

**INSTRUCTIONS:**

- Attempt all questions in Section A.
- Answer one item from part one and part two respectively of Section B.
- The total number of questions answered should only be four.
- Use non-programmable scientific calculators and mathematical tables with a list of formulae.

**SECTION A**

(Attempt all questions in this section)

**ITEM ONE:**

Your friend has visited you with the concern that she wants to start a business worth UGX.10,000,000. She has a quarter of the money and wishes to borrow the rest from the bank. He visited a certain bank and it's willing to give her the loan payable in three years at a compound interest rate of 20%.

According to her estimations, she expects to incur a total cost of UGX.5,000,000 per year and also expects to make profits that are 10% more than the cost. However what she is not sure of is whether those profits will be enough to pay back the loan in the required time. And so she is requesting you to help her find out.

She has also brought you 30 dresses and 6 pairs of shoes to share them equally with your other friends.

**TASK:**

- a) (I) how much will your friend get from the bank?  
(II) Will your friend be able to pay back the loan in the required time?
- b) What is the highest number of friends you will share your clothes with?

**ITEM TWO:**

You have a poultry project with hens and turkeys. You wish to maximize sales by selling each turkey at UGX.50,000 and each hen at UGX.30,000. However you don't wish to sell all your birds. You only want to sell a maximum total of 40 birds all together. You also want to sell turkeys that are less than twice the number of hens. You also want to sell at most 20 turkeys and at most 20 hens.

**ASK:**

- a) How many hens and turkeys will you choose to sell to maximize sales amidst all the constraints?

**SECTION B****PART ONE**

(Attempt one question from this part)

**ITEM 3**

A certain sports company is inviting students taking on Physical education classes with weight 45kg and less to apply and participate in some games. **You only want to let your learners apply if at least 70% of them qualify.** Below where the weight measurements of your leaners offering physical education:

No.of students	7	12	25	9	5	2
Weights (kg)	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59

**TASK:**

- a) i) How many of your students qualify for the game?  
ii) Will you apply on behalf of your students? (Justify your answer)

**ITEM 4**

Your friend wants to open up a store that sells dog, cat and fish food in your community. **So she asks you as the community member for the possibility that some people will not buy any of the foods such that she can base on that to decide whether to open up the store or not.** However before you gave her your response, you decided to ask sample of 197 people with in the community which pets out of the three they keep and below where your findings;

- 50 people kept dogs exclusive of fish and cats.
- 31 people kept both dogs and cats.
- 8 people kept dogs and fish.
- 10 people kept cats and fish.
- 83 people kept dogs.
- 101 people kept cats.
- 22 people kept fish.

- The rest kept none of the three pets.

TASK:

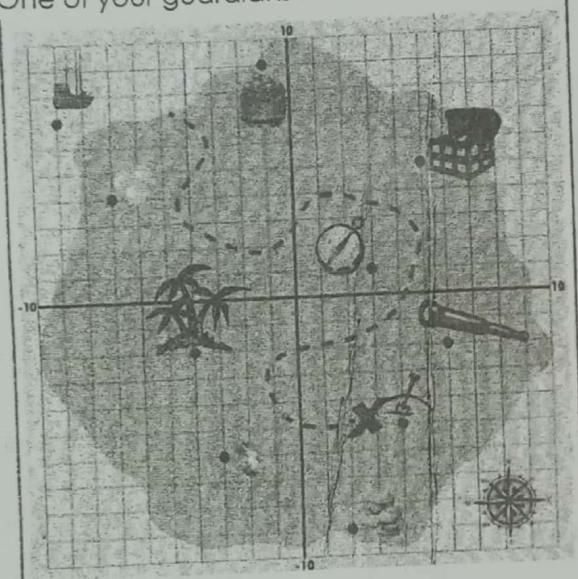
- a) (I) what is the possibility that some people will not buy any of the foods?  
 (II) Do you think your friend should open up the store? Justify your answer.  
 (III) Do you think your friend should open up the store? Justify your answer.

## PART TWO

(Answer any one question from this part)

### ITEM 5

One of your guardians loves treasure hunting! He has his treasure map below:



Scale (1square: 2km)

He rode with you at a constant speed of 50km/hr. from a place located at  $(-9, 7)$  to one located at  $(-7, 4)$  for the first treasure and then from there, he rode North-East to pick the second treasure and anchored the boat there for some rest.

