MATHEMATICAL LITERACY
Grade 12

# MAPS & MEASUREMENT

2 JULY 2014

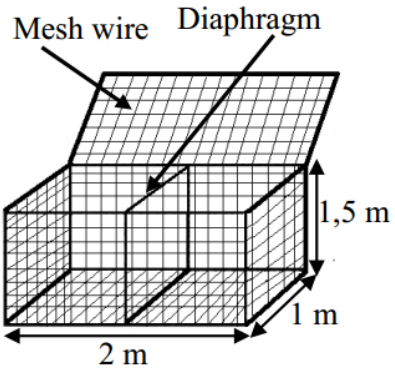
## Lesson Description

In this lesson we:

- Revise working with maps and different calculations of measurement

## Challenge Question

The dimensions of a gabion basket, shown below, are:
L = Length = 2 m  B = Breadth = 1 m  H = Height = 1,5 m




Farmers decide to build a bigger gabion basket but to keep the ratio of the dimensions of the original gabion basket the same, that is L : B : H = 2 : 1 : 1,5. Calculate the volume of the bigger basket if the new breadth is 1,75m

## Exam Questions

## Question 1

*(Adapted from DBE Feb 2014 Paper 2, Question 1)*

Mathys is the owner of Roseleigh farm. He makes bales of hay in order to feed his livestock (cattle, sheep and horses) duing winter. [Hay is a mixture of grass, clover, barley and wheat plant materials.]The hay is allowed to dry and then picked up by machines to be processed into cylindrical bales.

The temperature of each bale must be controlled to prevent fermentation (decay due to moisture) and combustion (burning due to dryness). The table below gives guidelines for actions to be taken for different bale temperatures.

**Table 2: Guidelines for actions to be taken for different bale temperatures**

| Bale temperatures | Action to be taken |
|---|---|
| Lower than 120 °F | None |
| 120 °F to 140 °F | Separate from the rest of the bales to cool off |
| Higher than 140 °F | Separate from the rest of the bales and destroy |

Mathys measures the temperature of a specific bale. He finds it to be 55 C ° and then destroys the bale.

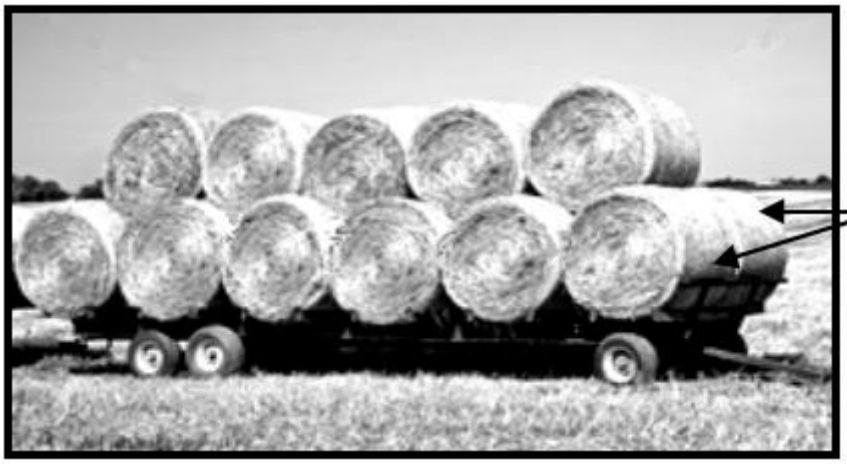
1.1 Determine, showing ALL the necessary calculations, whether the action taken by Mathys is correct.

The following formula may be used:

$$\text{Temperature in °F} = \frac{9}{5} \times \text{Temperature in °C} + 32°$$

(3)

Mathys has to transport the bales with a trailer. The photograph below shows an example of a stack of two layers of bales loaded onto a trailer.




Only the bottom layer of bales on the trailer consists of two rows of 6 bales each to ensure balance. The 2nd layer of bales on the trailer consists of one row of 5 bales. Each subsequent layer that has to be stacked has one less bale than the previous layer.

1.2 Determine the total number of bales that can be loaded onto the trailer in this way if FOUR layers of bales are to be stacked. (5)

Mathys calculates that each cow needs to be fed an average of 12 kg of hay daily. Each bale weighs 1 440 kg.

1.3 Determine the maximum number of days one bale will last if it is used to feed 10 cows. (3)

1.4 Write down a simplified formula that can be used to calculate the maximum number of days one bale will last if it is used to feed a number of cows. (3)

1.5 Use the equation obtained in Question 3.6 to draw a graph, on showing the maximum number of days one bale can last if it is used to feed a number of cows. (5)

Mathys has a herd of 150 dairy cows. He needs to prepare hay to last from 1st May to 31st August . He estimates that he needs 6 trailer loads of hay

