

Markscheme

May 2022

Interdisciplinary

On-screen examination














25 pages



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The following are the annotations available to use when marking responses.

Annotation	Explanation	Annotation	Explication
	Benefit of the doubt		Omission
	Vertical wavy line		Unclear
	Horizontal wavy line		On page comment (text box)
	Underline tool (can be expanded)		Seen
	Incorrect Point		Words to that effect
	Tick		Ellipse
	Highlight tool		

Best fit Approach

'The approach used in assessment in the application of assessment criteria is a "best fit" model. The examiner or teacher applying an assessment criterion must choose the achievement level that overall best matches the piece of work being marked. It is not necessary for every detailed aspect of an achievement level to be satisfied for that level to be awarded but it must reflect the balance of student achievement against the markband. For example, if student work matches two of the three requirements within a markband but one is seriously lacking, the student should be awarded for the strands that have been met well, but the mark awarded should be at the lower end of the markband to compensate for what is lacking in one strand. If the level of student work spans multiple markbands, compensation depends on the performance in the higher order skills. It is worth noting that the highest level of any given criterion does not represent perfection'. Please note that spelling errors should not impact the marks awarded in any part of the examination.

Note: Before marking, please familiarize yourself with the pre-release material, all sources, the questions and the markscheme.

***These are the command terms used throughout the markscheme.**

Command term	Definition
State*	Give a specific name, value or other brief answer without explanation or calculation.
Outline*	Give a brief account or summary.
Describe*	Give a detailed account or picture of a situation, event, pattern or process.
Evaluate*	Make an appraisal by weighing up the strengths and limitations.
Explain*	Give a detailed account including reasons or causes.
Analyse	Break down in order to bring out the essential elements or structure. To identify parts and relationships, and to interpret information to reach conclusions.
Compare and contrast	Give an account of the similarities and differences between two (or more) items or situations, referring to both (all) of them throughout.
Construct	Display information in a diagrammatic or logical form.
Create	To evolve from one's own thought or imagination, as a work or an invention.
Estimate	Obtain an approximate value for an unknown quantity.
Identify	Provide an answer from a number of possibilities. Recognize and state briefly a distinguishing fact or feature.
Justify	Give valid reasons or evidence to support an answer or conclusion. (See also "Explain".)
Suggest	Propose a solution, hypothesis or other possible answer.
To what extent	Consider the merits or otherwise of an argument or concept. Opinions and conclusions should be presented clearly and supported with appropriate evidence and sound argument.

Question 1a

Select the perspective and motivation for an ecologist and a construction worker.

(4 marks)

Award **(1 mark)** for each correct.



Ecologist

Keeping the ancient Baobab trees will preserve the habitat for wildlife and maintain the ecological balance.



