



**higher education  
& training**

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

**NATIONAL CERTIFICATE (VOCATIONAL)**

**MATHEMATICAL LITERACY**

(Second Paper)

**NQF LEVEL 4**

(10401034)

**7 November 2019 (X-Paper)**

**09:00–12:00**

**This question paper consists of 11 pages and 1 addendum.**

<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. Use only a black or blue pen.
  5. Clearly show ALL calculations used in determining answers.
  6. Round off answers to TWO decimal places unless stated otherwise.
  7. Answer QUESTION 2.1.4 on the ADDENDUM (attached) and hand it in with the ANSWER BOOK.
  8. Diagrams are NOT necessarily drawn to scale.
  9. Write neatly and legibly.
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## QUESTION 1

Mr Arendse owns a business called High Flyers Flight School. He has asked you to help him with some financial decisions.

1.1 Below is an incomplete variance report for High Flyers Flight School.

High Flyers Flight School Variance report for the month ended October 2019			
	ACTUAL AMOUNT	BUDGETED AMOUNT	VARIANCE
<b>Income</b>			
Lessons revenue	440 700	429 000	+11 700
<b>Total income</b>	440 700	429 000	+11 700
<b>Expenses</b>			
Instructor wages	128 310	126 750	-1 560
Aircraft depreciation	<b>A</b>	74 100	-2 470
Fuel	35 750	29 250	-6 500
Maintenance	31 850	30 290	-1 560
Ground facility expenses	20 020	<b>B</b>	+130
Administration	43 160	44 070	+910
<b>Total expenses</b>			<b>C</b>
<b>Profit/Loss</b>	<b>105 040</b>	<b>104 390</b>	<b>+650</b>

1.1.1 Calculate the missing values marked A, B and C. (3×2) (6)

1.1.2 What does the positive sign for the variance in the profit/loss row indicate? (2)

1.1.3 Express the variance of the total income as a percentage of the budgeted amount. (3)

1.1.4 Why do you think it is important to compile a variance report? Give ONE reason. (2)

1.2 Mr Arendse decides to invest R50 000 for a period of two years. His bank offers him two options:

Option 1: Simple interest at a rate of 8,21% per annum

Option 2: Compound interest at a rate of 8,13% per annum

Which of the two options would earn Mr Arendse a better return on investment? Show ALL calculations to substantiate the answer. (10)

- 1.3 Mr Arendse has a metered account for water at his office but has the option to install a prepaid meter. His average monthly consumption is 12 kℓ.



The table below shows the cost per month for the metered account and the prepaid account.

kℓ per month	Metered account (R/kℓ) excl. VAT (15%)	Prepaid account (R/kℓ) excl. VAT (15%)
0–6	8,28	7,57
6–10	8,79	7,57
10–15	15,00	9,72
15–20	21,83	18,07
20–30	29,98	28,70
30–40	33,22	31,11
40–50	42,42	40,92
+50	45,19	45,13

Residential water tariffs – 2018/2019

Assuming his average consumption remains the same, calculate which option would be cheaper for him. Include VAT of 15% on the calculated values. Show ALL calculations to substantiate the answer.



(11)

- 1.4 Mr Arendse employs a secretary at the flight school. He is 25 years old and earns an annual taxable income of R216 000.

Calculate what his monthly tax contribution should be.

2019 tax year	
Taxable income (R)	Rates of tax (R)
1- 195 850	18% of taxable income
195 851–305 850	35 253 + 26% of taxable income above 195 850
305 851–423 300	63 853 + 31% of taxable income above 305 850
423 301–555 600	100 263 + 36% of taxable income above 423 300
555 601–708 310	147 891 + 39% of taxable income above 555 600
708 311–1 500 000	207 448 + 41% of taxable income above 708 310
1 500 001 and above	532 041 + 45% of taxable income above 1 500 000

Tax rebate	
	<b>2019</b>
Primary	R14 067
Secondary (65 and older)	R7 713
Tertiary (75 and older)	R2 574



(8)  
[42]

**QUESTION 2**

- 2.1 Mr Arendse offers students two paying options for training. The first option costs R1 025 per hour plus an additional annual amount of R4 800. The second option costs R1 345 per hour with no annual amount.



- 2.1.1 Calculate the missing values in the table below. Write only the answer next to the letter (A–F) in the ANSWER BOOK.

