



# higher education & training

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

## **NATIONAL CERTIFICATE (VOCATIONAL)**

### **MATHEMATICAL LITERACY**

(First Paper)

**NQF LEVEL 4**

(10401034)

**2 November 2018 (Y-Paper)**

**13:00–16:00**

**Nonprogrammable calculators may be used.**

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

**TIME: 3 HOURS**  
**MARKS: 150**

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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. Answer QUESTION 4.6 on the ADDENDUM.
  5. Clearly show ALL calculations, diagrams, graphs, et cetera used in determining the answers.
  6. Approved calculators may be used, unless otherwise stated.
  7. Round off the answers to TWO decimal places, unless otherwise stated.
  8. Use  $\pi = 3,14$ . Learners will be penalised if any other value is used.
  9. Drawing instruments including rulers, pairs of compasses and protractors may be used.
  10. Diagrams are not necessarily drawn to scale.
  11. Start each question on a NEW page.
  12. Write neatly and legibly.
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**QUESTION 1**

1.1 Calculate the value of  $x$  in the following equations by using a calculator.

1.1.1 
$$x = \frac{1}{4} \times \frac{1}{5} (2 \div 5) - \frac{1}{2 \times 25}$$
 (1)

1.1.2 
$$x = \frac{5^2 - \sqrt[3]{27} + \sqrt[4]{49}}{25 - 2(10)}$$
  
Round off your answer to TWO decimal places. (2)

1.2 Write 120% as a fraction in simplest form. (2)

1.3 Convert 210 753 centimetres to kilometres. (2)

1.4 Extend the following pattern by writing down the next 3 numbers:  
-7; -3; 1; ...; ...; ... (3)

1.5 Calculate the amount of time passed, in hours and minutes, from Tuesday 4:55 pm to Friday 9:15 am of the same week. (3)

1.6 The price of paraffin is 625,188 cents per litre. If the price increases by 26 cents per litre, calculate the new price of paraffin in rands. (3)

1.7 If  $1 \text{ km}^2 = 1\,000\,000 \text{ m}^2$ , then convert  $1\,600\,000 \text{ m}^2$  into  $\text{km}^2$ . (2)

1.8 Twelve workers complete a job in 48 hours. How long will 16 workers take to complete the same job? (3)

1.9 If you mix apple juice and orange juice in the ratio 3 : 5 to make a fruit blend, how many litres of apple juice will you need to make 20 litres of the fruit blend? (3)

1.10 John is converting his dollars to Rands at the foreign exchange office at the airport. How many rands will he get for \$1250.  
 $1 \$ = \text{R } 12,45$  (2)

1.11 Use the formula below to convert  $102^\circ\text{F}$  (degrees Fahrenheit) to  $^\circ\text{C}$  (degrees Celsius).  
 $^\circ\text{C} = (^\circ\text{F} - 32^\circ) \div 1,8$  (2)

1.12 Increase 1039 by 13,75%. (2)

**[30]**

**QUESTION 2**

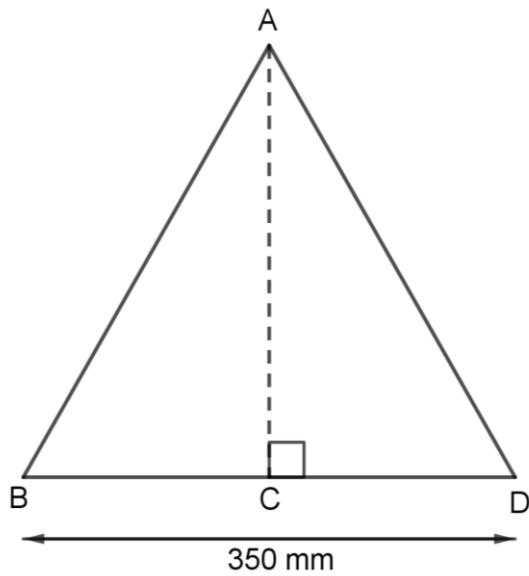
- 2.1 Choose a definition from COLUMN B that matches a term in COLUMN A. Write only the letter (A–F) next to the question number (2.1.1–2.1.5) in the ANSWER BOOK, eg. 2.1.6 G.

