Western Cape Government
Education

Directorate: Curriculum FET

TELEMATICS 2020

MATHEMATICAL LITERACY

Grade 12

TELEMATICS SCHEDULE

SESSION	DATE	TIME	TOPIC
1	27 Feb 2020	15:00 – 16:00	Finance: Tariff Systems pg. 2-7
2	4 March 2020	16:00 – 17:00	Data Handling pg. 8-14

TARIFF SYSTEMS

We will work with the following tariff systems:

- Transport tariffs
- Municipal tariffs
- Telephone tariffs
- Bank fees

TRANSPORT TARIFFS

The table below shows the bus fare (in rand), including 15% VAT, for a single trip.

BUS FARE IN RAND FOR A SINGLE TRIP

	Port Elizabeth	Grahamstown	King William's Town	Queenstown	Aliwal North	Bloemfontein	Welkom
Port Elizabeth		305	320	395	410	435	515
Grahamstown	305		305	385	410	435	515
King William's Town	320	305		350	410	435	465
Queenstown	395	385	350		365	410	455
Aliwal North	410	410	410	365		410	435
Bloemfontein	435	435	435	410	410		335
Welkom	515	515	465	455	435	335	

Use the TABLE above to answer the questions that follow.

1.1 Write down the SECOND highest bus fare for a single trip between two cities.

1.2 Between which two cities is the single bus fare R350,00?

1.3 A person travels from Port Elizabeth to Bloemfontein via another city, City X, and uses two different buses. The total cost for this one-way trip is R755.

1.3.1 Calculate the cost from Port Elizabeth to City X.

1.3.2 Hence, identify City X.

1.4 Determine the cost, excluding 15% VAT, of a single bus fare of R 365,00.

1.5 Lindiwe travels from Queenstown to Bloemfontein and back (return trip) once a month.
Calculate her total travelling cost for ONE year.

MUNICIPAL TARIFFS

2.1

Ms Leranto lives in ABC Municipality. She needs assistance to understand the calculations involved in her electricity bill.
ANNEXURE A contains the electricity bill and TABLE 1 shows the electricity tariffs.

ANNEXURE A

ELECTRICITY BILL

ABC MUNICIPALITY **12 MAIN STREET**
QTD REGION **P.O. BOX 2531**
TOSO

SINGLE PHASE FOR HOME USE

Street Address	Client Name	Invoice Number	Account No.
7 South Street	Kami Lerato	WR 43 9000 87	004237 670-1

Account date: 31/3/2019	Details: Electricity Consumption
28/2/19	Previous reading: 23 901 kWh
31/3/19	Current reading: 24 051 kWh
Total KWh used	**D**
Cost without VAT	**R210,35**
Amount Due including VAT (15%)	---------

TABLE 1
ELECTRICITY TARIFF FOR ABC MUNICIPALITY

Usage in kWh	Cost per kWh (excluding VAT)
1 – 100 kWh	132,70c
101 – 400 kWh	155,30c
401 – 650 kWh	169,20c
Above 650 kWh	182,40c
Electricity tariff is calculated on a sliding scale. The more you use, the more you pay.	

Use ANNEXURE A to answer the questions that follow.

2.1.1 Determine the value of D, the amount of kilowatt (kwh) used in March 2019.

2.1.2 Show how the cost of R210,35 was calculated.

2.1.3 Determine the Value Added Tax (VAT) amount payable.

WATER TARIFF

2.2 ANNEXURE B shows an extract from Mr Daniels' monthly municipal statement including the residential water and sewer tariff tables.

Use the information in ANNEXURE B and answer the questions that follow.

2.2.1 Write down the market value in words.

2.2.2 Calculate the VAT amount for the sewer monthly charge on a stand lager than 2000 m^2.

2.2.3 Write down the unit of measurement that was used for the meter readings.

2.2.4 Determine the value of A.

2.2.5 Use the stepped residential water tariff table to calculate the value of B, the total amount for water usage.

ANNEXURE B

EXTRACT FROM MR DANIELS' MONTHLY MUNICIPAL STATEMENT

Mr KJ Daniels		Date:	2019/03/12
14 Sirkoon Street		Statement for:	March 2019
Kruger Park			
2738			

STAND SIZE	NUMBER OF DWELLINGS	DATE OF VALUATION	PORTION	MUNICIPAL VALUATION	REGION
463 m^2	1	2018/07/01	R1	Market value R944 630,00	WARD C

ACCOUNT NUMBER: **345 678 8900 60**			
		SUBTOTAL **(R)**	TOTAL AMOUNT **(R)**
Water and sewer			
Reading period	2019/01/16 to 2019/02/12		
Meter reading	Start: 795 000 End: 807 000		
Water usage	12 kl (kilolitres)		
Daily average consumption	0,429 kl		
Charges for 12 k£ are based on a sliding scale for a 28-day period			
Total water charge (excluding VAT)		B	
Water demand management levy		22,64	
Monthly sewer charge based on stand size (excluding VAT)		A	
VAT: 15%		73,75	

PAYMENT DUE		XXX
DUE DATE		**2019/03/27**

STEPPED RESIDENTIAL WATER TARIFF	
KILOLITRES PER CONNECTION PER MONTH	**2018/19** TARIFF (R/kl) EXCLUDING **15%** VAT
from 0 to 6	8,28
above 6 to 10	8,79
above 10 to 15	15,00
above 15 to 20	21,83

SEWER MONTHLY CHARGE BASED ON STAND SIZE	
STAND SIZE (m^2)	**2018/19** TOTAL CHARGE (IN RAND) EXCLUDING **15%** VAT
Up to and including 300 m^2	194,67
Larger than 300 m" to 1 000 m^2	378,95
Larger than 1 000 m^2 to 2 000 m^2	573,29
Larger than 2 000 m^2	836.02

TELEPHONE TARIFFS

Sandra start a new job. She does not have her own computer, she will need a cellphone with unlimited web-browsing. The table below illustrates the cost of 3 different deals from a cellphone company.