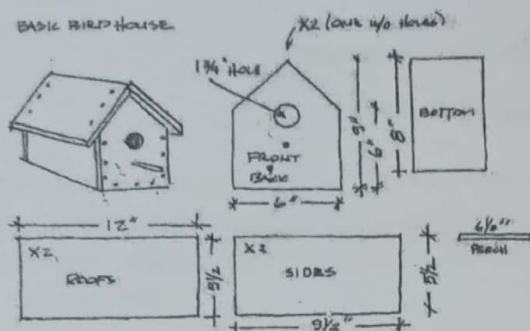
Before you two set off to ride back, he wants to know how many hours it will take to ride back using the direct route and the time you will arrive if he sets off at 1900hours while riding at the same speed of 50km/hr. including the direction he will have to take to use the direct route. He tasked you to find out as he gets some rest.

TASK:

- a) i) How far will you have to ride if you two take the direct route back?  
 ii) How many hours will it take you to return using that route?  
 iii) What time will you two arrive, if you set off at the planned time?  
 b) Which direction will you have to take to travel via that route?

### ITEM 6

You plan to buy a bird as a pet. But before you do, you want to construct for it a basic bird house using your rectangular board which is 2ft by 4ft. You went on the Internet and downloaded the design below with dimensions in inches:



You wish to find out whether the board you have is enough to make to the same house and the angle at which the two slanting sides of both the back and front boards have to meet for you to have the exact roof slope in the sketch.

Note:

$$1\text{m} = 39.4\text{inch}$$

$$1\text{ft} = 0.3\text{m}$$

TASK

- Will your board be enough?
- At what angle will the two slanting sides of both the back and front boards have to meet for your roof to have the same slope as that in the sketch?

END

# SCORING GUIDE:

S4: Resourceful Mock, 2024; Mathematics 456/1.

ITEMS	THEMES	TOPICS
1	Numbers.	<ul style="list-style-type: none"> <li>- Fractions, Decimals and Percentages.</li> <li>- Working with integers.</li> <li>- Numerical concepts 1 (Indices).</li> </ul>
2	Patterns and Algebra.	<ul style="list-style-type: none"> <li>- Algebra 1.</li> <li>- Inequalities.</li> <li>- Equation of a straight line.</li> <li>- Cartesian planes.</li> <li>- Linear programming.</li> </ul>
4	Data and Probability.	<ul style="list-style-type: none"> <li>- Set theory.</li> <li>- Probability.</li> <li>- Data collection and display   presentation.</li> </ul>
3.	Data and Probability.	
5.	Geometry and Measures.	<ul style="list-style-type: none"> <li>- Vectors.</li> <li>- Bearings.</li> <li>- Time and timetables.</li> <li><del>Trigonometry</del>.</li> </ul>
6	Geometry and Measures.	<ul style="list-style-type: none"> <li>- Length and area properties of two dimensional geometrical figures.</li> <li>- Trigonometry 1 and 2.</li> </ul>

# 1 Basis of assessment.

## Evidence | Skills | Processes.

- Amount of money loan from the bank.

$$\text{A quarter of the money} = \frac{1}{4} \times \text{Ugx. } 10,000,000.$$

$$= \text{Ugx. } 2,500,000.$$

$$\begin{aligned} & \text{Borrowed money} = \text{Ugx.}(10,000,000 - 2,500,000). \\ & = \text{Ugx. } 7,500,000. \\ & \text{My friend will get Ugx. } 7,500,000 \\ & \text{from the bank.} \end{aligned}$$

- Amount of money to pay back to the bank.

$$\begin{aligned} A &= P\left(1 + \frac{R}{100}\right)^t \\ A &= \text{Ugx. } 7,500,000 \left(1 + \frac{20}{100}\right)^3. \\ A &= \text{Ugx. } 7,500,000 \left(1 + 0.2\right)^3. \\ A &= \text{Ugx. } 7,500,000 \times 1.728. \\ A &= \text{Ugx. } 12,960,000. \end{aligned}$$

$$\begin{aligned} & \text{Profits per year} = (100+10)\% \text{ of Ugx. } 5,000,000 \\ & = \frac{110}{100} \times \text{Ugx. } 5,000,000 = \text{Ugx. } 5,500,000. \\ & \text{Profits for 3 years} = 3 \times \text{Ugx. } 5,500,000. \\ & = \text{Ugx. } 16,500,000. \\ & \text{Yes, she will be able to pay back the loan because the profits made in 3 years of } \\ & \text{Ugx. } 16,500,000 \text{ are greater than the amount to pay back of Ugx. } 12,960,000. \end{aligned}$$