COLUMN A		COLUMN B	
2.1.1	Cone	A	the amount of space occupied by a three-dimensional figure
2.1.2	Prism	B	the longest side of a right-angled triangle, opposite the right angle
2.1.3	Sphere	C	a shape with two identical ends and flat sides
2.1.4	Volume	D	a polyhedron that has a base and triangular faces meeting at a point
2.1.5	Hypotenuse	E	a 3D-figure where every point on its surface is an equal distance from its centre
		F	a shape that has a circular base and a single vertex

(5 × 1)

(5)

2.2 Elizabeth makes placemats in the shape of a triangle as shown below.



$$\text{Area of a triangle} = \frac{1}{2} \times \text{base} \times \perp \text{ height}$$

$$1\,000\text{ mm} = 1\text{ m}$$

The base of the triangle is 350 mm and  $AD = AB$ .  
The area of the triangle ABD is  $70\,000\text{ mm}^2$ .

2.2.1 The area of the triangle ABD is  $70\,000\text{ mm}^2$ .

Show by calculations that the height  $AC = 400\text{ mm}$ .

(4)

2.2.2 If  $BC = CD$

Calculate the length of CD in mm.

(1)

2.2.3 Use the theorem of Pythagoras to calculate the length of AD (the hypotenuse of triangle ACD).

Round of the answer to the nearest millimetre.

(5)

2.2.4 Elizabeth puts fancy edging around the placemats.

Calculate the total length of the edging, in metres, that would be required to go around 1 placemat.

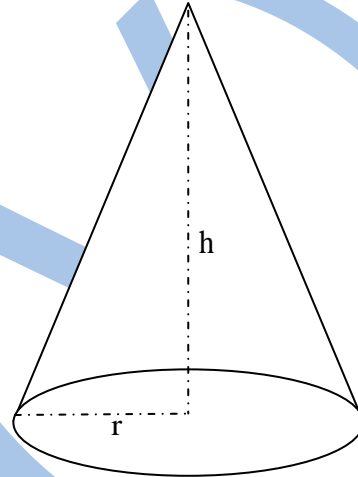
(5)

2.3 Thandi makes and sells personalised cone-shaped party hats.



The hat has the following dimensions:

- Diameter = 16 cm
- Height = 25 cm



2.3.1 Determine the radius of the party hat. (2)

2.3.2 Write down the ratio of the cones diameter to its height. (1)

2.3.3 Calculate the volume of the party hat using the formula:

$$\text{Volume} = \frac{1}{3} \pi r^2 h, \text{ where } \pi = 3,14 \quad (3)$$

2.3.4 Calculate the surface area of the party hat using the formula:

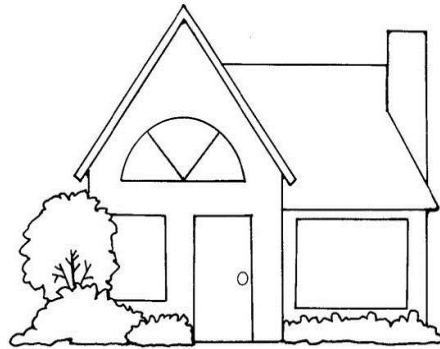
$$\text{Surface area} = \pi r \sqrt{r^2 + h^2}, \text{ where } \pi = 3,14 \quad (4)$$

[30]

**QUESTION 3**

Alex wants to purchase a house valued at R1 400 000 by taking a house bond. The following information has been given to him.

Purchase Price	R1 400 000
Interest Rate	10,25%
Deposit	R 0
Number of years	20
Monthly bond repayments	R13 743



3.1 Use the table above to answer the following questions:

3.1.1 The bank will only approve a bond with monthly repayments to a maximum of 30% of a person's monthly salary after expenses. Alex's monthly salary is R55 000 and his monthly expenses are R8 500. Alex is certain that he qualifies for the bond. Determine, by showing ALL calculations, if Alex qualifies for the bond. (5)

3.1.2 Calculate the total bond repayment after 20 years. (4)

3.1.3 Calculate the total interest amount that Alex will pay after 20 years. (3)

3.2 Before buying the house, Alex must pay the transfer duty fees and other once off bond costs. These costs are reflected below:

<b>Transfer duty fees</b>	
<b>Value of the property (R)</b>	<b>Rate</b>
750 001–1 250 000	3% of the value above R750 000
1 250 001–1 750 000	R15 000 + 6% of the value above R1 250 000
1 750 001–2 250 000	R45 000 + 8% of the value above R1 750 000
2 250 001–10 000 000	R85 000 + 11% of the value exceeding R2 250 000

<b>Once-off bond costs</b>	<b>Fee</b>
Security assessment	R1 500 VAT exclusive
Home loan initiation fee	R1 400 VAT inclusive
Deeds office registration fee	R500

Study the above table to answer the questions.