Construction worker

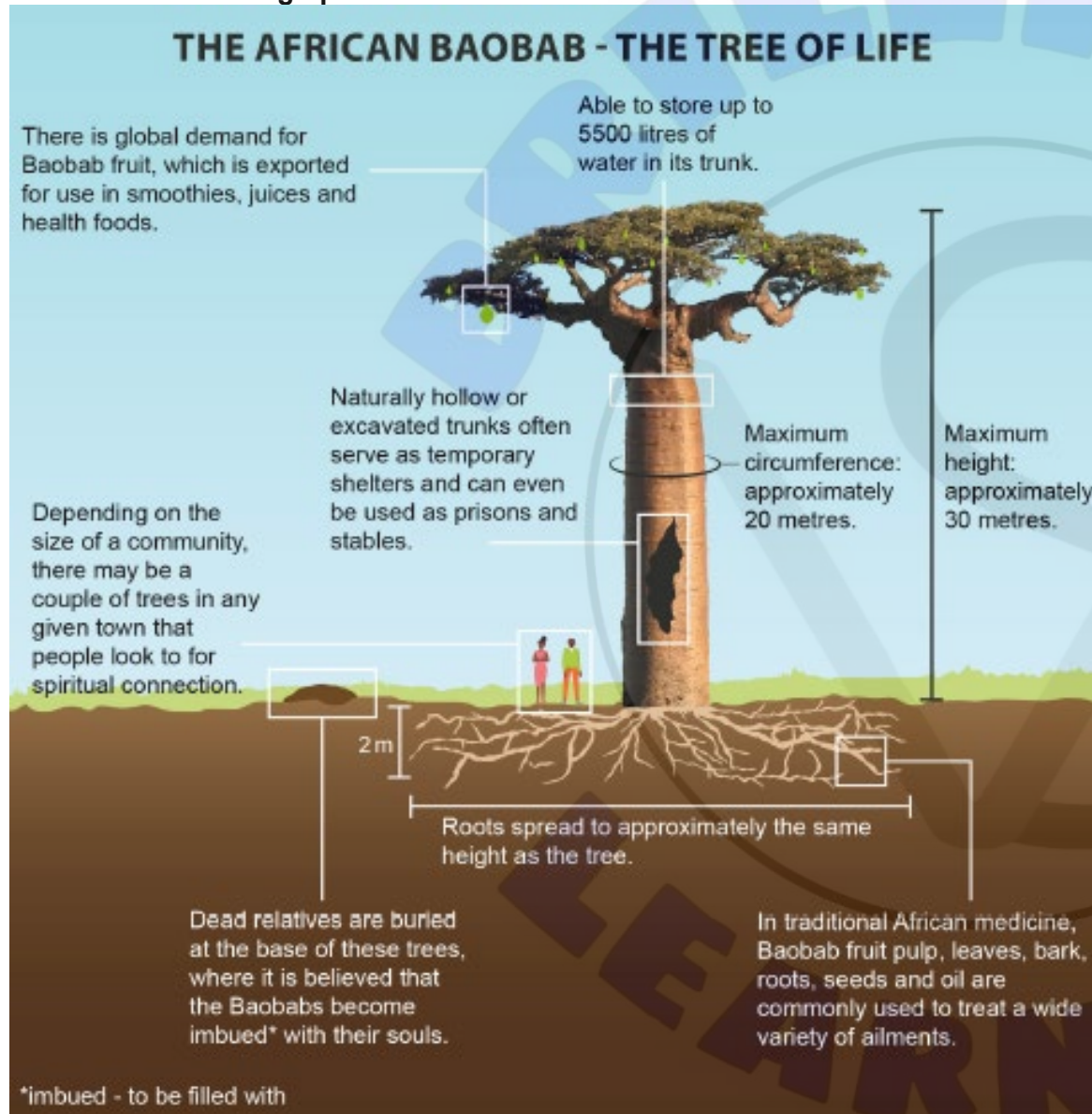
If we remove the Baobab trees, we will create jobs and increase the quantity and affordability of housing

Motivation:

Motivation:

Question 1b and 2

Reference 5: An infographic on the Baobab tree



Question 1b

Key concept:

Global interactions

For individuals and societies, global interactions focuses on the interdependence of the larger human community, including the many ways that people come into conflict with and cooperate with each other, and how they live together in a highly interconnected world to share finite resources.

You are a member of the decision committee for the removal of the Baobab trees.

Explain how the key concept of **global interactions** helps us to understand the cultural impact of removing the Baobab trees. In your answer, you must include an example from reference 5.

(6 marks)

Note: Just mentioning cultural impacts of removing the Baobab tree is not sufficient.

Mark	Descriptor
0	The student does not reach any of the descriptors below.
1-2	The student <ul style="list-style-type: none">• outlines how the key concept of global interactions helps us to understand the cultural impact of removing the Baobab trees.• attempts to use examples from the reference 5.
3-4	The student <ul style="list-style-type: none">• describes how the key concept of global interactions helps us to understand the cultural impact of removing the Baobab trees.• uses an example from the reference 5.
5-6	The student <ul style="list-style-type: none">• explains how the key concept of global interactions helps us to understand the cultural impact of removing the Baobab trees.• uses an example from the reference 5 directly related to their explanation.

Question 2

Video transcript exam only video

The ancient Baobab trees have been given a protection order.

This means that the Baobab trees must not be removed and must not be damaged to make way for the urban development.

Construction work must be away from the roots of the Baobab trees – but how far?

A surveyor takes measurements of one of the Baobab trees.