## Distribution of Scores.

- Division | Multiplication (01)

- correct value (01)

- subtraction (01)

- correct value (01)

- conclusion from 05

- correct value (01)

- substitution of figures (01)

- use of BODMAS (01)

- use of calculator to compute (01)

- correct value (01)

- use of Percentage (01)

- Multiplication (01)

- correct value (01)

- Addition | Multiplication (01)

- correct value (01)

- conclusion from correct values (01)

- Reason - well explained (01)

Basis of assessment.	Evidence /Skills / Processes.	Distribution of Scores.	Total Scores.									
-Highest common Factor (H.C.F).	<table border="1"> <tr><td>2</td><td>30</td><td>6</td></tr> <tr><td>3</td><td>15</td><td>3</td></tr> <tr><td></td><td>5</td><td>1</td></tr> </table> <p>H.C.F = <math>2 \times 3 = 6</math>.</p> <p>Friends = <math>(6 - 1) = 5</math></p> <p><math>\therefore</math> I will share the dresser and shoes with 5 friends.</p>	2	30	6	3	15	3		5	1	<p>-Strategy (01).</p> <p>-Correct value (01).</p> <p>-Subtraction (01).</p> <p>-Conclusion (01). <span style="color:red">04</span></p>	(20)
2	30	6										
3	15	3										
	5	1										
<b>TOTAL</b>	<p><b>2</b></p> <p>Forming linear inequalities and linear equations.</p>	<p>-Let <math>x</math> represent hens and <math>y</math> turkeys. Defining Variables (01)</p> <p>Linear inequalities,</p> <p><math>2x + y \leq 40</math></p> <p><math>y &lt; 2x</math></p> <p><math>y \leq 20</math></p> <p><math>x \leq 20</math></p> <p><math>x \geq 0</math></p> <p><math>y \geq 0</math></p>	<p>Forming Linear equations (01)</p>									
		<p>Linear equations.</p> <p><math>x + y = 40</math></p> <p><math>y = 2x</math></p> <p><math>y = 20</math></p> <p><math>x = 20</math></p> <p><math>x = 0</math></p> <p><math>y = 0</math></p>	<span style="color:red">07</span>									

## Basic of assessment

### Evidence | Skills | Processes.

- Graphing inequalities.

$$\begin{array}{|c|c|c|} \hline x & 0 & 40 \\ \hline y & 40 & 0 \\ \hline \end{array}$$

$$\begin{array}{|c|c|c|} \hline x & 0 & 20 \\ \hline y & 0 & 40 \\ \hline \end{array}$$

$$\begin{array}{|c|c|c|} \hline x & 0 & 20 \\ \hline y & 0 & 20 \\ \hline \end{array}$$

$$y = 2x$$

### Distribution of Scores.

### Total Scores

$$\begin{array}{|c|c|c|} \hline x & 0 & 20 \\ \hline y & 0 & 10 \\ \hline \end{array}$$

$$\begin{array}{|c|c|c|} \hline x & 0 & 20 \\ \hline y & 0 & 20 \\ \hline \end{array}$$

$$y = 2x$$

$$\begin{array}{|c|c|c|} \hline x & 0 & 20 \\ \hline y & 0 & 20 \\ \hline \end{array}$$

$$y = 2x$$

Title: A graph showing inequalities for hens and turkeys.

Scale: 1cm  $\equiv$  5 hens; 1cm  $\equiv$  5 turkeys

- Labelling axes (with hens and turkeys) - Title. (01)

- Plotting the coordinates - Scale (01).

- Solid lines - drawn.

- Dotted lines - drawn.

- Line of regions

- Objective function | Sales expression. - Forming expression (01)

$30000x + 50000y$

- Identifying optimal | feasible region. - Region (01).

(x, y).  $30000x + 50000y$ .

(19, 20)  $570000 + 100000 = 1570,000$ . - Substitution (01).

(20, 19)  $600000 + 950,000 = 1550,000$ .

(20, 20)  $600000 + 100000 = 1600,000$ .

I will choose to sell 20 hens and 20 turkeys for maximum sales.

- conclusion. (01).