Number of hours	0	5	10	20	30	40	<b>D</b>
Cost (R) Option 1	<b>A</b>	9 925	15 050	<b>B</b>	35 550	<b>E</b>	56 050
Cost (R) Option 2	0	6 725	<b>C</b>	26 900	40 350	<b>F</b>	67 250



(6×1) (6)

- 2.1.2 Write down a formula that can be used to calculate the cost for option A. (2)

- 2.1.3 Which is the dependent variable? Give ONE reason for the answer. (2)

- 2.1.4 Use the information in the above table to draw TWO graphs on the same set of axes on the ADDENDUM (attached) to show the costs for the TWO options.

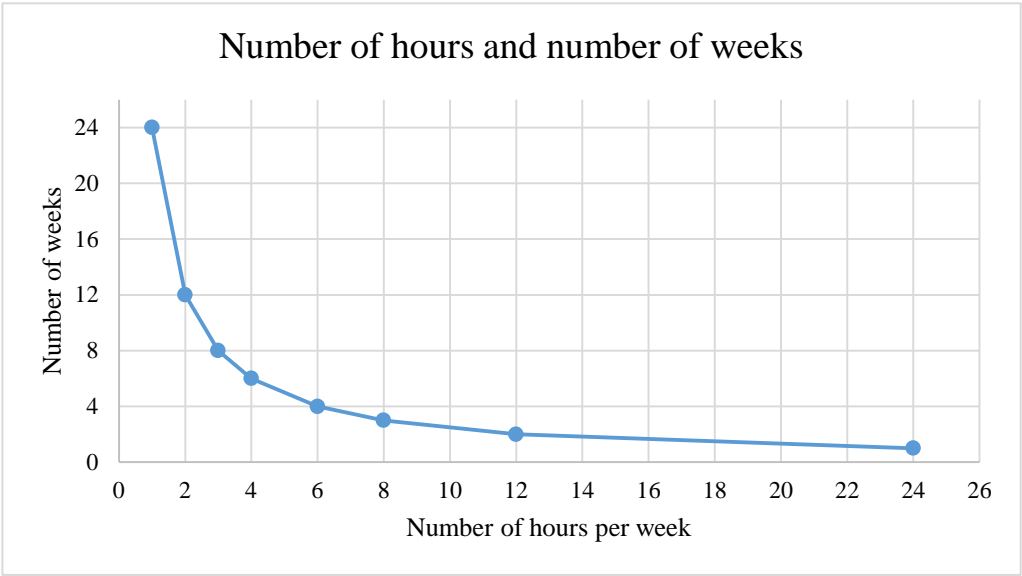
Take note of the following:

- Give the graph a suitable heading.
- Choose appropriate scales for the axes.
- Label the axes.
- Label each graph.
- Clearly show the break-even point. (9)



- 2.1.5 What is the break-even point on this graph? Give the answer in terms of the number of hours and the rand value. (4)

2.2 Jack is training to be a pilot and still has to complete 24 hours of flying time. He can choose the number of hours he can practice flying each week and this will determine how long (in weeks) it will take him. The graph below shows how many weeks it will take, depending on how many hours per week he flies.



2.2.1 Which type of relationship is shown in the graph? Give a reason for the answer. (3)

2.2.2 Use the graph to find the missing values in the table below. Write only the answer next to the letter (A–D) in the ANSWER BOOK.

No. of hours	1	A	3	4	6	B	12	24
No. of weeks	24	12	8	C	4	3	2	D

(4)

2.2.3 What is the constant product in the table above? (2)  
[32]

**QUESTION 3**



3.1 The amount of money (in rand) that Jack spent on flying over six months is recorded in the table below.

Month	Amount (R)
January	17 485
February	12 105
March	13 450
April	16 140
May	12 105
June	0

3.1.1 Calculate the mean, median and the mode for the amounts in the given data set. Express the answers to the nearest rand. (7)



- 3.1.2 'The mean is the best measure of central tendency that represents the given data.'



State whether you agree or disagree with this statement and give a full explanation for your choice.

(3)

- 3.1.3 Do you think that the mode represents a typical value in the given data set? Give ONE reason for the answer.

(3)

- 3.2 Thumi and Angela are flight instructors. The table below represents the number of different trainee pilots they assisted over a four-week period.

	Week 1	Week 2	Week 3	Week 4
Thumi	6	4	5	2
Angela	3	4	1	5

- 3.2.1 Mr Arendse states that a trainee pilot would be more likely to have been assisted by Thumi over the given four-week period.