The surveyor uses the measurements to calculate the height of the tree.

$$\tan \theta = \frac{\text{opp}}{\text{adj}}$$

$$\tan 50 = \frac{h}{20}$$

$$20 \tan 50 = h$$

$$h = 23.8 \text{ m}$$

The length of the roots of the Baobab tree spread to be the same as the height of the tree.

Using these calculations, the surveyor instructs that buildings must not be constructed within 11.9 m of the Baobab tree.

Question 2a

Outline, with an example, a way that the surveyor protected the Baobab tree using mathematical logic. **(2 marks)**

Note: descriptions of the 'method' or 'workings' to calculate the height is not relevant as this is information provided in the video.

Marks	Descriptor
0	The student does not achieve a standard described by any of the descriptors given below.
1	The student provides an outline of a way that the surveyor protected the Baobab tree using mathematical logic.
2	The student provides an outline with an example of a way that the surveyor protected the Baobab tree using mathematical logic.

Examples

- 1 mark

the surveyor can get the height of the tree and therefore determine the total length of the roots WTTE

- 2 marks

the surveyor can get the height of the tree and half this value to get the length of the roots (i.e. outline of height of tree and then 11.9 for roots) **and** the surveyor must ensure the construction is at least the length of the roots away from the tree WTTE

Question 2b

Comment on the degree of accuracy of the surveyor's calculations. You must provide **two** comments.

(2 marks)

Note: Responses referring to any inaccuracy due to human error is not accepted

Marks	Descriptor
0	The student does not achieve a standard described by any of the descriptors given below.
1	The student makes one comment on the degree of accuracy of the calculations.
2	The student makes two comments on the degree of accuracy of the calculations.

The degree of accuracy can be related to the following:

Values used in the formula	Values calculated from the formula	The method using the trig / trigonometry formula
1. The distance/length of the surveyor from the tree is rounded to the nearest whole number.	1. The height of the tree is rounded down (or not exact or rounded to 1 decimal place or rounded to 3 significant figures)	1. Use of the trig formula cannot give exact values which need to be rounded (or the trig formula will give irrational numbers)
2. The angle from the surveyor to the top of the tree is rounded to the nearest whole number		2. The method did not include the height of the surveyor from the ground
3. The measuring tape/equipment for the distance/length is approximate/is limited in its accuracy		
4. The angle measurer for the angle is approximate/is limited in its accuracy		

Question 2c

Evaluate the use of representations in identifying the distance each house should be from each Baobab tree. In your answer, you must include:

- strengths of the use of representations
- weaknesses of the use of representations.

(6 marks)

Note: descriptions of the 'method' or 'workings' to calculate the height is not relevant as this is information provided in the video.

Marks	Descriptor
0	The student does not achieve a standard described by any of the descriptors given below.
1-2	The student: <ul style="list-style-type: none">• outlines the strengths of the use of representations• outlines the weaknesses of the use of representations.
3-4	The student: <ul style="list-style-type: none">• describes the strengths of the use of representations• describes the weaknesses of the use of representations.
5-6	The student: <ul style="list-style-type: none">• explains the strengths of the use of representations• explains the weaknesses of the use of representations.

Examples: Not an exhaustive list

Strengths:

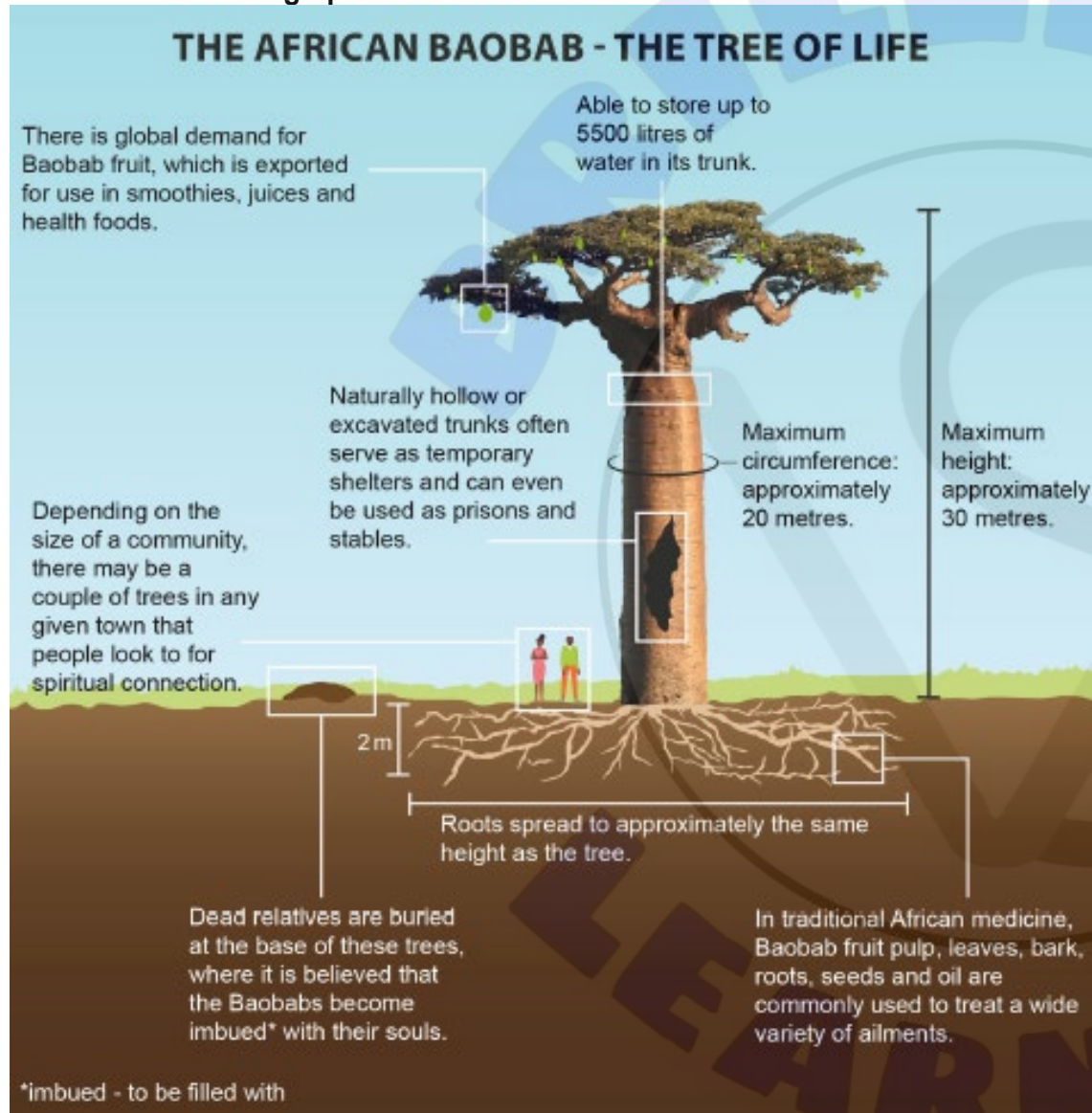
- Allows us to be able to visualise the area around the tree, might mention circle or square around the tree
- A consistent method – it can be applied for every tree
- We use the maximum height of a Baobab tree (30m) in all calculations
- Presenting a real-life situation as in a mathematical model/diagram,
- Identifies useful information so that mathematical formulas can be applied to solve problems

Weaknesses:

- Inaccuracies in real-life/model for example, the trees may not be vertical or land is not flat
- Cannot predict unknown or unseen issues e.g. depth of roots, burial sites
- Information/model is not exact
- Changes over time not captured or the tree(s) will continue to grow
- Measuring only one tree is not enough, they will need to measure all.

Question 3

Reference 5: An infographic on the Baobab tree



Question 3

To what extent does the infographic in reference 5 synthesize individuals and societies and mathematics to demonstrate the cultural importance of the Baobab tree? In your answer, you must:

- explain how the synthesis is successful
- explain how the synthesis is not successful
- use **two** specific examples from the infographic
- write an evaluative conclusion.