Deal	Phone and Internet Costs	Call Costs
Deal 1	R2 500 cash for the phone R50 / month for internet	R2 per minute for calls
Deal 2	R250 per month over 24 months including internet and phone	50 free minutes R2,50 per minute for calls after free minutes used
Deal 3	R400 per month over 24 months including internet and phone	50 free minutes R2,50 per minute for calls after free minutes used

3.1 Determine which deal (for phone, internet and calls) is the cheapest over 24 months (if Sandra makes 3,5 hours of calls per month). Show all calculations.

BANK FEES

Maths πrates (Maths pirates) is a Mathematical Literacy club. Maths pirates opened a bank account with Dot Bank and all club related transactions is done with this account.

An extract of the bank statement of Maths Pirates for February 2017 is given below:

DATE	TRANSACTION	DEBIT	CREDIT	BALANCE
01/02	Balance brought forward			R28 955,47
02/02	Cash deposit (Bank)		2 556,50	31 511,97
02/02	Cash deposit fee	27,30		31 484,67
02/02	Service fee	500,00		30 984,67
10/02	Payment to RT printing	245,67		**A**
16/02	Cash deposit(ATM)		230,00	30 969,00
16/02	Cash deposit fee	2,67		30 966,33
28/02	Interest earned		1 549,66	32 515,99

3.1 Calculate the missing value for A.

3.2 Calculate the total amount deposited into the Maths Pirates account during February 2017.

3.3 The bank charges (Cash deposit fee) for cash deposits is as follow:

- Cash deposit(ATM): R0,89 per R100 or part thereof
- Cash deposit(Bank): R1,05 per R100 or part thereof

The deposit made on 2 February was done in the bank. Calculate the difference in the amount of bank charges if he had used the ATM. Show all calculations.

DATA HANDLING

Data can be collected by the following three methods.

1. Surveys
2. Observation
3. Interviews

Data can be classified into two types.

1. Categorical
2. Numerical

Numerical data can be further classified into:

1. Discrete data and
2. Continuous Data

MEASURES OF CENTRAL TENDENCY

1. Mean
2. Median
3. Mode

MEASURES OF SPREAD

1. Range
2. Interquartile Range

Data can be presented by:

1. TABLES

In April 2015 the acting head of Eskom suggested that to improve its financial situation, Eskom should supply electricity directly to all customers. If this should happen many municipalities would lose the income they receive from the sale of electricity.

The table below shows the average percentage income received by municipalities from the sale of electricity per province for 2015 and 2016.

ANNEXURE A

AVERAGE PERCENTAGE INCOME RECEIVED BY MUNICIPALITIES FROM THE SALE OF ELECTRICITY PER PROVINCE FOR 2015 AND 2014

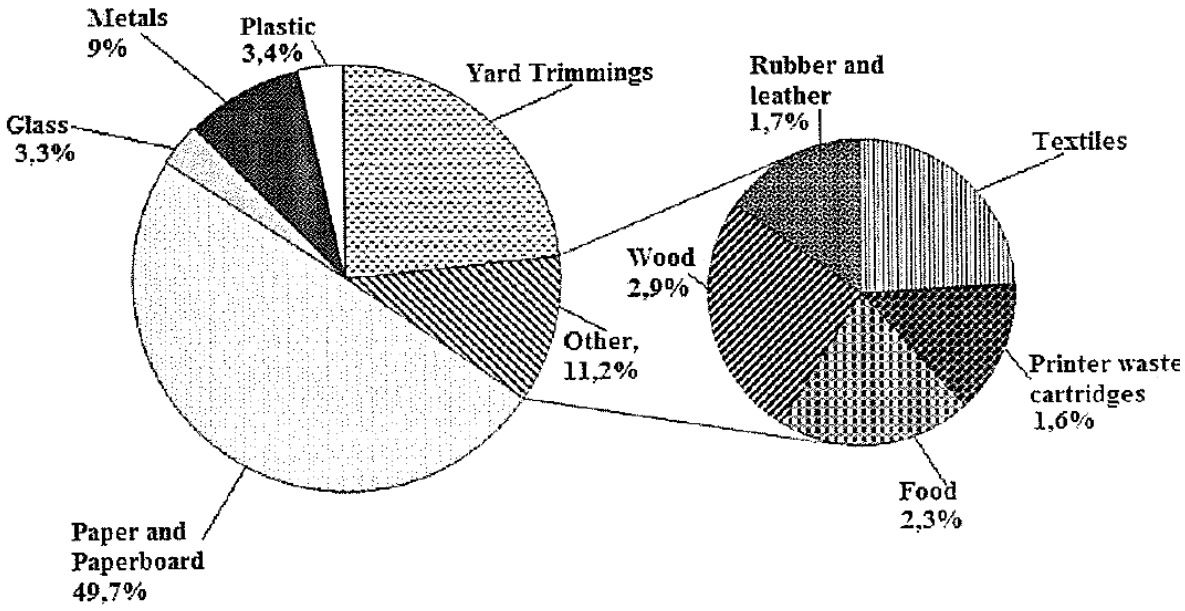
PROVINCE		AVERAGE PERCENTAGE INCOME	
		2015	2014
Eastern Cape	EC	20,6	34,0
Free State	FS	24,6	38,3
Gauteng	GP	37,1	50,5
KwaZulu-Natal	KZN	30,2	42,2
Limpopo	LP	14,9	29,3
Mpumalanga	MP	21,3	40,4
North West	NW	24,0	A
Northen Cape	NC	24,3	38,7
Western Cape	WC	31,1	44,8

A = 19,5% more than the average percentage income of the following year.

2. PIE CHARTS

The pie chart below shows the total recycling and composting of material for 2015.