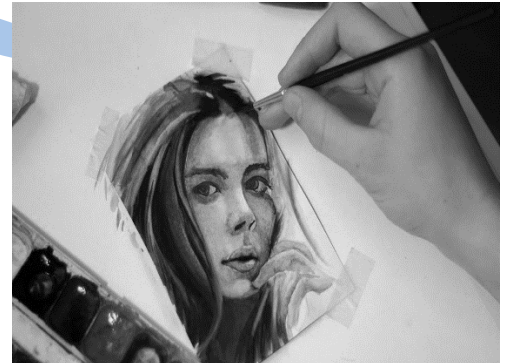
- 3.2.1 Calculate the transfer duty fee according to the purchase price of Alex's house. (5)
- 3.2.2 What does the acronym VAT stand for? (1)
- 3.2.3 Calculate the security assessment fee. VAT is charged at 14%. (3)
- 3.2.4 Determine the home loan initiation fee. (1)
- 3.2.5 Calculate the total initial amount that Alex must pay before purchasing the house. (5)
- Total initial amount = transfer duty fees + once off bond costs.
- 3.2.6 Calculate the total amount that Alex will pay towards purchasing his house after 20 years. (3)
- Total amount = total bond repayment + total initial costs. (3)
- [30]**

#### QUESTION 4

Michael paints portraits at a stall in a busy shopping mall. His fixed weekly expense is R1 800 and it costs him R60 to paint one portrait. He sells each portrait at R250.

Use the table below to answer the questions that follow:

Number of portraits (n)	0	6	12	18	21
Weekly expense in rands	1800	2160	A	2880	3060
Income per portrait in rands	0	1500	3000	B	5250



- 4.1 Determine the value of **A** and **B**. (2×2) (4)
- 4.2 Determine whether the income per portrait in rands is a constant ratio or a constant difference pattern. Write down the value of the constant ratio/difference to substantiate your answer. (2)
- 4.3 Derive a formula to calculate Michael's weekly expense in rands. (3)
- 4.4 Derive a formula to calculate Michael's income per portrait in rands. (1)
- 4.5 Use the formula in QUESTION 4.3 to calculate the number of portraits that Michael painted if his weekly expenses was R2 700. (4)



- 4.6 Use the table to draw and label TWO line graphs (on the ADDENDUM) showing Michael's weekly expense and his income per portrait. Label each line, label the horizontal and vertical axes and give the graph a suitable heading. (9)
- 4.7 Does the income graph represent an example of a direct or an indirect relationship? Give a reason for your answer. (2)
- 4.8 Use the graphs in QUESTION 4.6 to determine the minimum number of personalised portraits that Michael must paint per week to make a profit. (2)
- 4.9 Use the graphs in QUESTION 4.6 to determine the profit that Michael will make if he paints 23 portraits in one week. (3)

**[30]****QUESTION 5**

- 5.1 The table below compares the number of students, in thousands, per province that enrolled full time at educational institutions for 2003 and 2013 per province:

Province	Number enrolled in thousands	
	2003	2013
Western Cape	1 351	1 682
Eastern Cape	2 583	2 470
Northern Cape	237	350
Free State	934	930
KwaZulu-Natal	3 472	3 605
North West	1 333	1 103
Gauteng	2 396	3 336
Mpumalanga	1 217	1 402
Limpopo	2 218	2 162

Note: The number of students enrolled at Western Cape for 2003 is 1351 000, etc.

[Adapted from: <http://www.statssa.gov.za/publications/P0320/P03202013.pdf>]

