

# PROPOSED GUIDE

0701300439

Candidate's Name: ..... MR. WASSWA ENOCK .....

Signature: ..... *Wasswa* .....

Random No.				Personal No.			

(Do not write your School/Centre Name or Number anywhere on this booklet.)

P530/3  
BIOLOGY  
Paper 3  
(Practical)  
Nov./Dec. 2024  
3¼ hours



UGANDA NATIONAL EXAMINATIONS BOARD  
Uganda Advanced Certificate of Education

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BIOLOGY

Paper 3  
(Practical)

3 hours 15 minutes

## INSTRUCTIONS TO CANDIDATES

This paper consists of three questions.

All questions are compulsory.

Write the answers in the spaces provided. No additional sheets of paper should be inserted in this booklet.

You are **not** allowed to start working within the first 15 minutes. You are advised to use this time to **read** through the paper and ensure that you have all the apparatus, chemicals and specimens you require.

For Examiners' Use Only		
Question	Marks	Examiner's Signature & No.
1		
2		
3		
Total		

1. You are provided with specimen X which is freshly killed.  
(a) Examine the head of specimen X and describe the structure and location of the following:

(i) Vibrissae (whiskers). (03 marks)

Many / Numerous; Thin; Stiff; they are of variable length; tapering; dorso-laterally / dorso-ventrally located; above the eyes / around mouth / around snout.

max 03

(ii) Eyes. (1½ marks)

Paired / two; broad / large; protruding / bulging; oval shaped / round / ball shaped; dorso-ventrally located; anterior to pinnae / behind vibrissae.

(iii) Pinnae. (03 marks)

Paired / two; broad / large; protruding /

Paired / two; large / big; funnel shaped / wide at top; narrow at bottom; covered by scanty hair / fur; dorso-laterally located; posterior to the eyes.

max 03

- (b) How significant is the location of the following structures in the life of specimen X?

(i) Vibrissae. (02 marks)

Anteriorly located; for easy detection of obstacles.

OR

Laterally positioned on the head; to easily determine the diameter of the burrow;