(12 marks)

Note: Responses that refer to I and S and mathematics separately can only score a maximum of 6

Note: Responses that only refer to one of I and S or mathematics can only score a maximum of 2

Marks	Descriptor
0	The student does not achieve a standard described by any of the descriptors given below.
1-3	The student: <ul style="list-style-type: none"> • states how the infographic successfully synthesises Individual and Societies and mathematics to demonstrate the cultural importance of the Baobab tree • states how the infographic does not successfully synthesise Individual and Societies and mathematics to demonstrate the cultural importance of the Baobab tree • attempts to use at least one example from the infographic.
4-6	The student: <ul style="list-style-type: none"> • outlines how the infographic successfully synthesises Individual and Societies and mathematics to demonstrate the cultural importance of the Baobab tree • outlines how the infographic does not successfully synthesise Individual and Societies and mathematics to demonstrate the cultural importance of the Baobab tree • uses at least one example from the infographic • attempts a conclusion.
7-9	The student: <ul style="list-style-type: none"> • describes how the infographic successfully synthesises Individual and Societies and mathematics to demonstrate the cultural importance of the Baobab tree • describes how the infographic does not successfully synthesise Individual and Societies and mathematics to demonstrate the cultural importance of the Baobab tree • uses at least two examples from the infographic • gives a conclusion.
10-12	The student: <ul style="list-style-type: none"> • explains how the infographic successfully synthesises Individual and Societies and mathematics to demonstrate the cultural importance of the Baobab tree • explains how the infographic does not successfully synthesise Individual and Societies and mathematics to demonstrate the cultural importance of the Baobab tree • uses at least two examples from the infographic to directly support their arguments • gives an evaluative conclusion.

Question 4

<p>Stele</p>  <p>Height 70 cm Width 10 cm Cost \$5000</p>	<p>Baobab tree</p>  <p>Height 50 cm Width 30 cm Cost \$8000</p>	<p>Krar</p>  <p>Height 10 cm Width 10 cm Cost \$500</p>
<p>Running shoe</p>  <p>Height 10 cm Width 40 cm Cost \$1200</p>	<p>Jebena</p>  <p>Height 30 cm Width 20 cm Cost \$2500</p>	<p>Images not to scale.</p>

Design brief

<p>Purpose</p> <p>To represent and celebrate culture on the front of the new community centre building</p>	<p>Requirements</p> <p>Have an area between 1500 cm² and 2000 cm² Cost no more than \$8500 Contain three different images from the selection</p>
<p>Details</p> <p>Whilst the images are different shapes, you have been given a quadrilateral template to help with your design.</p>	<p>Additional information</p> <p>The requirements above are flexible with sufficient justification.</p>

Information

Artefact	Height (cm)	Width (cm)	Area cm ²	Cost \$
Stele	70	10	700	5000
Baobab tree	50	30	1500	8000
Krar	10	10	100	500
Running shoe	10	40	400	1200
Jebena	30	20	600	2500

Reference 4 A selection of Ethiopian cultural artefacts



THE STELE OF AXUM

The Stele of Axum dates from around the 4th Century. It is also known as the Obelisk of Axum, but it is actually a stele. Traditionally, stelae were markers of underground burial sites.

In 1935, Italian soldiers found the Stele of Axum underground in three pieces and subsequently took it to Italy, where it was restored. Although repatriation was agreed to in 1947, the stele was not fully returned and reassembled until 2008.



KRAR

The krar is a five or six stringed instrument, often decorated with cloths and beads. Krars are often played by azmari, people who sing traditional songs to accompany their music in hotels or restaurants.



BAOBAB TREE

The African Baobab tree, commonly found in Ethiopia, is often considered the tree of life. The Baobab is used to provide water, food and medicines, and local communities often look to the tree for spiritual connection.



RUNNING SHOE

Ethiopia's main sport is track and field, with long-distance running being a particular strength. At the 1960 Olympic marathon, Ethiopian Abebe Bikila became the first sub-Saharan African to win a gold medal. Haile Gebrselassie, a famous long-distance runner, is also from Ethiopia.



JEBENA

Ethiopia is the birthplace of coffee. Inhabitants have drunk coffee for more than ten centuries. The Ethiopian coffee ceremony, using a traditional coffee pot called a Jebena, has a strong social and cultural element, welcoming guests as a form of respect.

Question 4

Reference 6: Examples of architecture that are culturally sympathetic to their natural surroundings

**Jameos del Agua,
Lanzarote,
The Canary Islands,
Spain**

Jameos del Agua is a series of lava caves. It is also an art, culture and tourism centre, created by local artist and architect, César Manrique. Manrique created a place to contemplate a natural attraction formed nearly without human intervention and it reflects one of his pillars of creativity: nature and artistic creation in harmony. Nowadays, it's impossible to imagine Lanzarote and its uniqueness without the work and efforts of César Manrique.

