



**higher education  
& training**

Department:  
Higher Education and Training  
**REPUBLIC OF SOUTH AFRICA**

**NATIONAL CERTIFICATE (VOCATIONAL)**

**MATHEMATICAL LITERACY**

(Second Paper)

**NQF LEVEL 4**

(10401034)

**23 February 2018 (Y-Paper)**

**13:00–16:00**

**This question paper consists of 12 pages and 3 addenda.**

<p><b>TIME: 3 HOURS</b> <b>MARKS: 150</b></p>
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## INSTRUCTIONS AND INFORMATION

1. Answer ALL the questions.
  2. Read ALL the questions carefully.
  3. Number the answers according to the numbering system used in this question paper.
  4. Clearly show ALL calculations, diagrams, graphs, et cetera used in determining the answers.
  5. Approved calculators may be used, unless otherwise stated.
  6. Round off the answers to TWO decimal places, unless otherwise stated.
  7. Use  $\pi = 3,14$ . Learners will be penalised if any other value is used.
  8. Drawing instruments including rulers, pairs of compasses and protractors may be used.
  9. Answer QUESTION 1.1.5 on ADDENDUM A, QUESTION 1.2.2 on ADDENDUM B and QUESTION 2.2.5 on ADDENDUM C.
  10. Diagrams are not necessarily drawn to scale.
  11. Work neatly.
  12. Start each question on a NEW page.
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## QUESTION 1

Themba and Ayola are brothers who have a part-time business in their community helping local school children with homework and school projects.

- 1.1 The parents of the children pay a monthly fee, and they also get donations from other local businesses. They employ a student to supervise and help the children.

Themba and Ayola drew up a budget for September 2017 and kept a record of their actual income and expenditure.

Study the budget below and answer the questions.

INCOME	BUDGET September 2017	ACTUAL September 2017	VARIANCE
Fees from parents	1 680	2 040	+ 360
Donations	5 000	4 500	- 500
<b>TOTAL INCOME</b>	6 680	6 540	<b>A</b>
<b>EXPENSES</b>			
Wages – student	3 000	3 000	0
Rent	500	500	0
Water and electricity	600	750	- 150
Stationery	200	350	- 150
Paper	200	380	- 180
Other expenses	200	465	- 265
<b>TOTAL EXPENSES</b>	4700	5 445	- 745
<b>SURPLUS/DEFICIT</b>	1 980	1 095	

- 1.1.1 Calculate the variance for the total income (the value of A). (2)
- 1.1.2 Is there a surplus or a deficit at the end of September? (1)
- 1.1.3 Give TWO reasons why there is a variance on the surplus/deficit. (2)
- 1.1.4 They had expected to enrol 14 children in September, but they actually had 17 enrolments.
- (a) Calculate how much each parent contributes. (2)
- (b) What will the income from fees be if they enrolled 30 children? (2)

1.1.5 Complete the table on ADDENDUM A (attached) by draw up a budget for October 2017. Take the following into account:

- They expect to have 30 children.
- The donation in October will be the same as the actual in September.
- They will employ an extra student for a few hours and pay him/her R1 200.
- Rent, water and electricity and other will remain the same as the actual September amount.
- Stationery will increase by 7,5 % and paper by 6%.

Hand in ADDENDUM A with your ANSWER BOOK. (6)

1.1.6 What TWO things should the brothers consider doing in order to increase the profits of their business? (2)

1.2 Themba and Ayola decide to get a new computer and printer combo. They have 2 options – they can either buy the computer and printer or hire them.

OPTION 1: They can **buy** the combo for a total price of R10 500.

OPTION 2: They can **hire** the combo for R525 per month.

1.2.1 The table below shows how the total cost to hire will increase over a period of time (given in months).

**COST TO HIRE THE COMPUTER AND PRINTER**

Duration in Months	1	5	10	20	24
Cost (R)	525	2 625	A	B	12 600

Calculate the values of A and B. (2)

1.2.2 Use ADDENDUM B to draw TWO graphs on the same set of axes.

The first graph must show the cost of buying the computer and printer (OPTION1). The second graph must show the cost of hiring the computer and printer (OPTION 2).