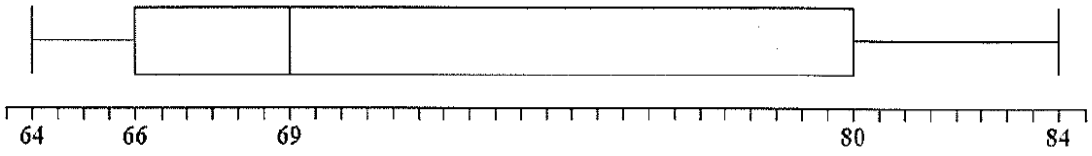
TOTAL RECYCLING AND COMPOSTING BY TYPES OF MATERIAL FOR 2015 (91,16 million tons)



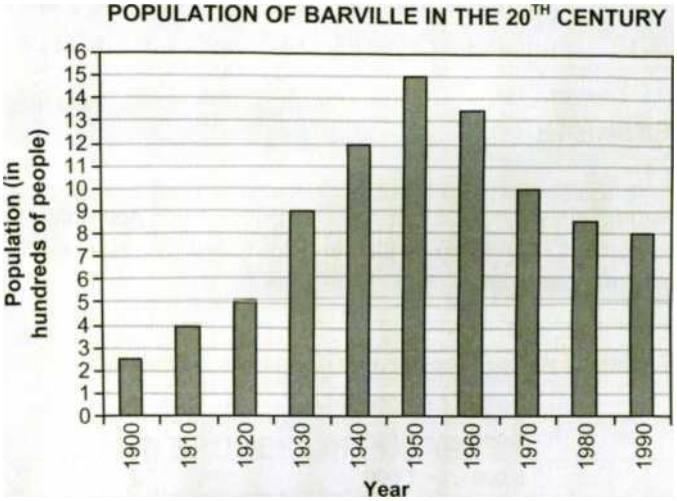
Glossary: Composting is the changing of waste material into fertilizer.

3. BOX-AND-WHISKER PLOTS

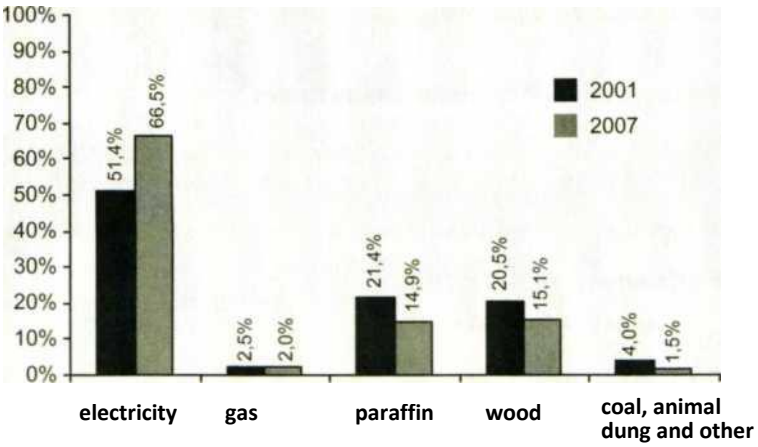
Candidates sat for the National Senior Certificate examinations in November 2018.
The box-and-whisker plot below shows the five-number summary of the average pass percentage for Mathematical Literacy.



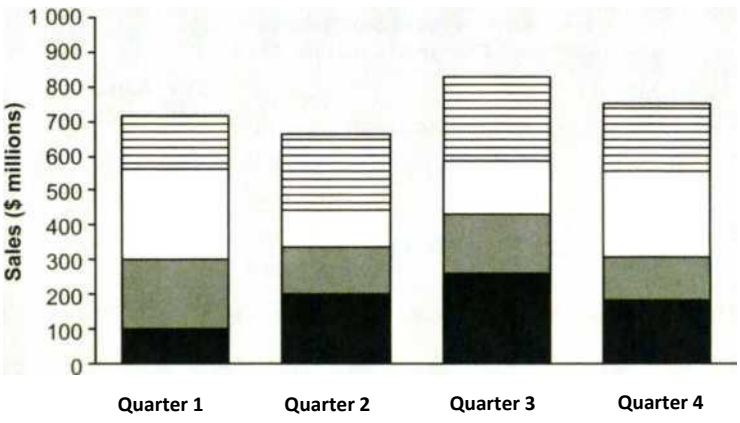
4. SINGLE, MULTIPLE ANS STACKED BAR GRAPHS