04

20

The graph showing hens and turkeys.

$$\text{Hens } \Delta y\text{-axis} (x=0)$$

$$y = 2x$$

$$x = 20$$

$$y = 20$$

$$x + y = 40$$

$$x\text{-axis } (y=0)$$

$$55 \text{ bot turkeys.}$$

(3)

Basis of assessment	Evidence	Skills/Processes-	Distribution of Scores.	Total Scores.
Data presentation	Weight (kg)	f	c.f class boundaries	-cumulative frequencies (01)
	30 - 34	7	7	29.5 - 34.5
	35 - 39	12	19	34.5 - 39.5
	40 - 44	25	44	39.5 - 44.5
	45 - 49	9	53	44.5 - 49.5
	50 - 54	5	58	49.5 - 54.5
	55 - 59	2	60	54.5 - 59.5

Title: A graph showing the number of learners and their weights.

Scales:  $2 \text{ cm} \equiv 5 \text{ kg}$

$$1 \text{ cm} \equiv 5 \text{ learners.}$$

Axes: Labelling the axes.

Data: Presenting data (c.f & c.b) on the ogive  
-Estimating the number of the learners on an ogive.

+ 45 students will qualify for the statement (01).  
as its the number that weighs 45kg and less.

An ogive showing weights of the learners,

give.



$$\begin{aligned}2 \text{ cm} &\equiv 5 \text{ kg}, \\10 \text{ cm} &\equiv 50 \text{ kg}, \\ \Rightarrow 1 \text{ cm} &\equiv 0.5 \text{ kg}.\end{aligned}$$

## Basis of assessment

### Data Analysis

#### Evidence | Skills | Processes.

$$\text{Probability} = \frac{45}{60} \times 100\% = 75\%$$

- I will apply for my becomes.
- Because the percentage of 75% exceeds 70%.

**TOTAL**

### Data Presentation

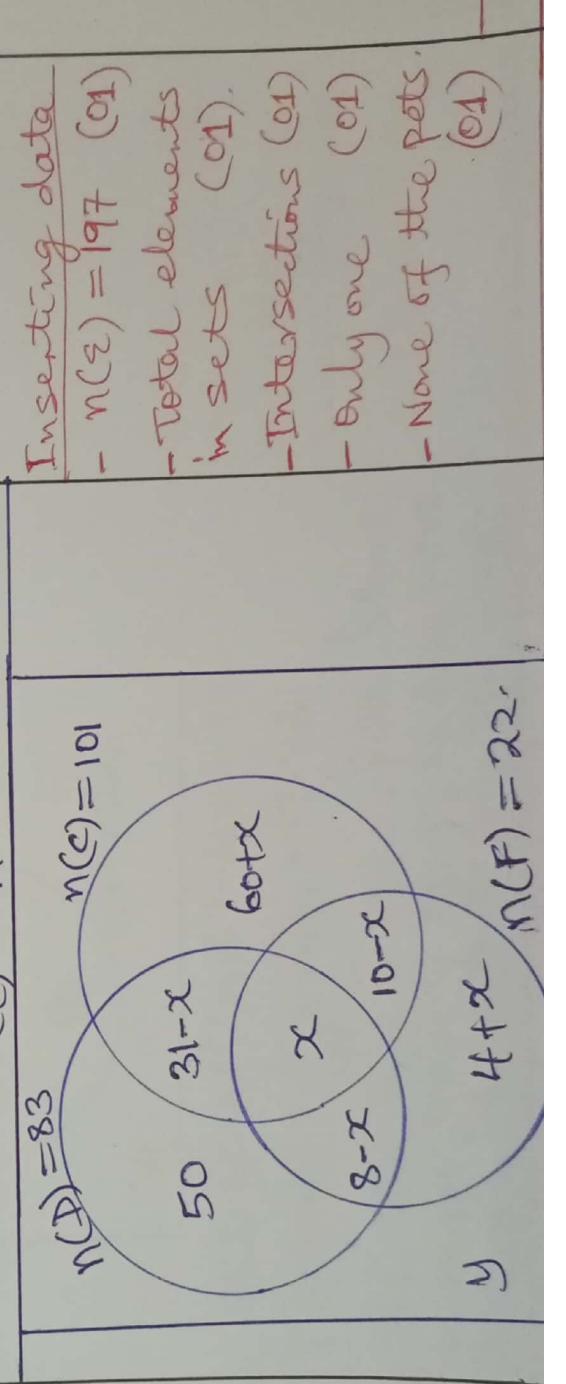
(4)

Let  $D = \text{Dogs}$ ,  $C = \text{cats}$ ,  $F = \text{fish}$

$$\begin{cases} n(E) = 197, & n(D \cap C \cap F') = 50 \\ n(C \cap F) = 10, & n(D \cap F) = 8, n(D \cap C) = 31, \\ n(D) = 83, & n(C) = 101, n(F) = 22, \\ n(D \cap C \cap F) = x, & n(D \cap C \cap F)' = y. \end{cases}$$

A Venn diagram showing people who keep dogs, cats and fish.

$$n(E) = 197$$



## Distribution of Scores.

### Substitution

- correct value (01)
- statement (01)
- reason (01).

