



**higher education
& training**

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

MATHEMATICS

(Second Paper)

NQF LEVEL 2

(10501042)

7 November 2019 (Y-Paper)

13:00–16:00

Non-programmable scientific calculators may be used.

This question paper consists of 8 pages, an information sheet of 2 pages and 1 addendum.

<p>TIME: 3 HOURS MARKS: 100</p>

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. Start each section on a NEW page.
 5. Use only BLUE or BLACK ink.
 6. Round off your answers to THREE decimals, unless stated otherwise.
 7. Write neatly and legibly.
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QUESTION 1

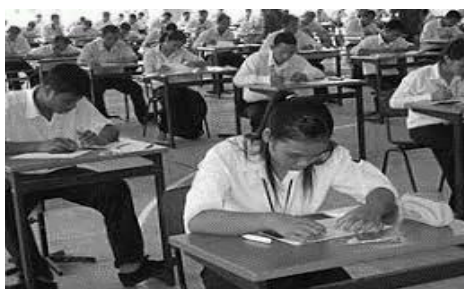
1.1 Define the following terminology as used in data handling:

1.1.1 Mode (1)

1.1.2 Median (1)

1.2 A Grade 11A class was given a test out of 100 marks. The marks were as follows:

41 54 43 56 75 36 67 83 52 56 30 77 70 51 56 63 97 39 30 48 54 56
84 61 46 76 90.



1.2.1 How many learners wrote the test? (1)

1.2.2 Calculate the mean of the test. (2)



1.2.3 Construct a stem-and-leaf plot. (7)

1.2.4 Determine the median of the test. (2)

1.2.5 Write down the mode. (1)

1.3 A group of cyclists travelled the following number of kilometers per day.

34 45 15 31 27 60 74 52 26 53 64 7 10 36 23 38.



1.3.1 Write down the minimum and the maximum value. (2)

1.3.2 Determine the lower quartile (Q_1). (2)

1.3.3 Calculate the upper quartile (Q_3). (2)



1.3.4 Determine the inter-quartile range (IQR) (2)

1.3.5 Determine the value for the 60th percentile. (3)

1.3.6 Determine the range.

(2)

1.4 The distribution table of the marks, in percentages, is shown below.

MARKS	TALLY	FREQUENCY
$0 \leq x < 20$	////	
$20 \leq x < 40$		8
$40 \leq x < 60$	//// //// ////	
$60 \leq x < 80$		20
$80 \leq x < 100$		12

1.4.1 Complete the distribution table on the ADDENDUM (attached).

(5)

1.4.2 Give the modal class.



(1)

1.4.3 In which interval does the median lie?

(1)

1.4.4 Use the above distribution table to construct a histogram on the attached ADDENDUM.

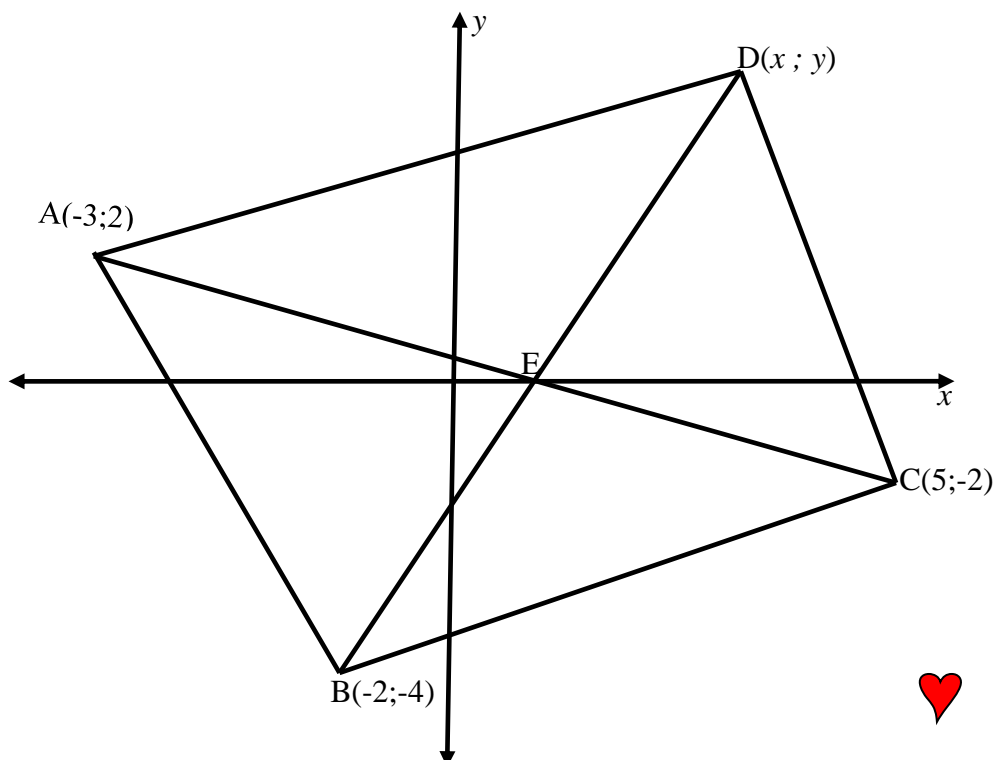
(5)