BAR GRAPH OF ENERGY SOURCES IN SOUTH AFRICA



TRUCK COMPANY'S SALES FIGURES FOR 2015



QUESTIONS

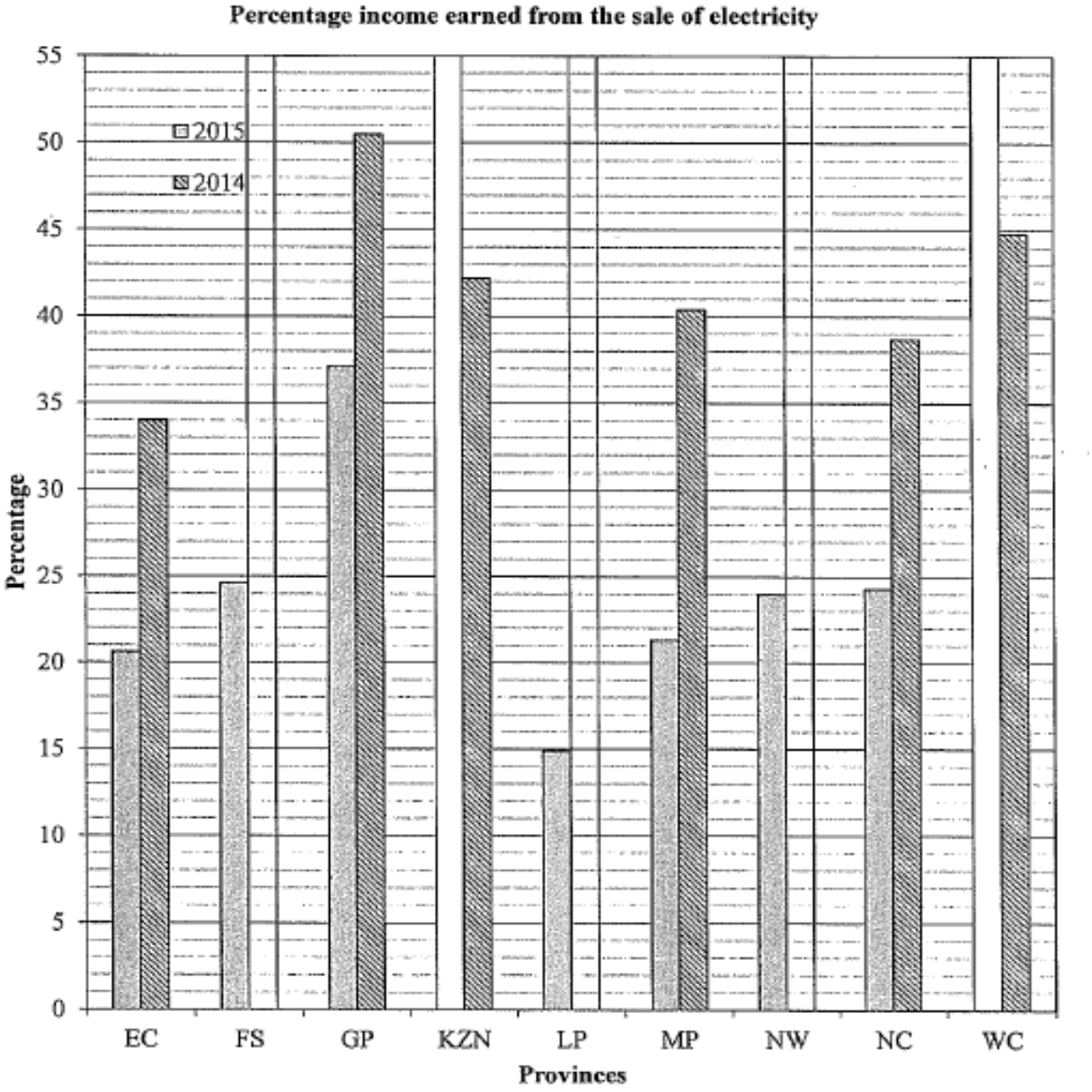
TABLES

1.1 Use the table in ANNEXURE A to answer the following questions.

1.1.1 Arrange, in descending order, the average percentage incomes for 2015.

1.1.2 List ALL the provinces where the municipalities have an average percentage income greater than the mean percentage income for all the provinces during 2015.

1.1.3 Use the information in the table to complete the bar graph on the grid provided on the ANSWER SHEET.



PIE CHARTS

2.2 Study the pie charts above and answer the questions that follow.

2.2.1 Write down ONE possible data collection method that was used to gather the above data.

2.2.2 Calculate the percentage allocated for yard trimmings.

2.2.3 Determine the percentage allocated for textiles.

2.2.4 Calculate (in tons) the total amount of plastic recycled in 2015.

2.2.5 Give ONE possible example of a product that could be recycled under the metals category.

2.2.6 State another type of graph that could be used to represent the data above.

2.2.7 Determine, as a decimal, the probability of randomly selecting a material in the 'other' category that is NOT textiles.

BOX-AND-WHISKER

3 Use the box-and -whisker plot above to answer the question that follow.

3.1.1 Write down the pass percentage that represents the following:

(a) The median

(b) Quartile 3

3.1.2 Determine the difference between the highest and the lowest pass percentage.

GENERAL QUESTIONS

4. The school-based assessment (SBA) marks and percentages of the ten lowest performing learners in Mathematical Literacy of a particular school in 2016 are represented in the TABLE below.

SBA MARKS IN MATHEMATICAL LITERACY FOR 2016 OF THE TEN LOWEST PERFORMING LEARNERS

LEARNER	NUMBER OF ASSESSMENT TASKS WRITTEN	TOTAL MARKS ATTAINED	ACTUAL SBA PERCENTAGE MARK (ROUNDED)
A	7	162	46
B	7	168	48
C	5	118	34
D	5	109	31
E	7	137	39
F	6	146	42
G	3	72	21
H	6	144	41
I	6	144	41
J	6	137	39

Information about SBA marks:

- The total mark for each task is 50.
- The actual SBA percentage mark is calculated out of a maximum of 350 marks.
- The SBA percentage marks of candidates submitting valid reasons for not writing a task will be adjusted. The recalculation of the SBA percentage mark will be based only on the actual tasks written.

Use the TABLE and the information above to answer the questions that follow.

4.1 Determine the probability (as a percentage) of randomly selecting a learner in the table who wrote all the assessment tasks.

4.2 Determine the median total mark.

4.3 Write down the modal actual SBA percentage mark.

4.4 Which learner scored the lowest actual SBA percentage mark?

4.5 Calculate the mean actual SBA percentage mark.

4.6 Learner J submitted a valid medical certificate for the day he missed his one task and qualifies for an adjusted SBA percentage mark.

Determine this learner's adjusted SBA percentage mark.

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TELEMATICS 2020

MATHEMATICAL LITERACY

Grade 12

TELEMATICS SCHEDULE

SESSION	DATE	TIME	TOPIC
1	14 April 2020	16:00 – 17:00	Finance pg. 2-7
2	6 May 2020	15:00 – 16:00	Measurement pg. 8-13

INCOME, EXPENDITURES, PROFIT/LOSS

The monthly fixed expenses to maintain the facilities are R3000 and an additional expense of R250 per event hosted. The table below shows the total monthly expenses.

TOTAL MONTHLY EXPENCES FOR THE HALL

Number of events hosted in a month	0	1	3	**D**	10
Total monthly expense in Rands (R)	3000	3250	3750	4250	5500

1.1.1 Use the following formula to calculate the value of **D**, the number of events.

Total monthly expenses = R3000 + (R250 × number of events hosted in a month)