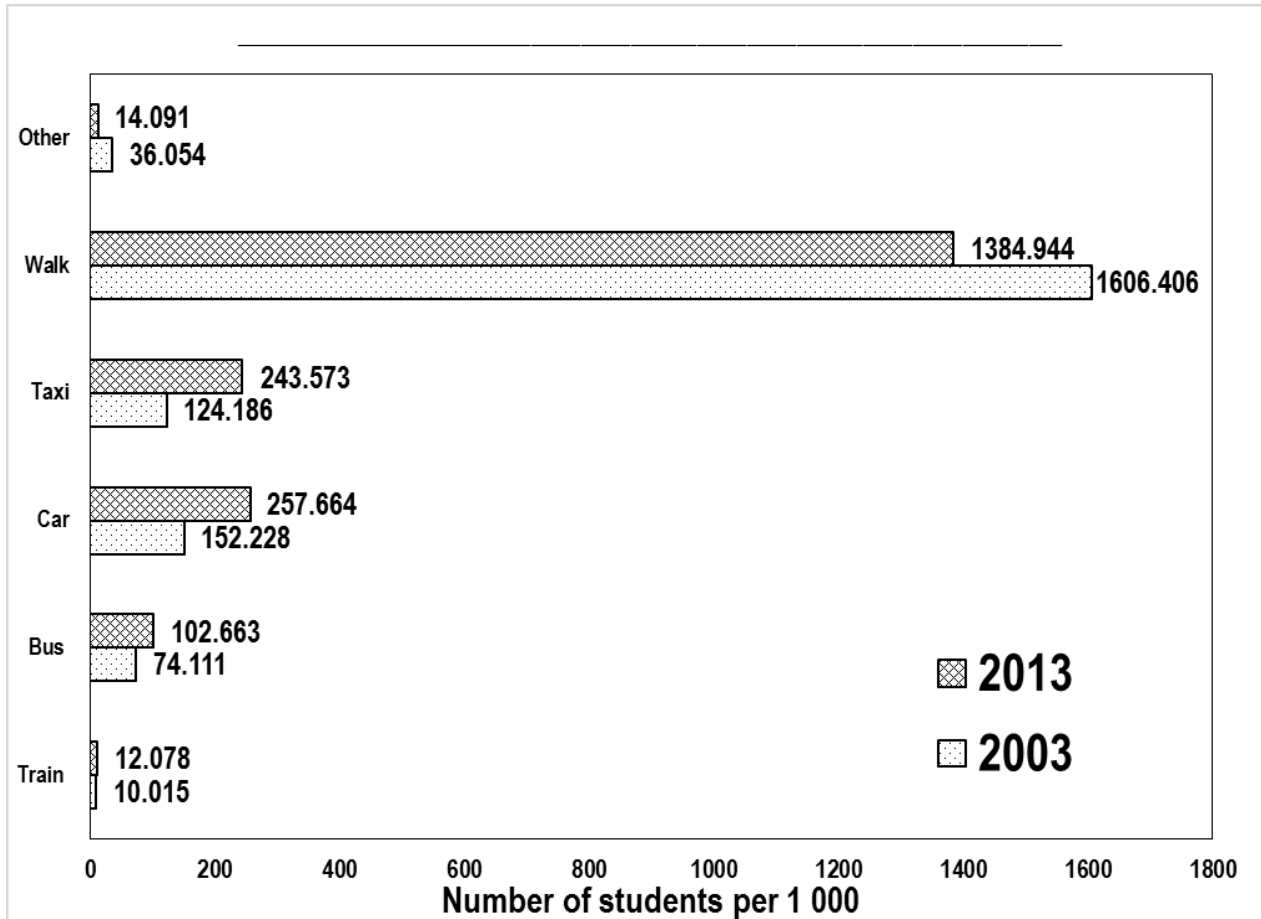
Study the above table and answer the questions.

- 5.1.1 Calculate the difference between the total number of students that enrolled in 2003 and total number of students that enrolled in 2013. (3)
- 5.1.2 Calculate the percentage increase in the number of students that enrolled in Northern Cape for 2003 and 2013. (5)
- 5.1.3 Calculate the median of the total number of students that enrolled in 2013. (3)
- 5.1.4 Calculate the range of the total number of students that enrolled in 2013. (3)

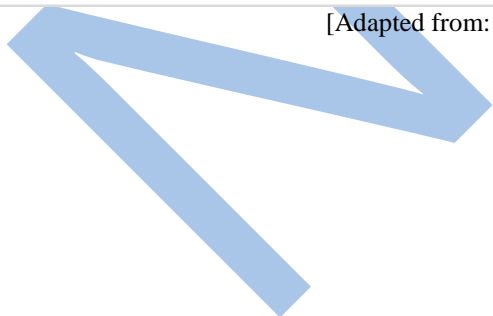
5.1.5 Calculate the difference between the means (average) of the total number of students that enrolled in 2003 and the total number of students that enrolled in 2013.

(6)

5.2 The graph below compares the mode of transport that students used to get to school for 2003 and 2013. The number of learners is given in thousands (1000).



[Adapted from: <http://www.statssa.gov.za/publications/P0320/P03202013.pdf>]



Study the above graph and answer the questions.