Do you agree with him? Give ONE reason for the answer.

(2)

- 3.2.2 What is the probability that a trainee in Week 1 would be assisted by Angela? Give the answer as a fraction in its simplest form.

(3)

- 3.2.3 If a trainee trained by Angela is selected at random, what is the probability of selecting a trainee that has been trained in Week 3? Give the answer as a percentage.

(3)

- 3.2.4 If a trainee is selected at random, what is the probability of selecting a trainee that has been assisted in Week 4?



(2)

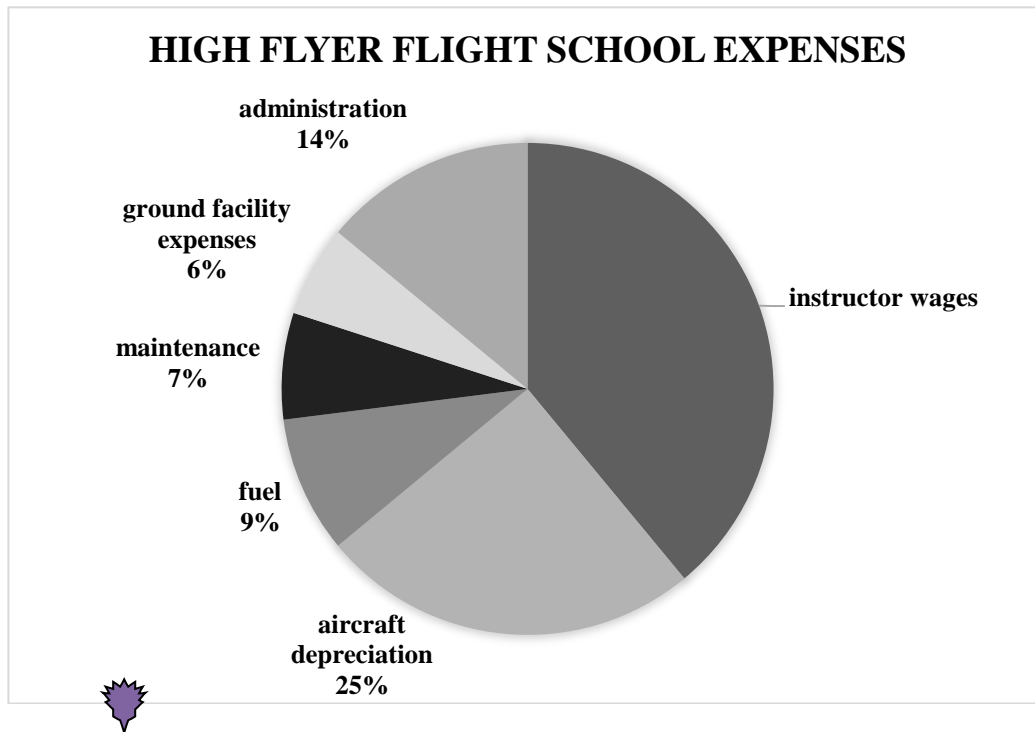
- 3.2.5 Draw a stacked-bar graph to show how many pilots each instructor assisted over the four-week period.

(8)

- 3.3 Mr Arendse's secretary draws up the following pie chart to illustrate his monthly expenses. Instructor wages cost R126 750 per month.



Use the pie chart to calculate his total monthly expenses.