Clearly label each graph, and give a suitable heading.

Hand in ADDENDUM B with your ANSWER BOOK. (6)

1.2.3 Which will be the cheaper option if the computer and printer will be used for ONE year?

1.2.4 After how many months would it be cheaper to have bought the computer and printer rather than hiring them? Justify your answer by referring to the graphs which you have drawn.

(2 × 2) (4)

- 1.3 Themba is 32 years old and has a full-time job in the banking industry. He earns a monthly taxable income of R45 000 and pays R10 905 PAYE (Pay as You Earn) every month.

The table below shows the annual tax brackets for individuals in the current financial year.

**SOUTH AFRICAN REVENUE SERVICE (SARS) 2016/2017**

<b>Rates applicable to individuals</b>	
<b>Taxable Income (R)</b>	<b>Rates of Tax (R)</b>
R0–R188 000	18% of each R1
R188 001–R293 600	33 840 + 26% of amount above 188 000
R293 601–R406 400	61 296 + 31% of amount above 293 600
R406 401–R550 100	96 264 + 36% of amount above 406 400
R550 101–R701 300	147 996 + 39% of amount above 550 100
R701 301 and above	206 964 + 41% of amount above 701 300
<b>Tax Rebates applicable to individuals are:</b>	
• Primary rebate	R 13 500
• Additional rebate (for persons 65 years and older)	R 7 407
• Tertiary (person 75 or older)	R 2 466

[Source: [www.sars.gov.za](http://www.sars.gov.za)]



- 1.3.1 Prove that his monthly PAYE amount (R10 905) is correct. Show all calculations. (9)
- 1.3.2 After a salary increase Themba's annual taxable income is R577 800.

What effect will this have on his monthly tax deduction? Explain your answer by referring to the tax brackets in the table above. (2)

**[40]**

**QUESTION 2**

- 2.1 Themba and Ayola decide to start a computer club for the children.  
They offer 2 different options – the children can be members or non-members.

 <b>MEMBERS</b> R160 membership fee per year And R12 for every hour spent online.	 <b>NON-MEMBERS</b> R20 for every hour spent online.
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- 2.1.1 Copy and complete the table below showing the costs using the TWO different options. The first row shows the number of hours.

NO OF HOURS	0	10	20	30
MEMBER				
NON- MEMBER				

(4)

- 2.1.2 Write down the general formula for calculating the cost of being a non-member by using the following format:

Cost = ..... × .....

(2)

- 2.1.3 Write down the general formula for calculating the cost of being a member by using the following format:

Cost = ..... + .....

(2)

- 2.1.4 After how many hours spent online does it become cheaper to be a member?

(2)

- 2.1.5 Use the formulae from QUESTION 2.1.2 and QUESTION 2.1.3 above to calculate the difference in cost for a member compared to a non-member if 28 hours are spent online.

(6)

- 2.2 Some of the children are working on a project in their community and need to spend time at the learning centre.

The table below shows how long the project will take depending on how many children work on it.

