. On a rainy day the temperature was 30^0c below zero in the morning. In the afternoon the temperature rose by only 8^0c. What was the temperature in the morning?

8. The normal body temperature of a human being is 37^0c. Before treatment of malaria Patient had a 4^0c increase and after the treatment, the temperature reduced by 2^0c.Find the body temperature of the patient after treatment.

9. Akello can run a race in a time of 5 seconds less than 5 minutes. Achom can run the same race in 2 seconds more than Akello. What is Achom's time for the race?

10. Peter went 20 minutes earlier to the airport to wait for his brother. If the plane arrived 15 minutes late. How long did Peter wait at the airport?

11. An electric pole is 500 cm long. If 85 cm is below the ground. What part of the pole is above the ground?

12. A man walked 10 steps backward and then 15 steps forward ward. What

distance was he away from the starting point if each step is equals 50 cm?

13. The temperature of ice is -5^0c and the temperature of boiling water is 100^0c.What is the difference in temperature?

14.The temperature during the day in London was 15^0c, but during the night the temperature dropped by 20^0c.What was the temperature during the night?

15. A football team scored 4points and lost 3, Scored 2 points and lost 1 and lastly scored 6 points and lost 3. What was the total score after scoring the six successive games given?

16. A man climbed an electric pole. He started climbing 3 steps upwards and slipped one step downwards in that order. Find the number of steps he is from the ground after slipping 4 steps downwards. What distance was he from the ground if each step 50cm?

17. The temperature at the foot of mount Rwenzori was 15^0c. When a climber reached at the top of it, the temperature dropped by 17^0c. What was the temperature at the top of the mountain?

18. On a rainy day the temperature was 30^0c below zero in the morning. In the afternoon the temperature rose by only 80^0c. What was the temperature in the morning?

19. The normal body temperature of a human being is 37^0c. Before treatment of malaria Patient had a 4^0c increase and after the treatment, the temperature reduced by 2^0c.Find the body temperature of the patient after treatment.

20. Akello can run a race in a time of 5 seconds less than 5 minutes. Achom can run the same race in 2 seconds more than Akello. What is Achom's time for the race?

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21. Peter went 20 minutes earlier to the airport to wait for his brother. If the plane arrived 15 minutes late. How long did Peter wait at the airport?

22. A man walked 10 steps backward and then 15 steps forward ward. What distance was he away from the starting point if each step is equals 50 cm?

23. The temperature of ice is -50^0c and the temperature of boiling water is 100^0c.What is the difference in temperature?

24. The temperature during the day in London was 15^0c, but during the night the temperature dropped by 20^0c.What was the temperature during the night?

25. A football team scored 4points and lost 3, Scored 2 points and lost 1 and lastly scored 6 points and lost 3. What was the total score after scoring the six successive games given?

26. On a rainy day the temperature was 30c below zero in the morning. In the afternoon the temperature rose by only 80c. What was the temperature in the morning?

27. The normal body temperature of a human being is 37^0c. Before treatment of malaria, a Patient had a 4^0c increase and after the treatment, the temperature reduced by 20^0c. Find the body temperature of the patient after treatment.

28. An electric pole is 500 cm long. If 85 cm is below the ground. What part of the pole is above the ground level?

29. A man walked 10 steps backward and then 15 steps forward. What distance was he away from the starting point if each step is equals 50 cm?

30. The temperature of ice is -5^0c and the temperature of boiling water is 100^0c.What is the difference in temperature?

31. The temperature during the day in London was 15^0c but during the night the temperature dropped by 20^0c.What was the temperature during the night?

32. A football team scored 4points and lost 3, scored 2 points and lost 1 and lastly scored 6 points and lost 3. What was the total score after scoring the six successive games given?

33. An electric pole is 500 cm long. If 85 cm is below the ground level, what part of the pole is above the ground level?

34. The temperature of hailstone was -5^0c and that of water was 25^0c. What was the difference in temperature between hailstone and water?

APPLICATION OF INTEGERS PART THREE:

(TIME AND DISTANCE):

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1. Opio arrived at the bus station 18 minutes before the normal departure time for a bus to Dodoma. If the bus was 12 minutes late, how long did Opio wait at the station?

Duration= Arrival time of the bus – Arrival time of the passenger.

$^{+}12 - {}^{-}18$	$^{+}12 + 18$	Note that: Time before is a negative (-)
$^{+}12 – (^{-}18)$	= 30 minutes	Late time is a positive (+)

Opio waited for 30 minutes at the bus station.