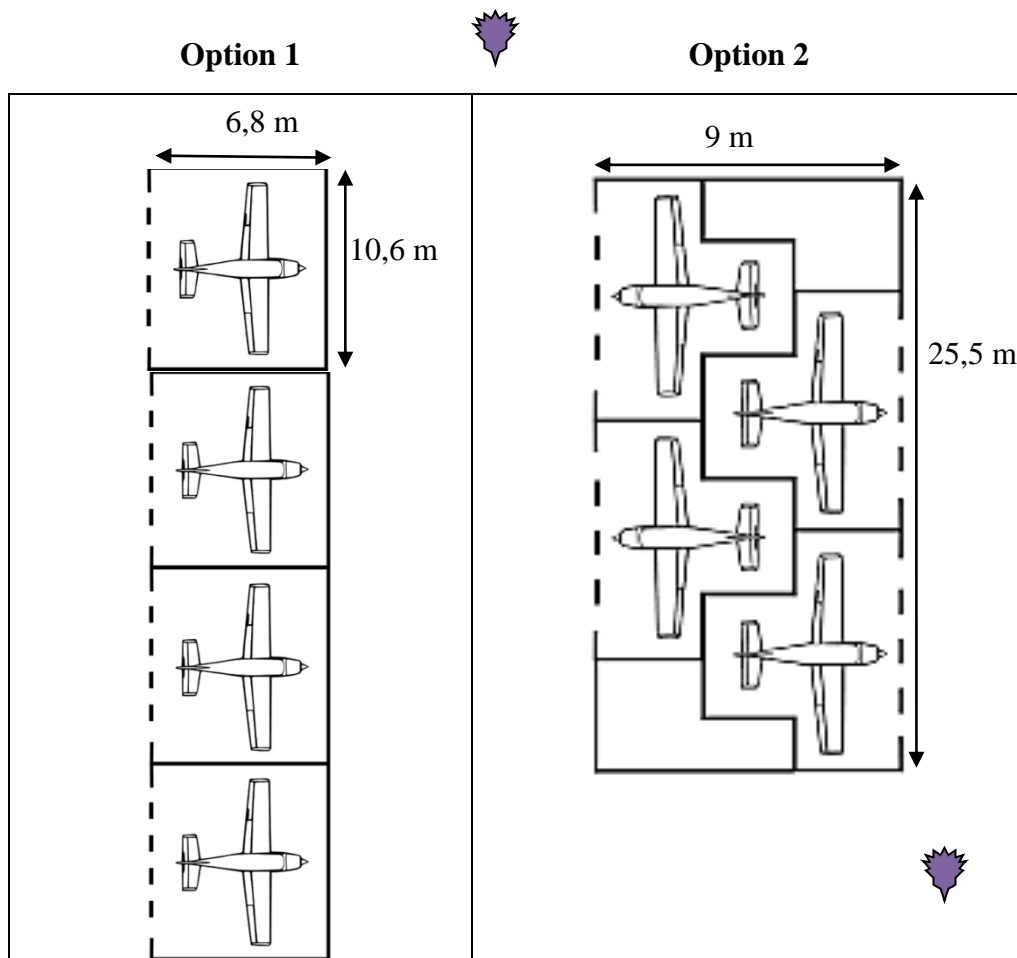


(5)  
[36]



**QUESTION 4**

- 4.1 Mr Arendse has four aeroplanes and needs to build a storage warehouse. He has two options as shown in the diagrams below. The diagrams are NOT drawn to scale.



- 4.1.1 Use the given dimensions to calculate which option will take up the smaller total area. Which option would you advise Mr Arendse to choose? Show ALL calculations to substantiate the answer.

Rectangle:  $A = L \times B$



(8)

- 4.1.2 If the diagram for option 2 is drawn with a length of 8,5 cm, determine the scale that is used. Use the actual length in the calculation and give the answer in ratio format.

(4)

- 4.2 Mr Arendse has rectangular fuel storage tanks at his flight school as shown in the picture below.

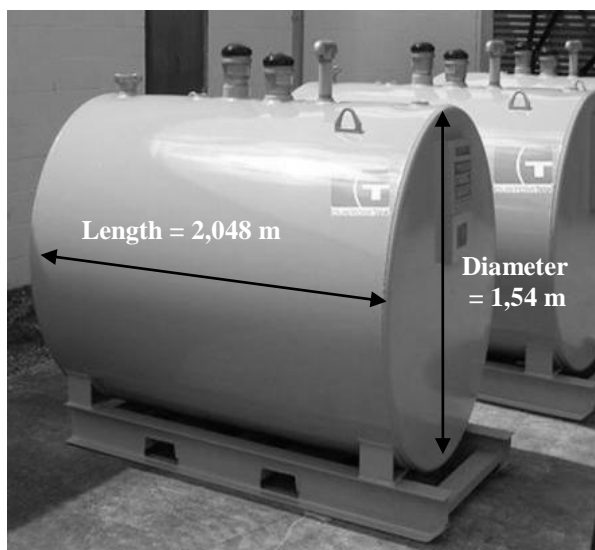


- 4.2.1 Each tank has a capacity of 567,5 litres. The length of the tank is 152,5 cm and the breadth is 61 cm.