(12)

## Total Scores

### Inserting data

- $n(E) = 197$  (01)
- Total elements in sets (01)
- Intersections (01)
- only one (01)
- None of the sets (01)

07

## Distribution of Scores, Total Scores

### Evidence | Skills / Processes,

$$n(\text{only}) = 101 - (31 - x + x + 10 - x) = 60 + x$$

$$n(\text{Forly}) = 22 - (8 - x + x + 10 - x) = 4 + x.$$

$$\underline{n(D) = 83}.$$

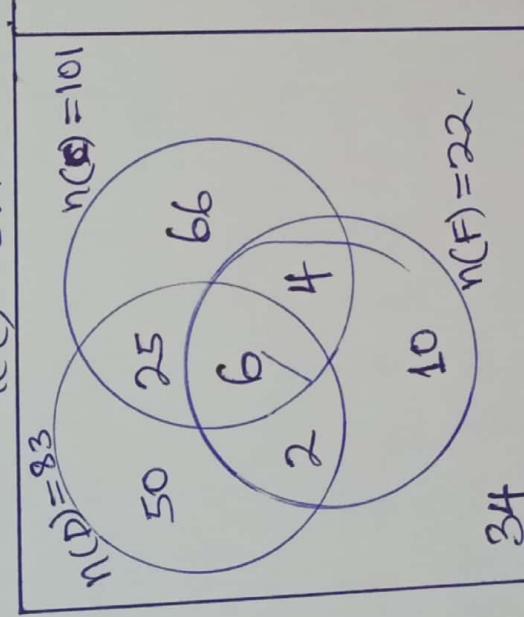
$$50 + 31 - x + x + 8 - x = 83.$$

$$89 - x = 83$$

$$x = 6.$$

### Data Analysis,

$$n(E) = 197$$



$$n(D \cup E \cup F)' = 197 - 163 = 34.$$

$$P(D \cup E \cup F)' = \frac{34}{197} \times 100\% = 17.3\%$$

Yes, she should open up the store because majority 82.7% keep the pets and will be able to buy pet food.

- operations (addition & subtraction) (01)
- correct value of x (01).

- operations (01).
- (addition & subtraction)

- Don't keep any pet (01).
- Substitution (01).
- correct value (01)

- conclusion (02)

08  
15

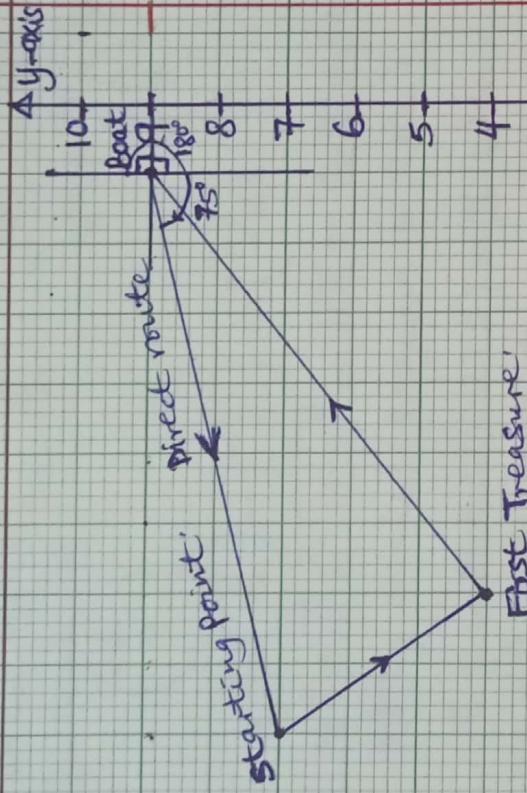
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Basis of Evidence/Skill process.

assessment  
Direct they  
will take:

Distribution  
of Scores.