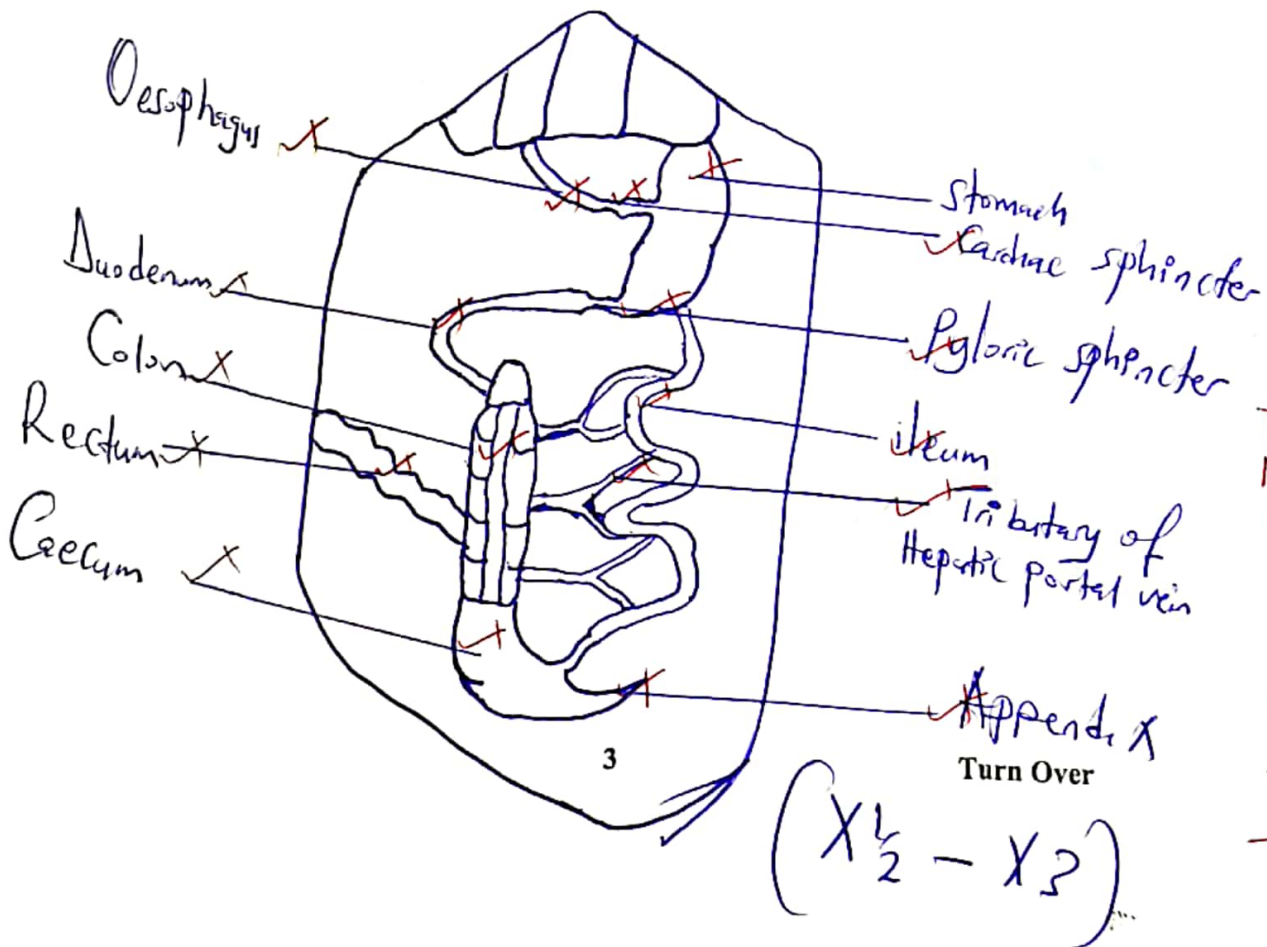
(ii) Eyes.

(1½ marks) (02)

Dorso-laterally positioned, on the both sides of head for greater field of view.

- (c) Dissect the abdominal cavity of specimen X to expose the structures in the viscera. Displace the liver lobes anteriorly to expose the underlying structures without displacing the stomach. Cut the rectum at the base, pull it upwards and pin it to the right side of the specimen. Locate the duodenum, caecum and ileum. Displace the duodenum and caecum to the right side of the specimen and the ileum to the left side of the specimen. Draw and label the displayed structures of the alimentary canal of the abdominal cavity up to the pinned rectum including the mesenteric structures attached to the small intestine.

A drawing showing structures in the viscera with liver lobes displaced anteriorly without displacing stomach, rectum cut and pinned at right, duodenum and caecum to right and ileum to left of specimen.