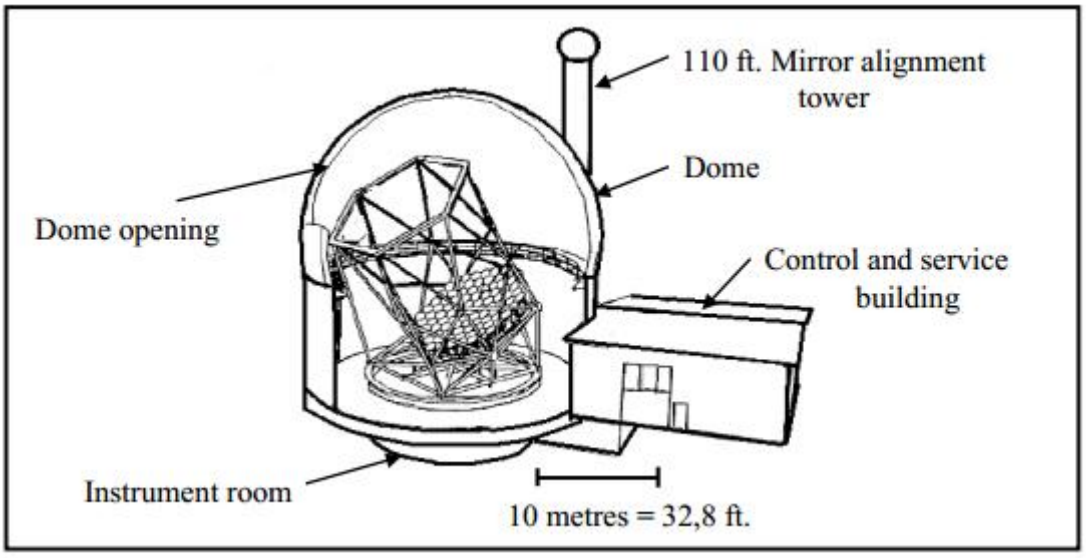
1.6 Show by doing calculations in Mathys's estimate is correct or not? (5)

## Question 2

*(Adapted from DBE Exemplar 2014 Paper 2, Question 2)*

The Southern African Large Telescope (SALT) is the largest single optical telescope in the Southern Hemisphere and among the largest in the world.

The photograph above shows the northern view (elevation) of the SALT which is situated at Sutherland, a small town in the Northern Cape, South Africa. The following is a diagram of the SALT, showing the various parts of the telescope.



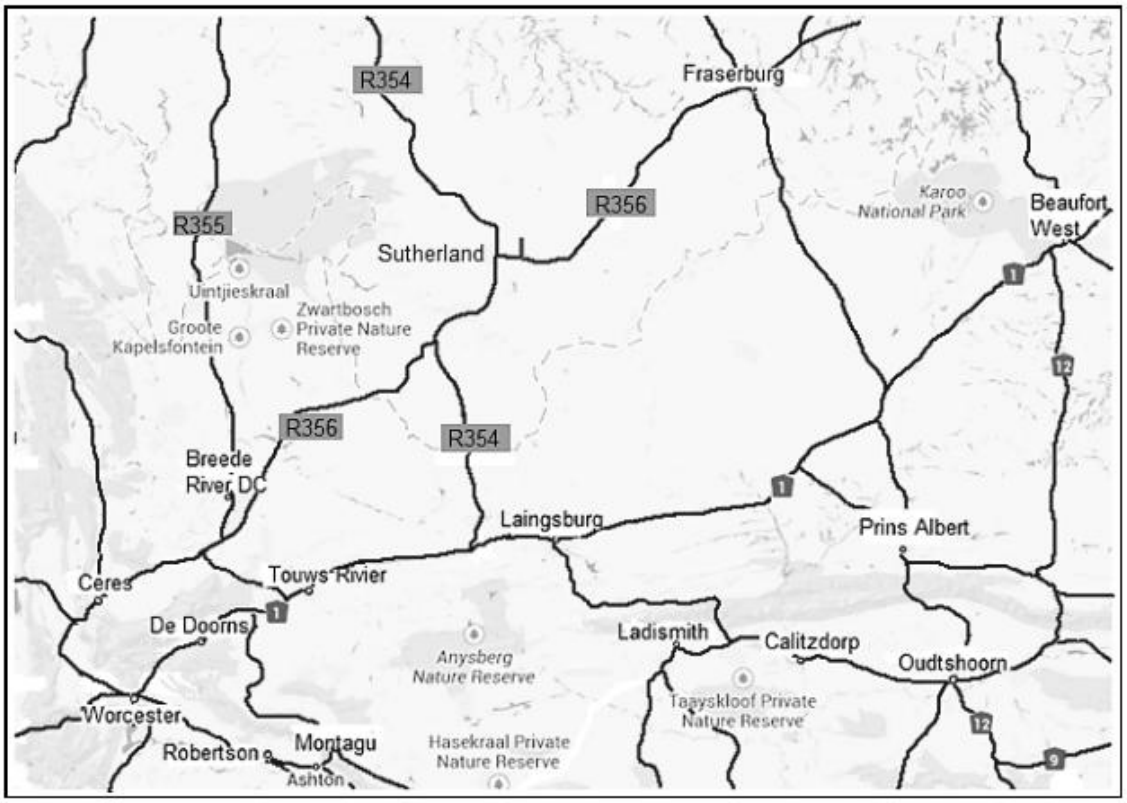

2.1 Which view does the diagram above show? (2)

2.2 Calculate the height of the mirror alignment tower in centimetres. Round off your answer to the nearest 10 centimetres.

Mr Vargese is on his way to do research at the SALT. He flew to Cape Town International Airport. He then rented a car and drove as far as Worcester. He has been given a map of area and a table of distances (see below) and the following instruction to get from Worcester to Sutherland.

**Instructions**

1. Turn right onto the N1 125 km
2. Turn left onto the R354 110 km
3. Turn right onto the R356 13,7 km
4. Turn left 4,9 km The destination will be on your right.




| FROM | TO | DISTANCE |
|---|---|---|
| Worcester | De Doorns | 29 km |
| De Doorns | Touws River | 42 km |
| Touws River | Laingsburg | 89 km |
| Touws River | Sutherland | 166 km |
| Sutherland | Fraserburg | 108 km |

2.3 Clearly indicate the route Mr Vargese should travel from Worcester to get to Sutherland (4)

2.4 It took Mr Vargese 2 hours 56 minutes to reach his destination. Calculate his average speed in km/h.

You may use the following formula:

Total distance = average speed × time (5)