2. A woman was standing against an electric pole. She started moving 3 steps forward and 1 step backward in that order. Find the number of steps she moved from the pole after moving 4 steps backward.

Forward steps →positive (+) and Backward steps →Negative (-)

Forward steps = $(^{+}3 \times 4)$ No. of steps from the pole

$= {}^{+}12$	$^{+}12 + (^{-}4)$
Backward step = $(^{-}4 \times 1)$	$^{+}12 - 4$
$= -4$	$= {}^{+}8$ steps

She moved 8 steps from the pole.

General Activity:

1. Roy misses his train by 5 minutes. If the train arrives every 10 minutes. How long does he have to wait for the next train?

2. Peter went 20 minutes earlier to the airport to wait for his brother. If the plane arrived 15 minutes late. How long did Peter wait at the airport?

3. A clock shows 10 minutes past 1:00 pm. It loses time by 6 minutes every hour. What will the real time be after 6 hours?

4. Patrick arrived at school 25 minutes before the start of the lesson but it delayed by a quarter an hour. Find the time Paul spent in class before the start of the lesson.

5. Sarah made 5 strides and each stride consists of 3 steps backwards facing negative direction. Find her position on the number line.

6. John arrived at the bus park 15 minutes before the normal departure time of the bus to Kampala. If the bus was late by 40 minutes. How long did he wait for the bus?

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7. The head teacher arrived at the meeting venue 5 minutes before the official starting time. The meeting was started 25 minutes late. How long did she wait at the meeting venue?

8. Morgan arrived for a church service 9 minutes before the usual starting time. On starting the service, a fault was detected on the system which took the church elders 34 minutes to put it right. How long did Morgan wait for the church service to start if the church pastor took 3 more minutes to start the service after the system was repaired?

AWARDING AND DEDUCTING OF MARKS (PART FOUR)

1. A teacher awards 3 marks for every correct answer and deducts 2 marks for every wrong answer given in a test of 30 questions.

a) If a boy answers 25 questions correctly, what is his final scores.

Correct answers + wrong answers = Final marks

Correct answers	Wrong answers
= 25	(30-25) = 5
$(25 \times {}^{+}3) + (5 \times -2)$	${}^{+}75 - 10$
${}^{+}75 + -10$	= 65 marks

b) If A girl fails 12 questions, find her final score.

Correct answers + Wrong answers = Final Marks

Wrong answers	Correct answers
= 12	(30-12) = 18

Correct answers + Wrong answers = Final Marks

$(18 \times +3) + (12 \times {}^{-}2)$	$(54 - 24)$	
$54 + ({}^{-}24)$	= 30 marks	**The girl scored 30 marks**

2. In an interview, 5 marks are awarded for any correct response and 2 marks are subtracted for any wrong response given. If the panel had 20 questions to answer.

a) What was the score of a candidate who failed 3 questions?

Correct answers + Wrong answers = Final score/marks

Correct responses	Wrong responses

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(20 – 3) = 17	= 3
(17 × $^{+}$5) + (3 × -2)	85 – 6
85 + (-6)	= 79 Marks

The candidate scored 79 marks

b) If a candidate passed 16 questions, what was his final score?

Correct responses + Wrong responses = Final marks

Correct responses Wrong responses

= 16 (20-16) = 4

(1 6 × $^{+}$5) + (4 × $^{-}$2)

80 + (-8)

80-8

= 72 Marks

The candidate scored 72 marks.

c) How many questions were passed by the candidate who scored 51 marks?

Let the number of correct /passed questions be represented by letter k

Correct questions = k Wrong questions = (20-k)

Correct answers + Wrong answers = Final score

(k × +5) + $^{-}$2(20-k) = 51	7k = 91
5k + ($^{-}$40) + 2k = 51	$\frac{7K}{7} = \frac{91}{7}$
5k – 40 + 2k = 51	k = 13
7k – 40 + 40 = 51 + 40	**The candidate passed 13 questions**

3. How many wrong responses/questions were given by a candidate who scored 65 marks?

Let the number of wrong responses be represented by letter m.

Wrong responses = m Correct responses = (20-m)

Correct response + Wrong response = Final score

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$+5(20 - m) + (-2 \times m) = 65$

$100 - 5m + -2m = 65$

$100 - 5m - 2m = 65$

$100 - 100 - 7m = 65 - 100$

$-7m = -35$

$\frac{-7m}{-7} = \frac{-35}{-7}$

$m = 6$

The candidate gave 6 wrong responses.