T-01  
M-01  
O-01  
N-0  
D-05

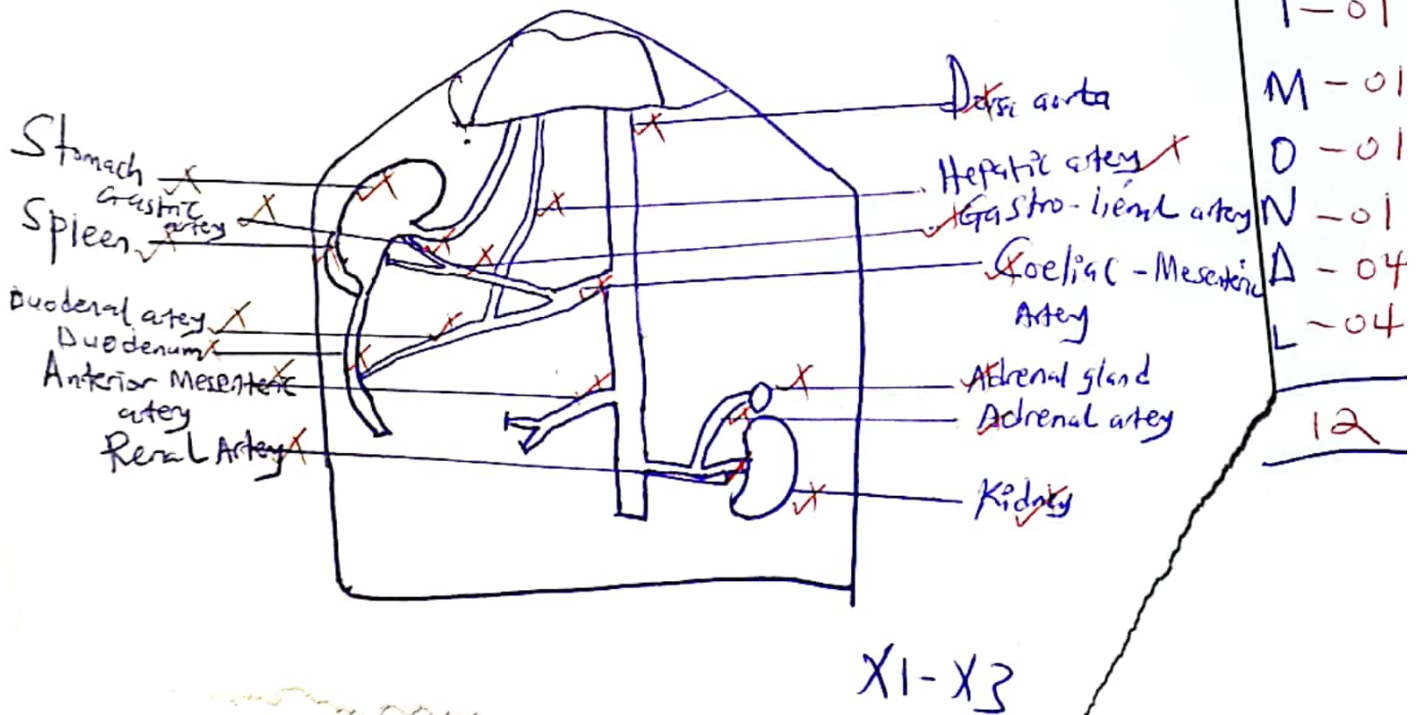
L-05

15



- (d) With the stomach displaced to the right side of the specimen, draw and label the organs lying between the anteriorly displaced liver lobes and the posterior end of the duodenum. Include the blood vessels that supply the structures displayed. (12 marks)

A drawing showing structures lying between the anteriorly displaced liver lobes and the posterior end of the duodenum with blood vessels that supply the structures displayed with stomach placed to right of specimen X.



2. You are provided with seedlings/seeds of five different lots labelled A, B, C, D and E, which have been grown for different lengths of time. You are required to investigate the effect of growth activities on the chemical components of the seed/seedlings using the following procedures:

- (a) (i) Label 5 petri dishes A, B, C, D and E.  
(ii) Obtain 10 seedlings/seeds from each lot and place them in the respective petri dishes labelled A, B, C, D and E.

- (iii) Using a clean mortar and pestle, thoroughly pound the seedlings from petri dish A. Add 15 cm<sup>3</sup> of distilled water, stir well and decant into a clean boiling tube and label it extract A<sub>1</sub>. Pour the residue into the plastic mug / beaker provided.
- (iv) Repeat the procedures (a)(i) – (iii) using the remaining seed/seedling lots to make corresponding extracts B<sub>1</sub>, C<sub>1</sub>, D<sub>1</sub> and E<sub>1</sub>.
- (b) (i) Carry out tests in table 1 to determine the food nutrients in extracts C<sub>1</sub> and D<sub>1</sub>. Record your test procedures, observations and deductions in the table.