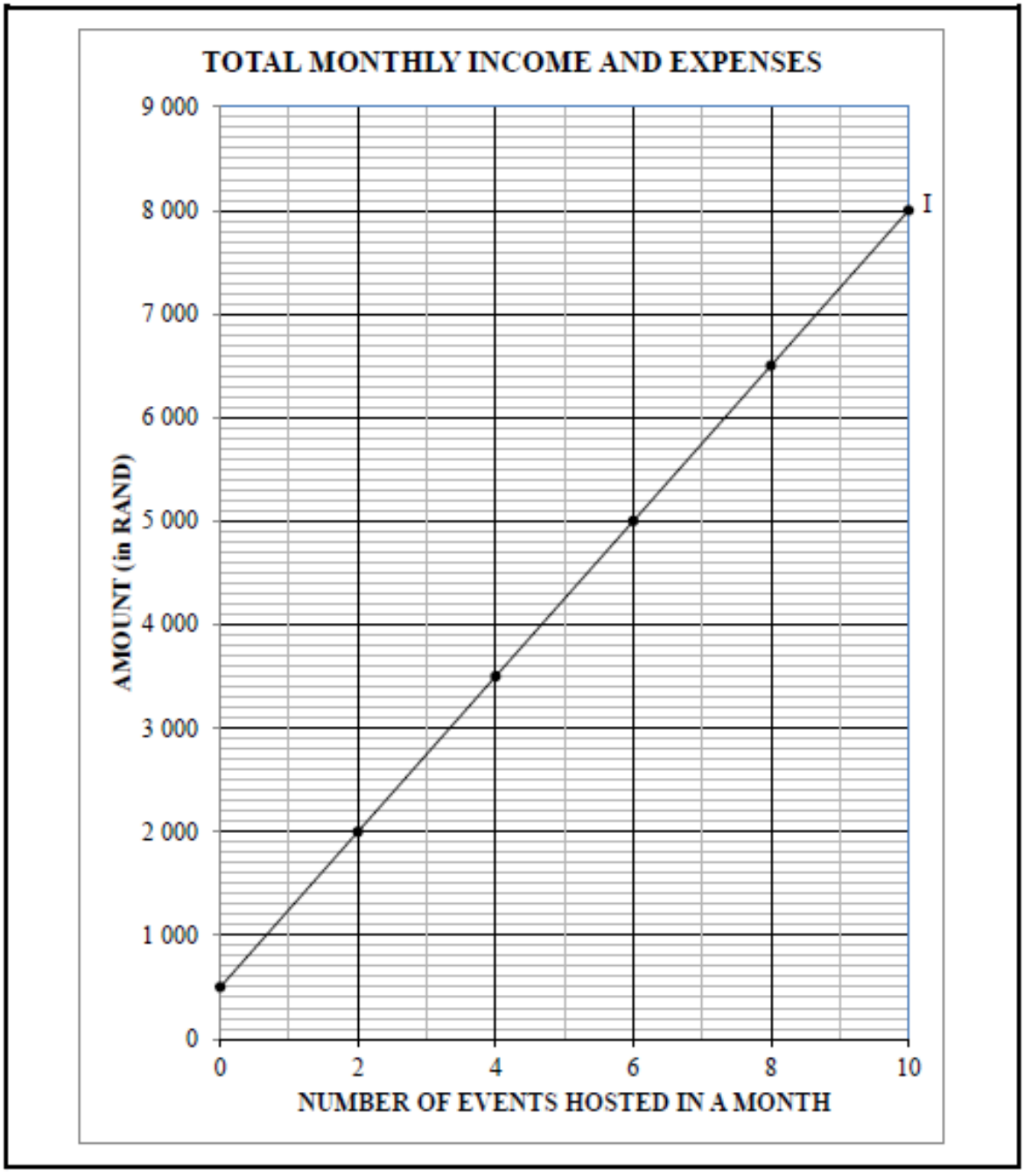
1.1.2 On the ANSWER SHEET a straight-line graph of monthly income has been drawn. Use the table to draw another straight-line graph on the same grid of the monthly expenses (E)

Use the graphs to answer the following questions.

1.1.3 Determine the number of events in a month that the community must host to break even.

1.1.4 Determine the profit the community would make it they hosted 8 events.

MASAKHANE COMMUNITY HALL: GRAPH FOR INCOME (I)/EXPENSES (E) IN RANDS



INTREST

A

Josh saved R500,00 each month since earning his profit. He has now accumulated an amount of R17 000,00.

The table below shows the simple interest rates that would be earned over fixed time periods for amounts ranging from R10 000,00 to R99 999,00.

SIMPLE INTEREST RATES FOR FIFXED TIME PERIODS

TERMS (MONTHS)	R10 000 - R24 999	R25 000 - R99 999
	INTEREST RATE PER YEAR	INTEREST RATE PER YEAR
6	7,12%	7,23%
12	7,76%	8,08%
18	7,87%	8,41%
24	8,08%	8,57%
36	8,30%	8,84%
48	8,46%	9,00%

Use the table above to answer the questions that follow.

2.1.1 Determine (in months) how long he took to save R17 000,00.

2.1.2 Write down the interest rate he will get if he invests his money for 3 years.

2.1.3 Determine (rounded to the nearest R100) the amount of interest Josh will earn if he invest his accumulated savings for 3 years.

2.1.4 Josh friend, Sifiso, wants to invest R24 000,00 for 48 months instead of 12 months.

Calculate the difference in percentage points for the interest rate.

2.1.5 Write down the minimum number of years and months a person must invest R25 000,00 to earn an interest rate of 8,41%.

B

Rajesh exchanged a gift of £360,00 to South African rand at a bank.

The exchange rate was R1,00 = £0,05773.

The bank charged 1,95% commission on the amount exchanged.

Rajesh then invested R5000 of his gift in a fixed deposit account for 1½ years at a compound interest rate of 6,3% per annum.

2.2.1 Calculate (in pounds) the amount of commission Rajesh paid.

2.2.2 Convert £360,00 to Rand.

2.2.3 Calculate (without the use of a formula) the value of the fixed deposit at the end of 1½ years. Show all the steps of the calculations.

BBC Bank has two different interest rates for fixed deposits, depending on the amount of money invested. The TABLE below shows the annual interest rates for different amounts invested.

TABLE: ANNUAL INTEREST RATES 2015/2016

AMOUNT INVESTED	ANNUAL INTEREST RATE
Less than R10 000	6,4%
More than R10 000	7,4%

[Adapted from www.standardbank.co.za]

Use the TABLE above to answer the questions that follow.