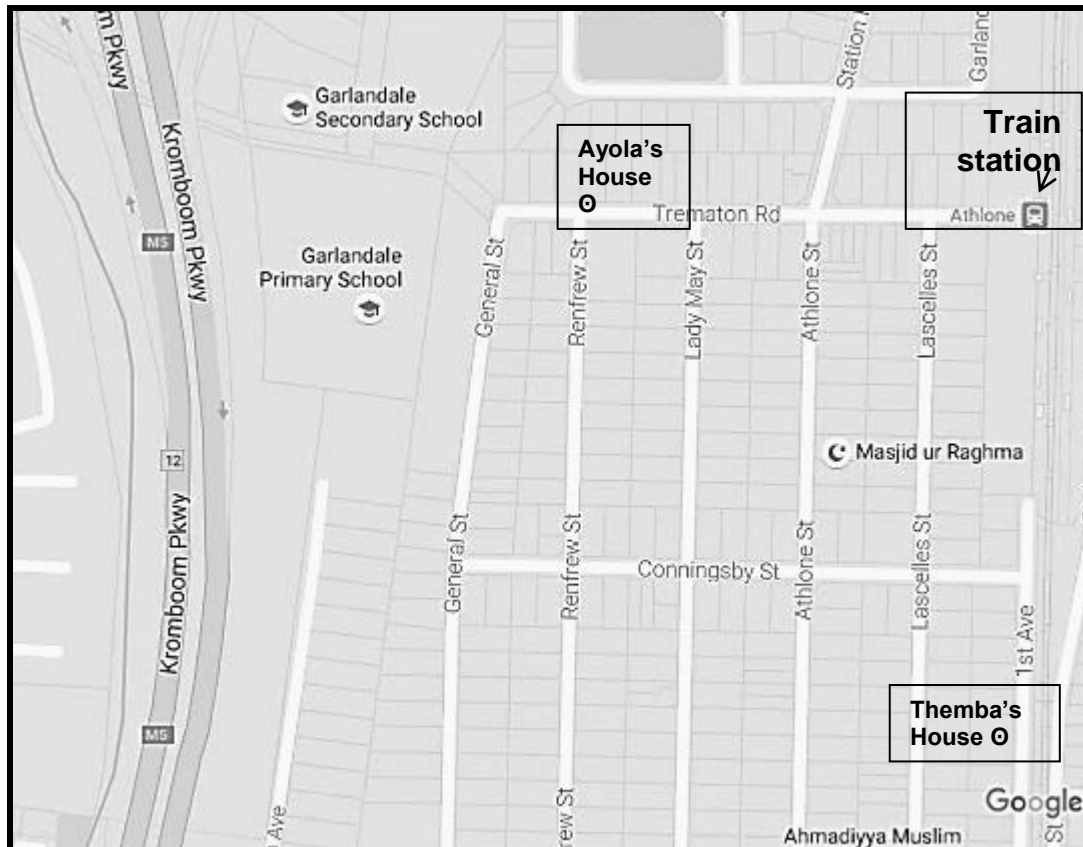
<b>Number of Children</b>	2	<b>A</b>	5	6	10	30
<b>Number of hours</b>	15	7,5	6	5	3	<b>B</b>

- 2.2.1 Calculate the values of **A** and **B**. (2)
- 2.2.2 What type of relationship is represented in the table above? Give a reason for your answer. (3)
- 2.2.3 Which is the dependent variable? Give a reason for your answer. (2)
- 2.2.4 If only ONE child worked on the project, how long would it take him/her to complete the project? (2)
- 2.2.5 Draw a graph (on ADDENDUM C) that represents the information in the table. Label the axes and give the graph a suitable heading. (8)
- Hand in the ADDENDUM with your ANSWER BOOK. [33]

### QUESTION 3

Themba and Ayola decide to build a new learning centre at one of their homes in Garlandale to help the children at the local school.

3.1 Refer to the map below to answer the questions.



[Source: [www.googlemaps.com](http://www.googlemaps.com)]

3.1.1 Themba lives on 1<sup>st</sup> Avenue and Ayola on Trematon Rd.

Which of these homes would be the best place to build the learning centre? Give a reason for your answer.

(2)

3.1.2 The distance from Themba's house to Ayola's house is 2,72 km. On the map the distance between the 2 houses is 8,5 cm.

Determine the scale of the map. Write your answer in ratio format.

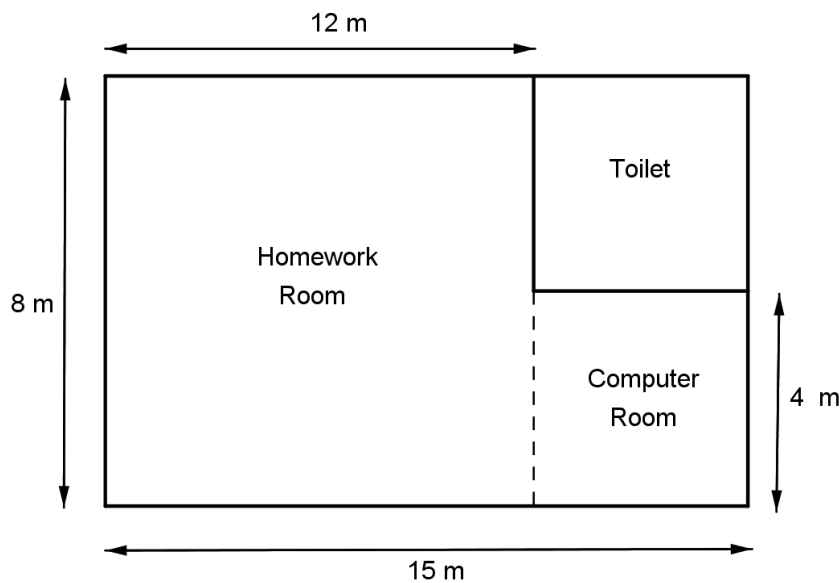
(4)