Table 1

(14 marks)

Test procedure		Observations	Deductions
<u>Iodine test</u> To 1cm <sup>3</sup> of solution, add 2/3 drop of iodine solution	C <sub>1</sub>	Turbid / milky solution turns to blue-black / blue solution	Much starch present
	D <sub>1</sub>	Turbid solution turns to pale purple solution / pale blue	Little starch present
<u>Benedict's test</u> To 1cm <sup>3</sup> of solution, add 1cm <sup>3</sup> of Benedict's solution and boil	C <sub>1</sub>	Turbid solution turned to pale blue solution to green solution	Little Reducing Sugar present
	D <sub>1</sub>	Turbid solution turned to pale blue solution to green solution, yellow ppt, orange ppt	Modest Reducing Sugar present
<u>Biuret test</u> To 1cm <sup>3</sup> of solution, add 1cm <sup>3</sup> of sodium hydroxide followed by 3 drops of copper(II) sulphate	C <sub>1</sub>	Turbid solution turned to purple solution / pale purple solution	Little proteins present
	D <sub>1</sub>	Turbid solution turned to pale blue / very pale solution.	very little proteins present

05

06

05

16

- (ii) Basing on your results in table 1, name the extract which was obtained from the seedling that had grown for a longer time. (01 mark)

$A_1$  or  $\Delta$  ✓

- (iii) Explain your observations in table 1. (02 marks)

The concentration of starch reduced from  $C_1$  to  $A_1$ , and rate of reducing sugars increased, because  $D_1$  had been germinated for longer periods resulting into much breakdown of much starch by enzymes.

- (c) (i) Obtain five clean test tubes of the same size, label them  $A_2$ ,  $B_2$ ,  $C_2$ ,  $D_2$  and  $E_2$  and place them in a test tube rack.

- (ii) To each of the labelled test tubes  $A_2$ ,  $B_2$ ,  $C_2$ ,  $D_2$  and  $E_2$ , measure and pour  $1 \text{ cm}^3$  of solution Q.

- (iii) Add  $1 \text{ cm}^3$  of  $A_1$  into the test tube  $A_2$  and immediately start the stop clock.

- (iv) After 30 seconds, using a ruler, measure in centimetres the height of the contents in the test tube  $A_2$ .

- (v) Record your measurement in table 2.

- (vi) Repeat procedures (c)(iii) – (v) using extracts  $B_1$ ,  $C_1$ ,  $D_1$ ,  $E_1$  and the corresponding contents of test tube  $B_2$ ,  $C_2$ ,  $D_2$  and  $E_2$ .