2.3.1 Mr Simmons invested R9 500 on 1 January 2015 in a BBC bank account.

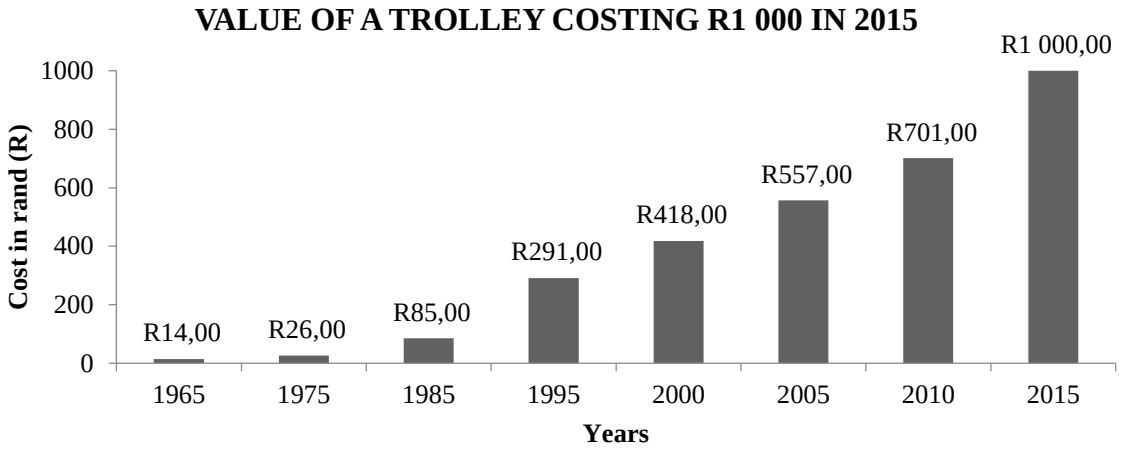
Show that the final amount in his account will be R10 108 after one year.

2.3.2 Mr Simmons reinvested the amount of R10 108 for a further nine months.

Hence, determine the final amount in his account at the end of the nine months.

INFLATION

3.1 The graph below shows the effect of inflation from 2015 going back 50 years.



Below are certain South African items and their prices for the years 1970 and 2015.

		PRICE IN 1970	PRICE IN 2015
Spur burger		R0,30	R62,90
Cheddamelt steak		R0,50	R104,90
Ricoffy 750 g		R0,25	R75,00
Nestlé condensed milk		R0,10	R19,00

Use the information above to answer the questions that follow.

3.1.1 Explain the term *inflation* within the given context.

3.1.2 Write down the price of a Spur burger in 1970.

3.1.3 Calculate by how much the cost, in rand, of a trolley had increased from 2000 to 2005.

3.1.4 Calculate the percentage increase of Ricoffy from 1970 to 2015.
You may use the following formula:

$$\textbf{Percentage increase} = \frac{\textbf{new amount} - \textbf{original amount}}{\textbf{original amount}} \times \textbf{100 \%}$$

3.1.5 A cheddamelt steak was sold for R104,90 at a percentage profit of 17,5%.
Determine the cost price.

The owner of a small business employs domestic workers.

The TABLE below shows the minimum wage rates for domestic workers employed.

MINIMUM WAGES FOR DOMESTIC WORKERS WHO WORK MORE THAN 27 HOURS PER WEEK

	MINIMUM WAGE RATES (IN RAND)	
	1 Dec. 2014 to 30 Nov. 2015	**1 Dec. 2015 to 30 Nov. 2016**
Hourly	10,59	11,44
Weekly	476,55	514,80
Monthly	2 065,05	**B**

[Source: www.labour.gov.za]

Use the TABLE above to answer the questions that follow.

3.2.1 Define the term *inflation*.

3.2.2 Use the minimum hourly rate to show that the minimum weekly rate in the table is for working 45 hours per week.

3.2.3 Determine the missing value B.

You may use the following formula:

$$\text{Minimum monthly rate} = \frac{\mathbf{r} \times \mathbf{w}}{\mathbf{12}}$$

where r = minimum weekly rate
w = number of weeks in a year

3.2.4 During November 2016 the company employed 15 domestic workers who each worked a total of 40 hours for five days.

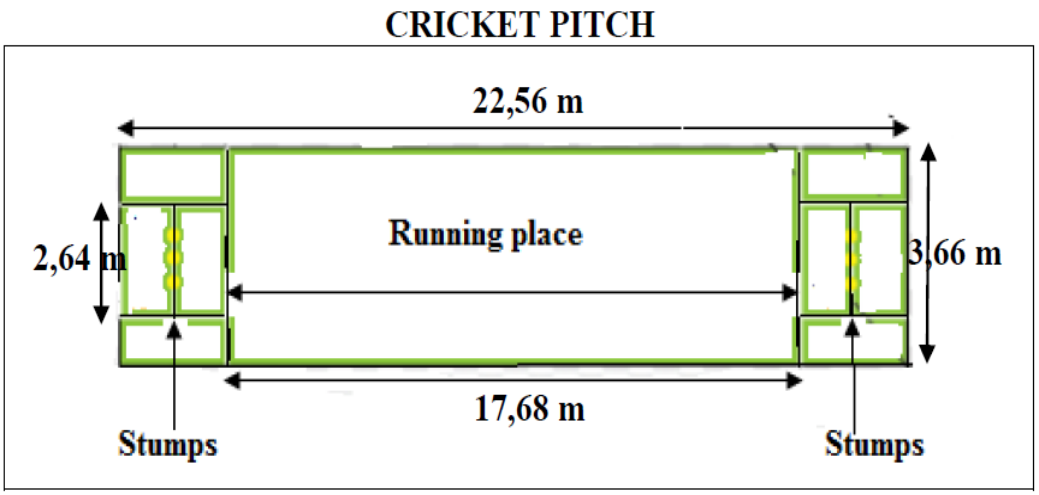
(a) Calculate the total minimum wage EACH of these domestic workers should be paid for the five days.

(b) Determine the actual hourly rate that was paid to these domestic workers if each domestic worker received a total wage of R550,90 for the five days.