Total  
Score



x-axis

Bearing = 180° + 75°  
= 255°

operation (addition)(Q1)

correct value (Q1)

Conclusion with correct compass (Q1)

∴ We will take the direction of 255° or S75°W using direct route.

Basin of assessment	Evidence (Skills) Processes,	Distribution of Scores,	Total Scores.
Distance to be travelled on direct route	<p>Where boat is anchored <math>\xrightarrow{\frac{9}{2}}</math> (Where the boat started from) <math>(-\frac{1}{9})</math> <math>\left(\begin{matrix} -9 \\ 7 \end{matrix}\right)</math>.</p> $\underline{\alpha} = \left(\begin{matrix} -9 \\ 7 \end{matrix}\right) - \left(\begin{matrix} -1 \\ 9 \end{matrix}\right) = \left(\begin{matrix} -8 \\ 2 \end{matrix}\right).$ $ \underline{\alpha}  = \sqrt{(-8)^2 + (-2)^2} = \sqrt{68} = 8.2 \text{ units}$ <p>Apply scale: (1 square <math>\equiv</math> 2 km).</p> $\therefore 8.2 \text{ units} \equiv (8.2 \times 2) = 16.4 \text{ km.}$ <p>We will ride a distance of 16.4 km along the direct route.</p>	<ul style="list-style-type: none"> <li>- Direction of movement (01)</li> <li>+ Reading coordinates (01)</li> <li>- Subtracting Vectors (01)</li> <li>- Substitution (01)</li> <li>- Correct value (01) with units (01).</li> <li>- Application of the Scale (01).</li> <li>+ Conclusion (01).</li> </ul>	07
Time it will take to return on direct route	<p>Time = <math>\frac{16.4}{50}</math> hours = 0.328 hours.</p> <p>1 hour = 60 minutes.</p> $0.328 \text{ hours} = 0.328 \times 60 \text{ minutes} = 19.68 \text{ minutes}$ <p><math>\approx</math> 20 minutes.</p> <p>Planned departure time. 19:00 hour <math>\rightarrow</math> 7:00 pm</p>	<ul style="list-style-type: none"> <li>- Substitution (01)</li> <li>- correct value with units (01).</li> <li>- Conversion of time into minutes. (01)</li> <li>(19 min is wrong)</li> <li>- conversion from 24 hours to 12 hours (01).</li> <li>+ Conclusion (01)</li> </ul>	03
Time of arrival	<p>7:00 pm + 0:20 minutes.</p> <p><u>7:20 pm</u></p>		02

Basis of assessment		Evidence   Skills   Processes.	Distribution of Scores.	Total Scores
Area of Rectangles.	<u>Root rectangles</u> $2(12 \times 5.5) = 132 \text{ inches}^2.$ Sides rectangles $2(9.5 \times 5.5) = 104.5 \text{ inches}^2.$ <u>Bottom rectangle</u> $8 \times 6 = 48 \text{ inches}^2.$	<ul style="list-style-type: none"> <li>- Substitution (01).</li> <li>- correct value with units (01).</li> <li>- Substitution (01).</li> <li>- correct value with units (01).</li> <li>- Substitution (01).</li> <li>- correct value with units (01).</li> <li>- Substitution (02) (Triangle &amp; Square).</li> <li>- correct value with units (01).</li> </ul>	<ul style="list-style-type: none"> <li>- Substitution (01).</li> <li>- correct value with units (01).</li> <li>- Operation / addition (01).</li> <li>- correct value with units (01).</li> </ul>	11
Area of the two pentagons.	<u>Area of front and back</u> $\frac{2[(\frac{1}{2} \times 6 \times 3) + (6 \times 6)]}{= 90 \text{ inches}^2.}$			
Total area of the Bird House.	$(132 + 104.5 + 48 + 90) = 374.5 \text{ inches}^2$			
Decision Making.	<u>Area of the available board</u> $12 \times 4 \text{ ft}^2 = 8 \text{ ft}^2.$ <u>Scale:</u> $1 \text{ ft} = 0.3 \text{ m} \Rightarrow 1 \text{ ft}^2 = 0.09 \text{ m}^2.$	<ul style="list-style-type: none"> <li>- Substitution (01).</li> <li>- correct value with units (01).</li> </ul>	<ul style="list-style-type: none"> <li>- Manipulation (01).</li> <li>- conversion of units (01).</li> <li>- conclusion (01).</li> </ul>	07 20