Calculate the height of the tank to the nearest centimetre.

$$1 \text{ litre} = 1\,000 \text{ cm}^3 \text{ and } V = L \times B \times H \quad (7)$$

- 4.2.2 Mr Arendse needs a bigger tank and finds a cylindrical one as shown below. The length of the tank is 2,048m and the diameter of the tank is 1,54m. The manufacturer claims it can hold more than six times the fuel that the current rectangular one can hold.



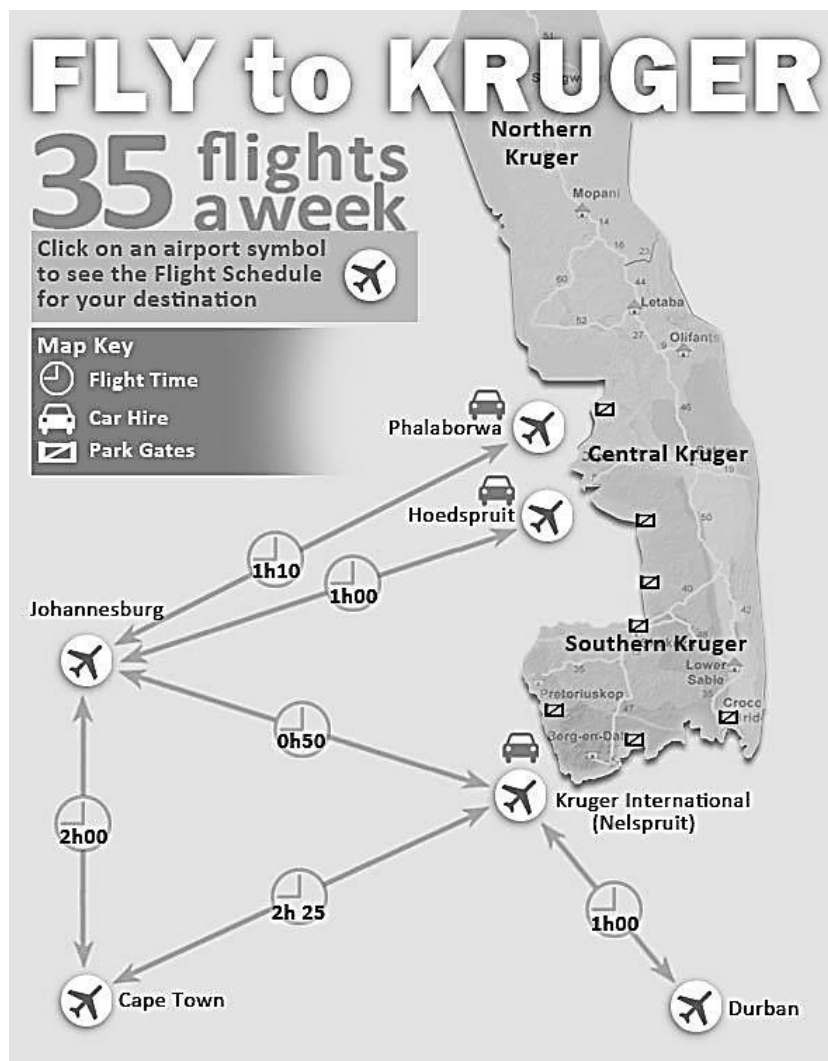
Determine, with the aid of calculations, whether this claim is valid. Show ALL calculations.

$$\begin{aligned} \text{Volume} &= \pi \times r^2 \times h \\ \pi &= 3,14 \\ \text{Diameter} &= 1,54 \text{ m} \\ \text{Length} &= 2,048 \text{ m} \\ 1\,000 \text{ litre} &= 1 \text{ m}^3 \end{aligned}$$



(8)

- 4.3 The map below shows various options for flying to and from the Kruger National Park.



- 4.3.1 The distance from Johannesburg to Nelspruit is 340 km.

Calculate the speed of an aeroplane travelling this route in km/h.

$$\text{speed} = \frac{\text{distance}}{\text{time}} \quad (5)$$

- 4.3.2 A pilot has to complete 40 hours of flying time.

What is the minimum number of trips between Johannesburg and Phalaborwa that she will have to complete to reach these hours? (5)

- 4.3.3 How many park gates are there? (1)



- 4.3.4 Name TWO places in the Central Kruger where you can hire a car. (2)

[40]

**TOTAL: 150**

**ADDENDUM      EXAMINATION NUMBER:**[illegible]

### QUESTION 2.1.4

[illegible]