General Activity:

1. When marking a test, a teacher awarded 3 marks for every correct response and subtracted a mark for every wrong response in a test of 20 questions.

a) Find the score of a candidate who failed 7 questions.

b) What will be the score of a candidate who passes 17 questions?

c) Find the number of correct responses got by a candidate who scores 44 marks.

d) How many wrong responses were given by a candidate who scored 16 marks?

2. When marking a test, a teacher awarded 2 marks for every correct answer and subtracts a mark for every wrong answer. The test contained 20 questions.

(a) A pupil got 18 correct answers. What marks did the pupil get?

(b) A pupil got 25 marks, how many correct answers did the pupil get?

3. A teacher awarded 5 marks for every correct answer and subtracted 2 marks for wrong answer given in a quiz of 20 questions.

a) How many marks were scored by a candidate who;

(i) Passed 11 questions? (ii) Failed 2 questions?

(iii) Passed 13 questions? (iv) Passed 18 questions?

b) Find the number of wrong answers which were given by a candidate who scored 72 marks.

c) Assuming you were part of the candidates who took up that quiz and it so happened that you got 86 marks, how many correct and wrong answers would you have given?

4. A mathematics examination contains 30 questions. 3marks are a warded for every answer got correct but a mark is deducted for every failed. If a candidate got 25 questions correct, how many marks did the candidate score?

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5. When marking a test, a teacher awarded 3 marks for every question got correct and subtracted a mark for any wrong answer. If the test contained 25 questions and a pupil got 22 questions correct.

a) How many marks did the pupil get?

b) A pupil scored 40 marks, how many numbers did the pupil get correct?

6. While marking a test of 25 questions, a teacher awards 4 marks for every correct answer and deducts a mark for every wrong answer given.

a) Find a score for a candidate who got 16 correct answers.

b) If a pupil scored 35 marks, how many correct answer did he get?

7. In an interview, 3 marks are awarded for any correct response and 2 marks are awarded for any wrong response. The interview had 20 questions.

a) Find a score for a candidate who failed 3 questions.

b) If a pupil scored 35 marks, how many correct responses did he get?

MORE ABOUT APPLICATION OF INTEGERS:

1. Roy has a total of 30 turkeys and sheep in his farm. The animals have 82 legs altogether. a) How many animals of each category are in the farm?

Let the number of turkeys be represented by letter k

Turkeys	Sheep	Total legs
k	(30-k)	82

Note that

- Turkeys have 2 legs
- Sheep have 4 legs
- That means we have to form an equation by multiplying the number of turkeys by 2 and the number of sheep by 4 and equate to 82 legs.

2(k) + 4(30 - k) = 82	-2k + 120 – 120 = 82 - 120	Turkeys → (k)
2k + 120 – 4k = 82	-2k = - 38	**= 19 Turkeys**
2k – 4k + 120 = 82	$\frac{-2k}{-2} = \frac{-38}{-2}$	Sheep →(30-k)
-2k + 120 = 82	**k = 19**	(30-19) **= 11 Sheep**

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b) Determine the total number of legs each turkeys and sheep have respectively.

Turkeys are 19 with 2 legs each and **Sheep** are 11 with 4 legs each.

Turkeys	**Sheep**
(19 x 2)	(11 x 4)
= 38 legs	**= 44 legs**

2. Brenda rears chicken and cows in her farm. When she counted their heads, they were 29 and when she counted their feet, they were 80.

a) How many chicken and cows are in Brenda's farm

Let the number of chicken be represented by letter m

Chicken	Cows	Total legs
m	(29-m)	80

Note that

- Chicken have 2 legs
- Cows have 4 legs
- That means we have to form an equation by multiplying the number of chicken by 2 and the number of cows by 4 and equate to 82 legs.

2(m) + 4(29 - m) = 80	-2m + 116 – 116 = 82 - 116	Chicken → (m)
2m + 116 – 4m = 80	-2m = - 36	**= 18 Chicken**
2m – 4m + 116 = 80	$\frac{-2m}{-2} = \frac{-36}{-2}$	Cows →(29-m)
-2m + 116 = 80	m = 18	(29-18) **= 11 Cows**

b) From the total of 80 legs on all the 29 chicken and pigs in the farm, determine the total number of legs chicken and pigs have each.

Chicken are 18 with 2 legs each and **cows** are 11 with 4 legs each.

chicken	**cows**
(18 x 2)	(11 x 4)
= 36 legs	**= 44 legs**

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