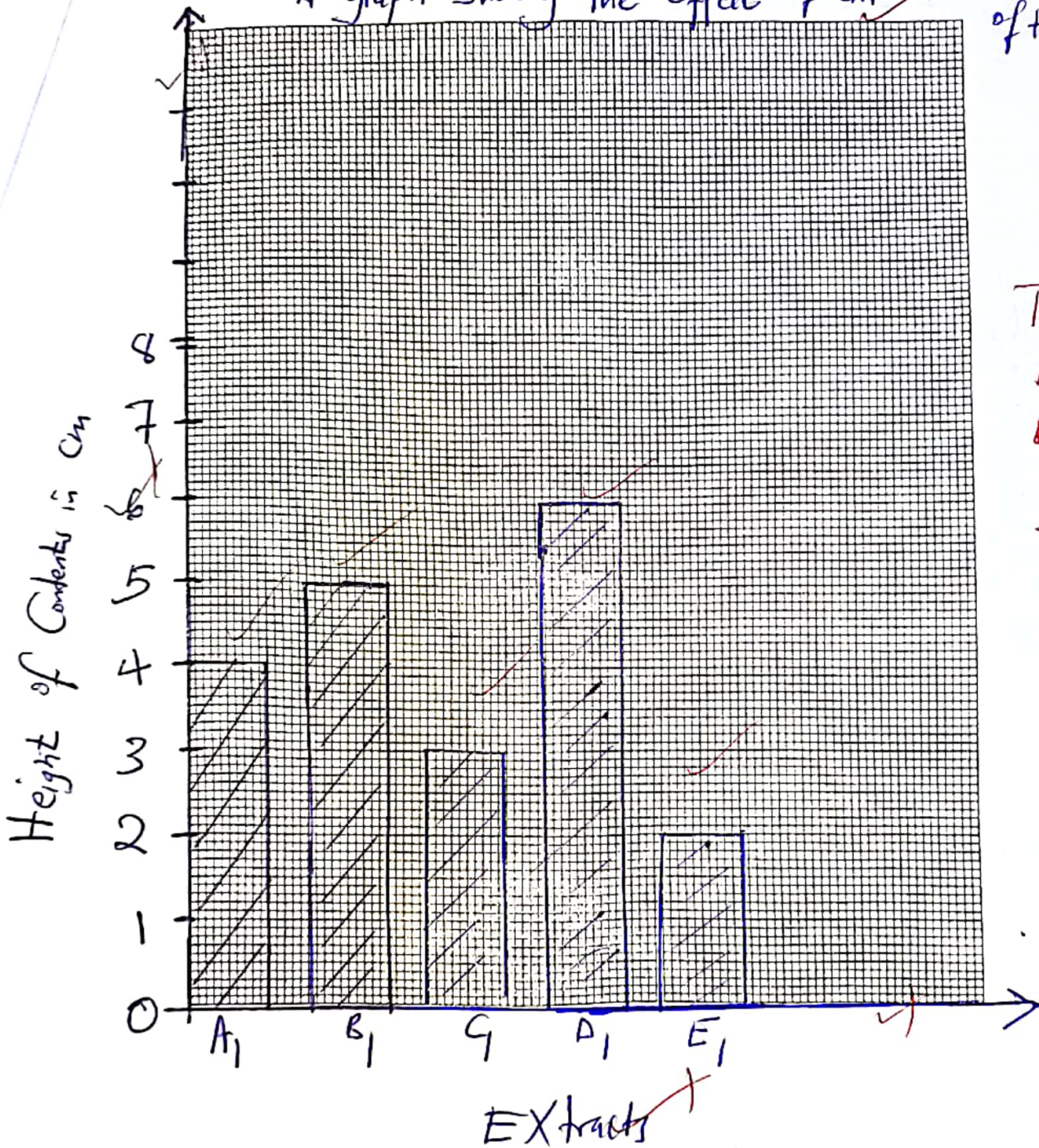
Table 2 (05 marks)

Extract	Height of contents after 30 seconds (cm)
$A_1$	1.5 – 4 ✓
$B_1$	1.6 – 5 ✓
$C_1$	1.4 – 3 ✓
$D_1$	1.9 – 6 ✓
$E_1$	1.1 – 2 ✓



(d) (i) Represent your results in table 2 on a suitable graph. (08 marks)

A graph showing the effect of extracts on the height of the contents



T-01  
DA-01  
LA-01  
P-05  

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08

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(ii) Explain the results plotted in (d)(i).

(04 marks)

The extracts contained an enzyme Catalase / active substance.  
The concentration of Catalase determines rate of decomposition / breakdown of  $H_2O_2$  to  $O_2$  and  $H_2O$ ,  
thus rising height of foam. As duration of germination increase, there is increased metabolism resulting into increased concentration of Catalase. max 4

3. You are provided with specimens V, W, Y and U.

(a) Examine specimens V, W, Y and U.

(i) Identify **two** distinctive features of the leaves and roots of each of the specimens and record your observations in table 3.