MEASUREMENT

- Length
- Perimeter
- Area
- Volume
- Surface Area
- Weight
- Temperature
- Time

1.1	A diagram of the cricket pitch is shown below. Study the diagram and answer the questions that follow.



1.1.1 Explain the term '*perimeter'*.

1.1.2 Calculate the perimeter of the erea where the players run during cricket overs.

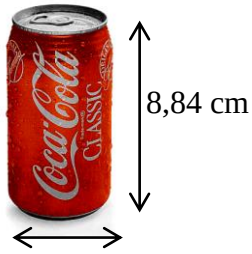
You may use the formula: Perimeter = 2 (length + width)

1.1.3 Calulate the area (m^2) ot the cricket pitch.

You may use the formula: Area = Length × Width

2.1 The Hermanus High School hiking club decided to go and do the Fish River Canyon Hiking Trail (in Namibia). On their route, they first visited the Augrabies waterfall near Upington.

Thalia packs a cooler bag for the road. She puts 2 six-packs cans in the cooler bag. Two six-pack cans fit exactly on top of each other in the cooler bag. A can has a diameter of 6 cm and a height of 8,84 cm.



π = 3,142

Volume = π × radius² × height

Volume = length × breadth × height **Note: 1 cm³ = 1 mℓ**

2.1.1 Calculate the volume of one can of cold drink, rounded to the nearest whole number.

2.1.2 Write down the capacity of one can of cold drink in mℓ.

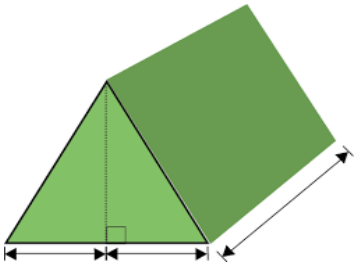
2.1.3 Calculate the height of the cooler bag, rounded to the nearest whole number.

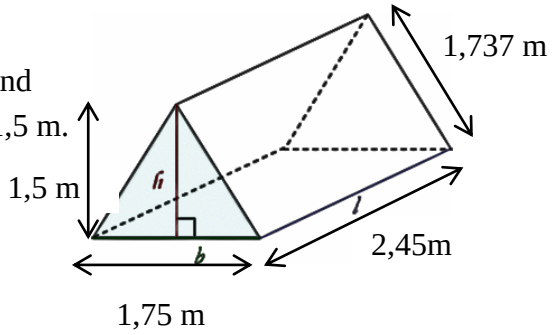
2.1.4 Calculate the volume of the cooler bag if the breadth of the bag is 12 cm and the length 18 cm.

2.2

Corniël is very tall and made a tent with specific measurements:

- the length is 2,45m
- the breadth 1,75 m
- the slant height 1,737 m and
- the perpendicular height 1,5 m.





2.2.1 Calculate the amount of material that is needed to make the tent. The ground cloth is attached to the structure of the tent.

Use the formula: ***Surface area =***

2(length × slant height) + (length × breadth) + 2 (base × perpendicular height)

2.2.2 The daily temperature of Namibia is shown in Fahrenheit. If the minimum temperature on Sunday will be 47°F, convert this temperature to degrees Celsius.
You may use one of the formulae:

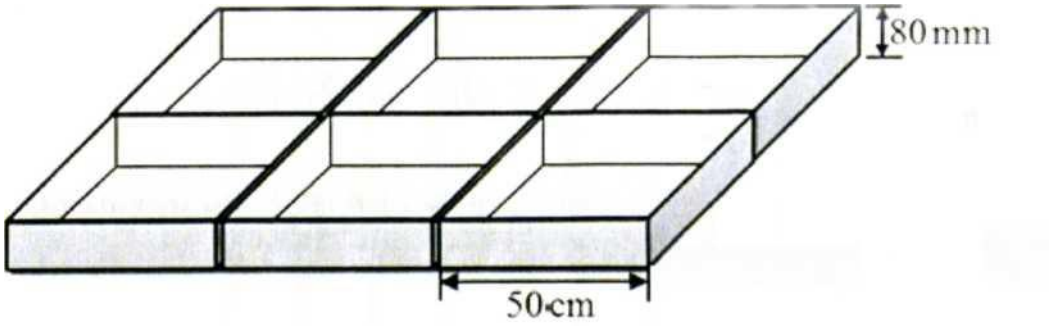
°F = (1,8 × °C) + 32 or **°C = (°F – 32) ÷ 1,8**

2.2.3 The distance from Hermanus to Upington is 979 km. The hikers leave Hermanus at 05:00. They travel at an average speed of 110 km/h. They stop twice for a half an hour each time to fill the petrol tank. At Springbok they spend an hour and 6 minutes on lunch. Determine the time they will reach their destination in Upington.

You may use the formula:

Distance = Speed × Time

3.1 African Concrete Blocks is a company that manufactures square concrete blocks. The diagram below shows the six steel moulds that they use to make the square concrete blocks.