**Cappadocia,
Turkey**

Cappadocia's landscape was formed by volcanic erosion. Thick ash solidified into a soft rock, and over time the rocks eroded with wind and water, creating the iconic fairy chimneys we see today. There are as many as 600 churches carved from the soft Cappadocian rock, and possibly many more that have not yet been discovered. These churches date back to medieval times and display beautiful painted frescoes, which have retained an amazing amount of colour and detail over the centuries.

**The Treasury,
(Al-Khazneh)
Petra, Jordan**

The Treasury, carved directly into the sandstone hill by the Nabataeans in the second century A.D. It was likely used as a temple and is part of the city of Petra, once a thriving trading centre and capital of the Nabataean empire. There are dozens of tombs and other carved structures within Petra.

**Church of St George,
Lalibela, Ethiopia**

The 13th century church of St George has become an icon of Ethiopia as a site of huge cultural and religious significance. The construction of the church was not traditional. It was carved downwards from a volcanic block. The block was further chiselled out, forming doors, windows, columns and various floors and roofs. There are ten other examples of medieval churches to be found in Lalibela, all carved out from the volcanic rock landscape.

**Afar dwelling,
Ethiopia**

Traditional Afar nomadic dwelling

The Afar people of Ethiopia are traditionally nomadic herders. They live in light, temporary dwellings that they transport from one location to the next on camelback.

Area and cost of three artefacts

Artefact	Height (cm)	Width (cm)	Area cm ² 1500 – 2000 ?	Cost \$ 8500 ?
Stele	70	10	700	5000
Baobab tree	50	30	1500	8000
Krar	10	10	100	500
Total area and cost of three artefacts			2300	13500

Artefact	Height (cm)	Width (cm)	Area cm ² 1500 – 2000 ?	Cost \$ 8500 ?
Stele	70	10	700	5000
Baobab tree	50	30	1500	8000
Running shoe	10	40	400	1200
Total area and cost of three artefacts			2600	14200

Artefact	Height (cm)	Width (cm)	Area cm ² 1500 – 2000 ?	Cost \$ 8500 ?
Stele	70	10	700	5000
Baobab tree	50	30	1500	8000
Jebena	30	20	600	2500
Total area and cost of three artefacts			2800	15500

Artefact	Height (cm)	Width (cm)	Area cm ² 1500 – 2000 ?	Cost \$ 8500 ?
Stele	70	10	700	5000
Krar	10	10	100	500
Running shoe	10	40	400	1200
Total area and cost of three artefacts			1200	6700

Artefact	Height (cm)	Width (cm)	Area cm ² 1500 – 2000 ?	Cost \$ 8500 ?
Stele	70	10	700	5000
Krar	10	10	100	500
Jebena	30	20	600	2500
Total area and cost of three artefacts			1400	8000

Artefact	Height (cm)	Width (cm)	Area cm ² 1500 – 2000 ?	Cost \$ 8500 ?
Stele	70	10	700	5000
Running shoe	10	40	400	1200
Jebena	30	20	600	2500
Total area and cost of three artefacts			1700	8700

Artefact	Height (cm)	Width (cm)	Area cm ² 1500 – 2000 ?	Cost \$ 8500 ?
Baobab tree	50	30	1500	8000
Krar	10	10	100	500
Running shoe	10	40	400	1200
Total area and cost of three artefacts			2000	9700

Artefact	Height (cm)	Width (cm)	Area cm ² 1500 – 2000 ?	Cost \$ 8500 ?
Baobab tree	50	30	1500	8000
Krar	10	10	100	500
Jebena	30	20	600	2500
Total area and cost of three artefacts			2200	11000

Artefact	Height (cm)	Width (cm)	Area cm ² 1500 – 2000 ?	Cost \$ 8500 ?
Baobab tree	50	30	1500	8000
Running shoe	10	40	400	1200
Jebena	30	20	600	2500
Total area and cost of three artefacts			2500	11700

Artefact	Height (cm)	Width (cm)	Area cm ² 1500 – 2000 ?	Cost \$ 8500 ?
Krar	10	10	100	500
Running shoe	10	40	400	1200
Jebena	30	20	600	2500
Total area and cost of three artefacts			1100	4200

Question 4a

The local council wants to build a new community centre as part of the urban development. You have been asked to plan the design for the front of the building, using images that represent the cultural heritage of the region.