Table 3

(07 marks)

Specimen	Distinctive Features Observed	
	Leaves	Roots
V	Simple / undivided; parallel venation; narrow lamina; entire margin; hairy lamina	Adventitious / fibrous at nodes = variable length, many tapering
W	Scaley and fibrous leaves; inner green; succulent; outer dry	Adventitious fibrous at base of bulb; variable length
Y	Absent	Absent
U	Trifoliate / divided into 3 leaflets; Not veined; stalked petiole; broad	Tap root / main root; lateral roots; many variable length tapering

8 laminae;  
serrated margins;  
pointed apex



- (ii) Using the features in table 3, construct a dichotomous key for the identification of specimens V, W, Y and U. (03 marks)

1 (a) Has roots - - - go to 2 ✓  
 (b) Has no roots - - - Y ✓  
 2 (a) Net veined leaves - - - ✓  
 (b) Parallel veined leaves - - go to 3 ✓  
 3 (a) Has both scale and fleshy leaves - - W ✓  
 (b) Has only fleshy leaves - - - ✓  
 03

- (b) Explain the significance of any two common observable features unique to both specimens W and Y. (02 marks)

(i) Both are swollen / thick to increase surface area for storage of much food; for increased chances of survival of the plant upon sprouting.  
 (ii) Max 2

- (c) (i) Peel off the lower epidermis of a fleshy leaf of specimen W. Place it on a glass slide, add 1 – 2 drops of distilled water and cover with the cover slip. Observe under low power of a light microscope and describe the appearance of the observed structures within the field of view. (03 marks)

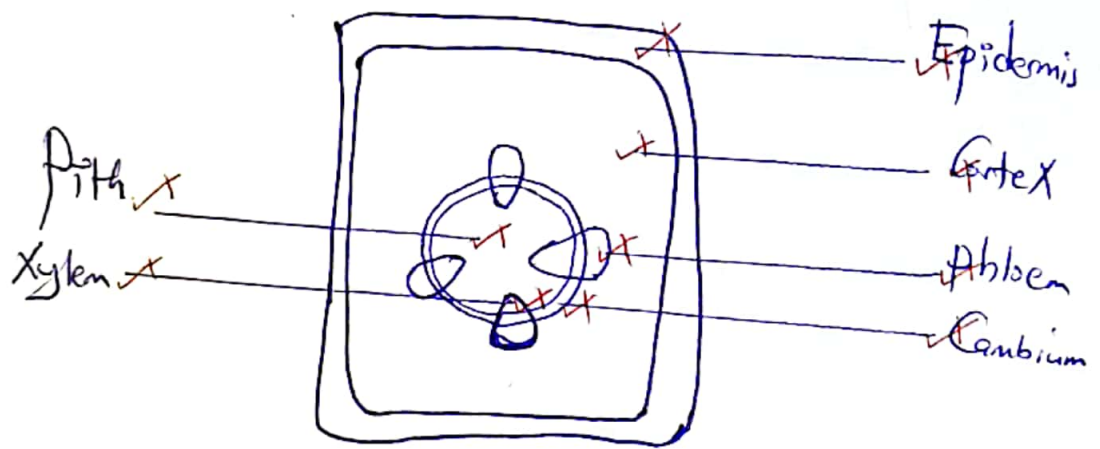
Many / numerous, polygonal / hexagonal / rectangular, tightly packed, thick cell wall, elongated, with circular nucleus, arranged side by side, in parallel rows.  
 03

- (ii) Obtain a thin transverse section at the fourth internode towards the apex of specimen U. Place it on a glass slide, add 1 – 2 drops of iodine solution and cover it with a cover slip. Allow it to stand for 3 minutes and observe under low or medium power of a light microscope.

Draw and label the observed structures.

(08 marks)

A drawing showing structures observed in transverse section at the fourth internode of specimen U under low power / Medium power of a light microscope ✓



X40 - X60

- (iii) State how any **three** observed structures in (c)(ii) are suitable for their functions. (03 marks)

Thick epidermis; for increased protection of internal structures. ✓  
 Numerous parenchyma cells that support the stem when turgid. ✓  
 Closely packed parenchyma cells in cortex for increased support when turgid. ✓



Numerous xylem vessels for increased surface area for  
transporting large amount of materials.

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