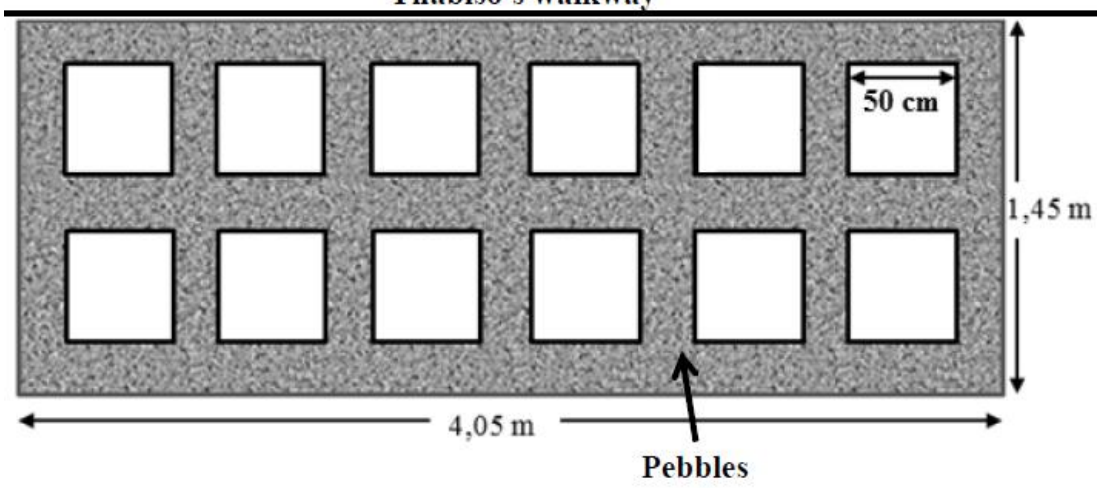
[Adapted from www.researchgate.net

Use the diagram above to answer the questions that follow

3.1.1 Explain the meaning of *volume.*

3.1.2 Calculate (in m^3) the volume of ONE concrete block.
You may use the following formula:

Volume = side x side x height

3.2	Thabiso wants to renovate the walkway in his garden. He wants to replace the grass on the walkway with concrete blocks and pebbles. The dimensions of the walkway, as shown, will be 4,05 m by 1,45 m. **Thabiso's walkway**  • 1 concrete block = 50 cm ×50 cm • The pebbles are sold in 20 kg bags and covers an area of approximately 0,36 m^2. • He will need 12 blocks, as shown in the sketch above.

Use the information to answer the questions that follow.

3.2.1 Calculate (in m^2) the total area of the 12 concrete blocks.

You may use the following formula:

Area = side x side

3.2.3 Calculate the area of the walkway that needs to be covered with pebbles.

You may use the following formula:

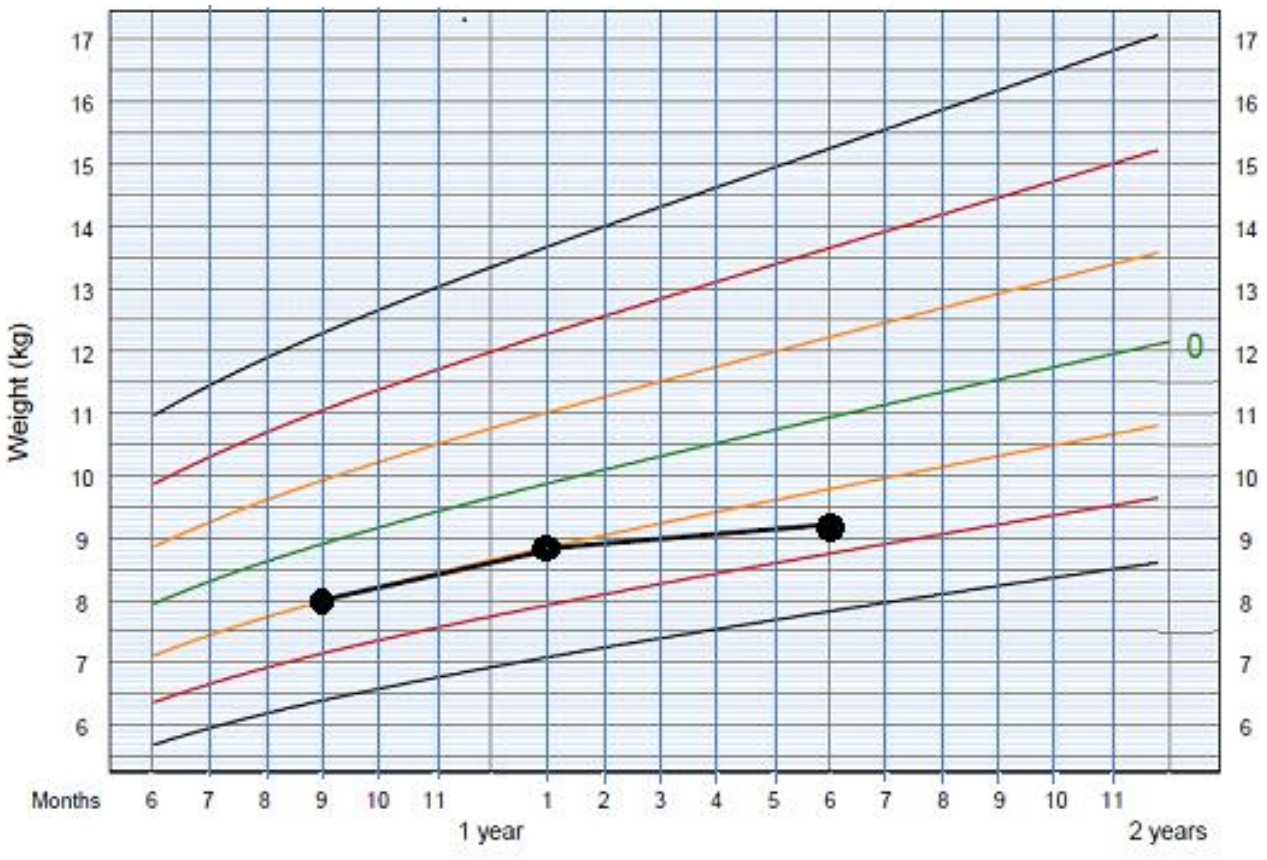
Area = length x breath

3.2.3 Calculate the total number of bags of pebbles needed to cover an area of 5,7 m^2.

4.1 A nurse from Port Allen Clinic conducts road shows to demonstrate the use of growth charts to parents. She uses a weight-for-age chart for boys as on ANNEXURE A, which shows the recorded measurements of a boy for three visits.

ANNEXURE A

WEIGHT-FOR-AGE CHART FOR BOYS



Age (months and years)

Use ANNEXURE A to answer the questions that follow.

4.1.1 Identify the age group represented on this chart.

4.1.2 Give the boy's weight at his first visit.

4.1.3 Determine the boy's age (in months) during a visit when he weighed a little less than 9 kg.

4.1.4 The boy's first visit was in May.
Determine the month in which the third visit took place.

4.1.5 During the fourth visit, the boy weighed 11,2 kg and his body mass index (BMI) was calculated as 19,5 kg/m^2.

Calculate the boy's corresponding height (in metres) rounded off to THREE decimal places.

You may use the following formula: $\mathbf{BMI = \frac{weight\ (in\ kg)}{(height\ in\ m)^2}}$