Create a plan to meet the design brief. In your answer, you must include:

- calculations to show the area and cost of your selected images
- justification of the images used
- justification for any requirements not met.

(12 marks)

Marks	Descriptor
0	The student does not achieve a standard described by any of the descriptors given below.
1-3	The student: <ul style="list-style-type: none"> • attempts to calculate the size or cost of their selected images • states why one image has been selected • states why a requirement has not been met.
4-6	The student: <ul style="list-style-type: none"> • correctly calculates the size or cost of their selected images • outlines why one image has been selected • outlines why a requirement has not been met.
7-9	The student: <ul style="list-style-type: none"> • correctly calculates the size or cost of their selected images, and with minor errors in the other calculation • describes why two images have been selected • describes why a requirement has not been met.
10-12	The student: <ul style="list-style-type: none"> • correctly calculates the size and cost of their selected images • justifies why all three images have been selected • justifies why a requirement has not been met.

Question 4b

The purpose of the design on the front of the new community centre building is to represent and celebrate culture.

Evaluate how your plan synthesizes mathematics and individuals and societies to meet its purpose. In your answer, you must include:

- benefits of the synthesis
- limitations of the synthesis
- an evaluative conclusion.

(8 marks)

Note: Answers must refer to the purpose (representing culture and/or requirements),

Note: Answers that do not refer to the purpose obtain 0.

Marks	Descriptor
0	The student does not achieve a standard described by any of the descriptors given below.
1-2	The student: <ul style="list-style-type: none"> • states the benefits of either individuals and societies or mathematics for the purpose • states the limitations of either individuals and societies or mathematics for the purpose • states a conclusion.
3-4	The student : <ul style="list-style-type: none"> • outlines the benefits of either individuals and societies or mathematics for the purpose • outlines the limitations of either individuals and societies or mathematics for the purpose • outlines a conclusion.
5-6	The student : <ul style="list-style-type: none"> • describes the benefits of both individuals and societies and mathematics for the purpose • describes the limitations of both individuals and societies and mathematics for the purpose • describes a conclusion.
7-8	The student: <ul style="list-style-type: none"> • explains the benefits of both individuals and societies and mathematics for the purpose • explains the limitations of both individuals and societies and mathematics for the purpose • explains an evaluative conclusion.

Question 5

Reference 2 transcript: A video about the Ethiopia Urban Expansion Program

The population in Ethiopia is expected to quadruple by 2050. Currently, Ethiopia is one of the least urbanized countries in the world and is set to grow rapidly.

In most countries, urban expansion is taking place faster than the government can respond.

Early interventions to harness urbanization will boost economic growth.

The Ethiopian government has introduced the Ethiopia Urban Expansion Program in order to plan for the expected growth in population.

The Ethiopia Urban Expansion Program will provide more housing, schools and medical provision.

People will have access to essential services in their local community.

Also, new arterial roads will provide reliable transport links to cities and industrial zones for employment opportunities.

Here we have Nyala. She lives with her parents in a traditional village renowned for coffee production. She is a healthy, bright young woman but there is limited work in her village. She dreams of being independent and having better access to job opportunities. The Urban Expansion Program will provide a rich future for Nyala.

The government will secure land for long-term future development.

They will achieve this either by paying compensation to land owners or by providing replacement land in another area.