- 5.2.1 Name the type of graph shown above. (1)
- 5.2.2 Determine the number of students that formed the sample size for 2013. (2)
- 5.2.3 Which modes of transport decreased from 2003 to 2013? (2)
- 5.2.4 Give ONE example of a mode of transport that will fall in the category called "other". (1)
- 5.2.5 Calculate the percentage of students who walked to school in 2013. (4)

**[30]**

**TOTAL: 150**

**ADDENDUM**

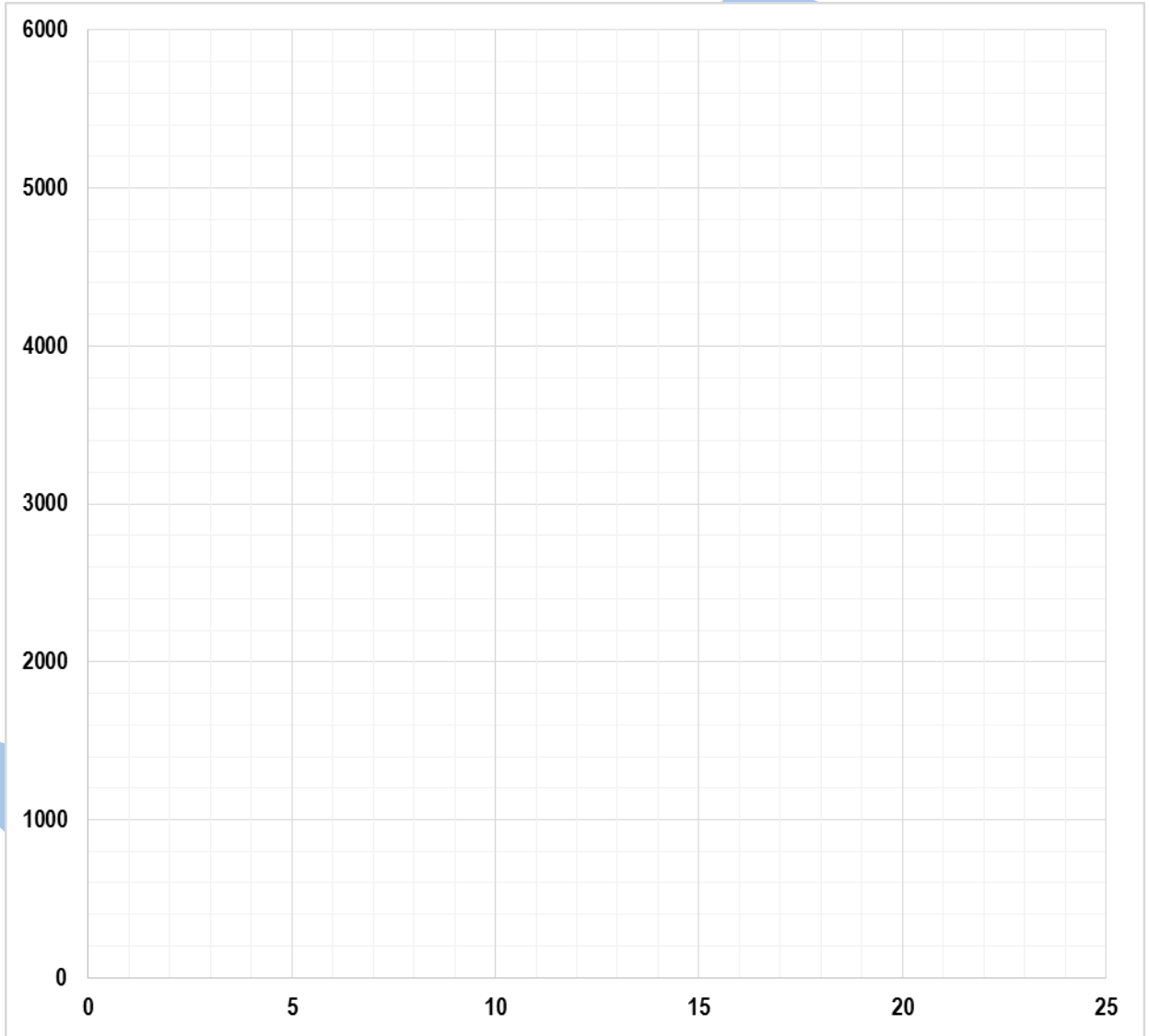
**EXAMINATION NUMBER:**

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**QUESTION 4.6**

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