3.1.3 Use the scale from QUESTION 3.1.2 to calculate the direct distance from Themba's house to the Athlone train station. Give your answer in kilometres.

(5)



- 3.2 Given below is the floorplan for the new learning centre. The plan is not drawn to scale.



- 3.2.1 Calculate the total area of both the homework room and the computer room.

$$\text{Area of rectangle} = l \times b$$

(7)

- 3.2.2 Calculate the total cost for tiling and carpeting the new centre, considering the following:

The toilet will be tiled at a cost of R42/m<sup>2</sup>.

The homework room and the computer room will be carpeted at a cost of R38/m<sup>2</sup>.

Labour costs R600 per day, and it should take 3 days to complete.

All prices include 14% VAT.

$$\text{Area of rectangle} = l \times b$$

(9)

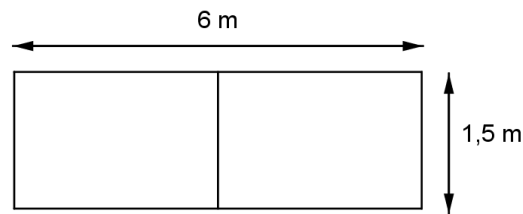
- 3.2.3 As an alternate option, Themba gets a quote to complete the tiling and carpeting at a total cost of R5 000 excluding VAT.

Use your answer obtained from QUESTION 3.2.2 to justify if this is a cheaper option. Show ALL working.

(4)

3.3 The diagram below shows the design of a window of the learning centre.

There are 2 rectangular glass panes next to each other with thin wooden frames surrounding each pane.



3.3.1 Calculate how many metres of wood are needed for the frame. (3)

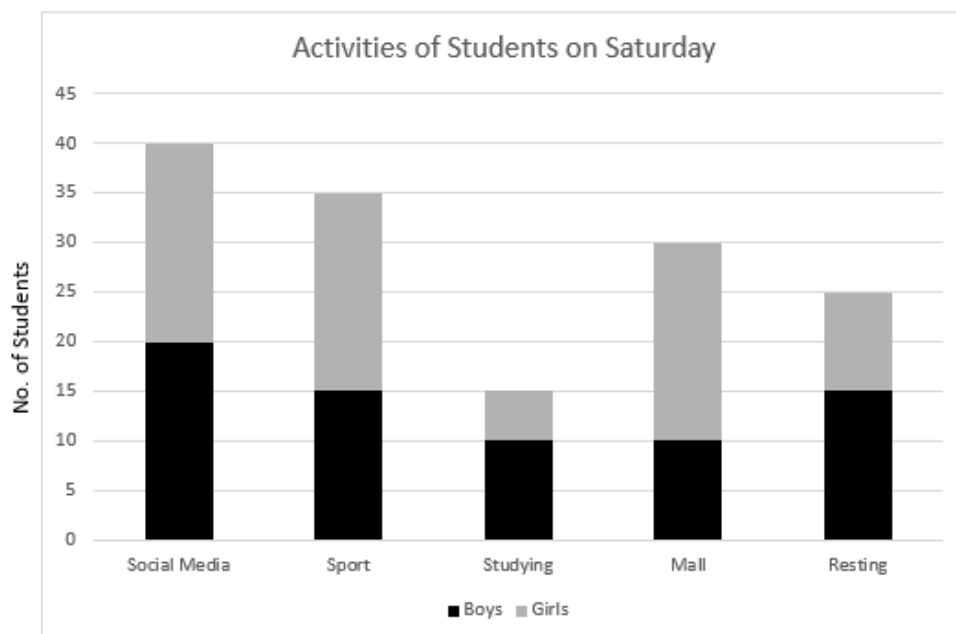
3.3.2 What are the dimensions (length and width) of each glass pane? (2)