Reference 3: An urbanization development plan

Before urbanization

Unreliable water supply
Poor access roads to city - impassable during rainy season

After urbanization

Reliable water supply
Fast and reliable access roads to city

City, schools and hospital: 60 km
Transport time: 2 hours



City, schools and hospital: 50 km
Transport time: 2 hours

Farmland: Coffee and cattle

Industrial area: 30 km
Transport time: 1.5 hours

City and hospital: 60 km
Transport time: 30 minutes



City and hospital: 50 km
Transport time: 50 minutes

Urbanization

Industrial area: 30 km
Transport time: 30 minutes



Population: approximately 400 adults and 600 children
Average wage: 600 USD per adult per year
Average cost of living: 500 USD per adult per year



Population: approximately 12 000 adults and 18 000 children
Average wage: 1600 USD per adult per year
Average cost of living: 1400 USD per adult per year



Hi there, my name's Nyala. I live with my parents in a traditional village with a strong sense of community and a long history of coffee cultivation. My village has very poor transport links to areas of employment. I have secured employment in the industrial zone. My salary will be 1500 USD per year and I'm looking for somewhere to live in the new urban development.

Question 5

Refer to the video in reference 2 and the urban development in reference 3. From Nyala's perspective, **create** an internal monologue about relocating to the urban development. In your answer, you must include:

- mathematical reasoning
- social and/or cultural reasoning
- an overall perspective on relocating.

(8 marks)

Marks	Descriptor
0	The student does not achieve a standard described by any of the descriptors given below.
1-2	The student states : <ul style="list-style-type: none">• mathematical reasoning• sociocultural reasoning• the overall perspective on relocating.
3-4	The student outlines : <ul style="list-style-type: none">• mathematical reasoning• sociocultural reasoning• the overall perspective on relocating.
5-6	The student describes : <ul style="list-style-type: none">• mathematical reasoning• sociocultural reasoning• the overall perspective on relocating.
7-8	The student explains : <ul style="list-style-type: none">• mathematical reasoning• sociocultural reasoning• the overall perspective on relocating.

Question 6

Evaluate how learning more than one language could help your interdisciplinary understanding of the importance of culture in urban development.

In your answer, you must include:

- the benefits of learning more than one language for understanding the importance of culture in urban development
- the limitations of learning more than one language for understanding the importance of culture in urban development
- examples from your own language course.

(8 marks)

Marks	Descriptor
0	The student does not achieve a standard described by any of the descriptors given below.
1-2	The student: <ul style="list-style-type: none"> • states the benefits of more than one language for understanding the importance of culture on urban development • states the limitations of more than one language for understanding the importance of culture on urban development • attempts to use at least one example from their own language course to support their arguments.
3-4	The student: <ul style="list-style-type: none"> • outlines the benefits of more than one language for understanding the importance of culture on urban development • outlines the limitations of more than one language for understanding the importance of culture on urban development • uses at least one example from their own language course to support their arguments.
5-6	The student: <ul style="list-style-type: none"> • describes the benefits of more than one language for understanding the importance of culture on urban development • describes the limitations of more than one language for understanding the importance of culture on urban development • uses at least two examples from their own language course to support their arguments.
7-8	The student: <ul style="list-style-type: none"> • explains the benefits of more than one language for understanding the importance of culture on urban development • explains the limitations of more than one language for understanding the importance of culture on urban development • uses at least two examples from their own language course to directly support their arguments.

Question 7

“A people without the knowledge of their past history, origin and culture is like a tree without roots” — Marcus Garvey

Discuss this quotation with reference to knowledge from individuals and societies and mathematics. In your answer, you must include:

- how your experience of individuals and societies relates to this quotation
- how your experience of mathematics relates to this quotation
- how your personal circumstances relate to this quotation
- evidence from the pre-release material.

(12 marks)

Marks	Descriptor
0	The student does not achieve a standard described by any of the descriptors given below.
1-3	The student states : <ul style="list-style-type: none"> • how individuals and societies relates to this quotation • how mathematics relates to this quotation • how their personal circumstances relate to this quotation.
4-6	The student outlines : <ul style="list-style-type: none"> • how individuals and societies relates to this quotation • how mathematics relates to this quotation • how their personal circumstances relate to this quotation • utilising evidence from the PRM for either individuals and societies or mathematics
7-9	The student describes : <ul style="list-style-type: none"> • how individuals and societies relates to this quotation • how mathematics relates to this quotation • how their personal circumstances relate to this quotation. • utilising evidence from the PRM for both individuals and societies and mathematics
10-12	The student explains : <ul style="list-style-type: none"> • how individuals and societies relates to this quotation • how mathematics relates to this quotation • how their personal circumstances relate to this quotation • utilising evidence from the PRM for both individuals and societies and mathematics