3.3.3 Glass is manufactured in large pieces. The length and the width of a glass piece is 10 m by 5 m respectively.

How many window panes can be cut from one large piece of glass? (6)  
[42]

#### QUESTION 4

4.1 The graph below shows the activities of students on a Saturday afternoon.



4.1.1 Give the mathematical name of the graph shown above. (1)

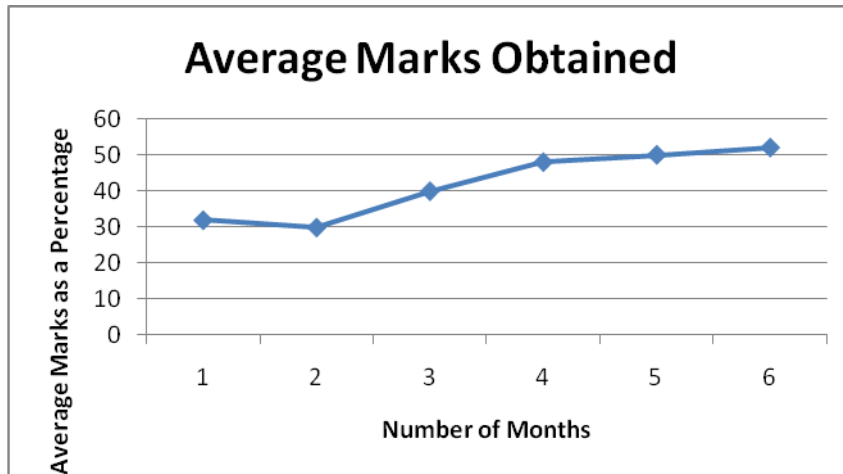
4.1.2 How many girls spent their Saturday afternoon playing sport? (2)

4.1.3 Determine the ratio of boys to girls who formed part of this survey. (2)

4.1.4 What percentage of the students surveyed spend their Saturday afternoon at the mall? (3)

4.1.5 Determine the modal activity. (2)

4.2 Study the graph showing the average marks achieved by the children at the learning centre for the first six months.



4.2.1 What is the general trend of this graph? (2)

4.2.2 Which TWO months showed the biggest improvement in marks? (2)

4.2.3 Based on the trend of the graph, what is likely to happen in the next few months? (2)

- 4.3 A survey was done amongst the children to determine the modes of transport used to get to school.

The results have been summarised below.

### MODES OF TRANSPORT

	BICYCLE	WALK	BUS	TAXI
GIRLS	2	4	4	3
BOYS	8	6	1	2
TOTAL	10	10	5	5

- 4.3.1 What is the sample size for this survey? (1)
- 4.3.2 What percentage of boys ride bicycles to school? (3)
- 4.3.3 What fraction of the sample are girls? (2)
- 4.3.4 If a boy is chosen at random, what is the probability that he will use a taxi to get to school? Express the answer as a decimal fraction. (3)
- 4.3.5 If a child is chosen at random, what is the probability that it will be a girl who walks to school? (2)
- 4.3.6 If a child is selected from those that rode in on a bicycle, what is the probability that it will be a girl? (3)
- 4.3.7 If a child is chosen at random, the probability that they will either ride a bicycle or walk to school is 66,67%.
- Is the above statement TRUE or FALSE? Support your answer by showing ALL calculations. (5)

[35]

**TOTAL: 150**

ANSWER SHEET EXAMINATION NUMBER:

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## ADDENDUM A

## QUESTION 1.1.5

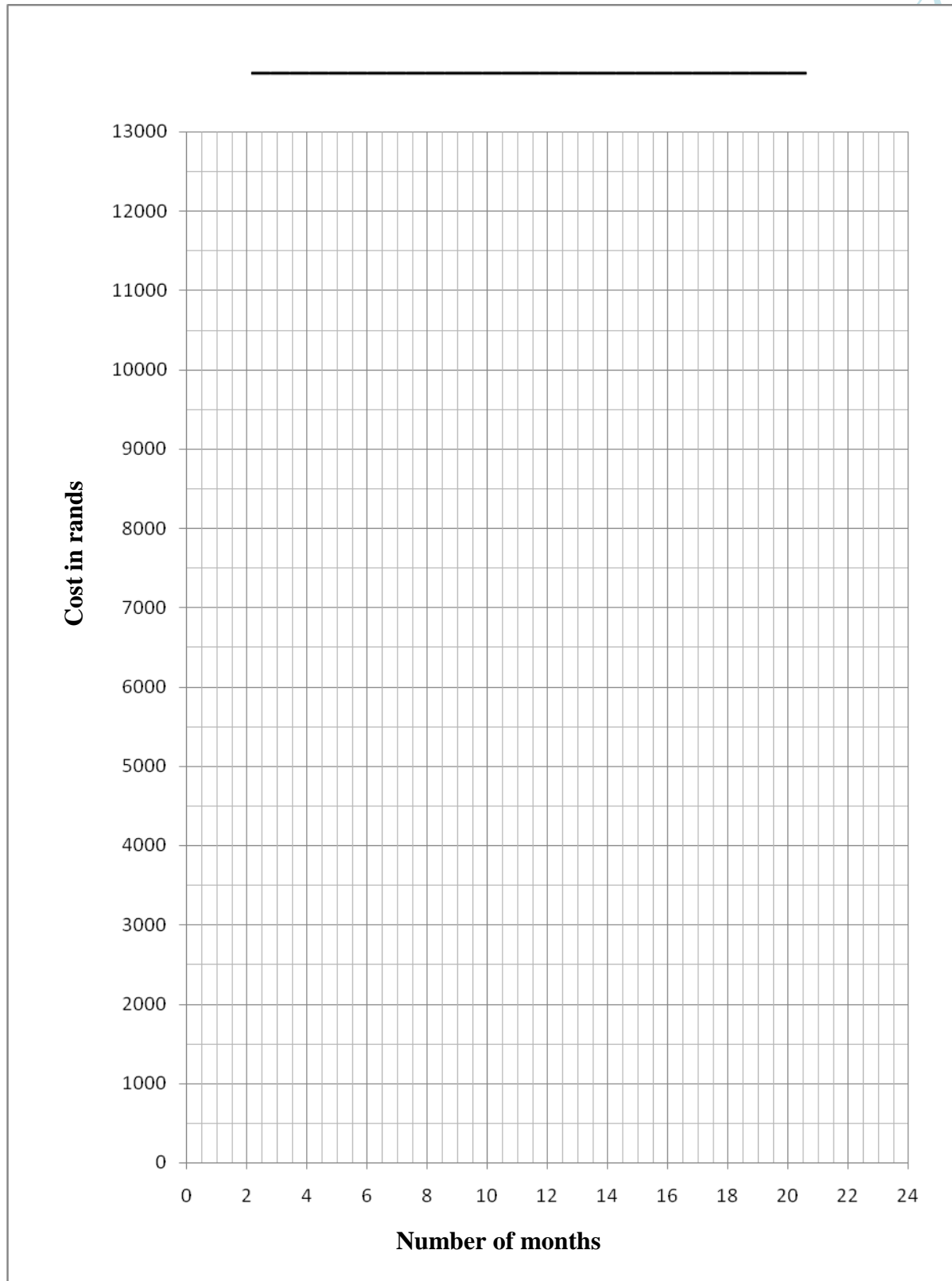
INCOME	ACTUAL September 2017	BUDGET October 2017
Fees from parents	2 040	
Donations	4 500	
<b>TOTAL INCOME</b>	6 540	
<b>EXPENSES</b>		
Wages – student	3 000	
Rent	500	
Water and electricity	750	
Stationary	350	
Paper	380	
Other	465	
<b>TOTAL EXPENSES</b>	5 445	
<b>SURPLUS/DEFICIT</b>	1 095	

**ANSWER SHEET    EXAMINATION NUMBER:**

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**ADDENDUM B**

**QUESTION 1.2.2**



[illegible]

### QUESTION 2.2.5

[illegible]