[40]



QUESTION 2

2.1 The diagram below represents quadrilateral ABCD with vertices A (-3;2); B (-2;-4); C (5;-2) and D (x;y). E is the midpoint of the two diagonals.



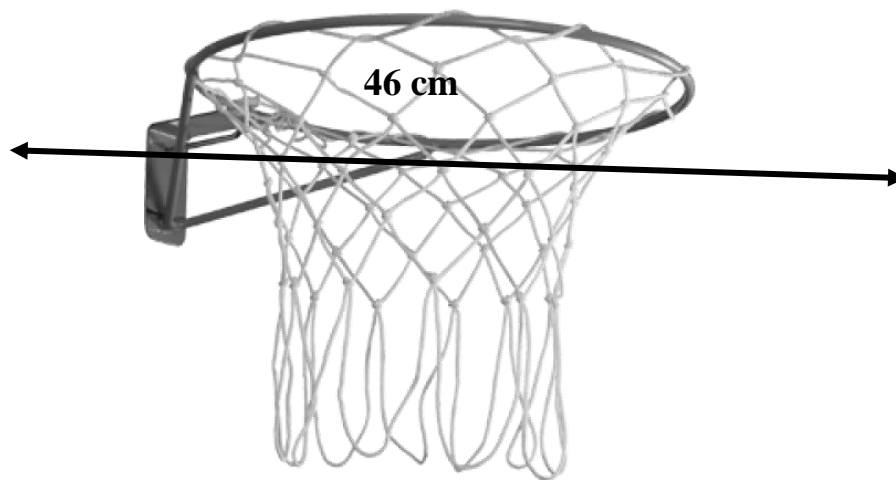
- 2.1.1 Calculate the coordinates of E, the midpoint of the TWO diagonals. (2)
- 2.1.2 Calculate the coordinates of D. (4)
- ♥ 2.1.3 Calculate the length of BC. (3)
- 2.1.4 Calculate the gradients of AB and DC. (4)
- 2.2 Given ΔPQR , vertices P (3 ; 4); Q (-2 ; 1) and R (6 ; -1).
- 2.2.1 If ΔPQR is translated by 3 units to the right and 2 units upwards, determine the coordinates of the translated points of P, Q and R. ♥ (6)
- 2.2.2 Determine the coordinates of P (3 ; 4) if it is reflected about the y-axis. (2)
- 2.3 A manufacturing company wants to manufacture a cylindrical grease container which must have a volume of $769,691 \text{ cm}^3$ and a radius of 7 cm.

Calculate the height of the cylinder.



(3)

2.4 A basketball hoop is shown in the figure below with a diameter of 46 cm.



Calculate:



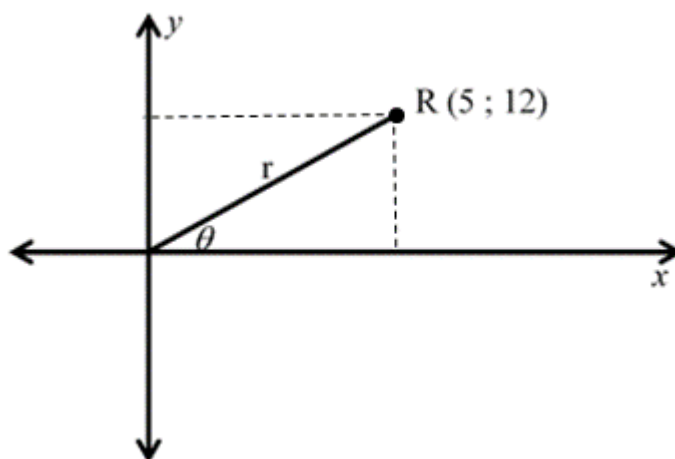
2.4.1 The circumference of the hoop (circle). (3)

2.4.2 The area of the hoop (circle). (3)

[30]

QUESTION 3

3.1 Given a Cartesian plane, with R (5 ; 12) in the first quadrant.



3.1.1 Calculate r . (2)

3.1.2 Determine the value of: $\sin \theta - \cos \theta$ (3)

3.1.3 Determine the value of:

$$\tan \theta - \frac{7}{5}$$



(2)

3.2 If $2\sin A = 1$ and $0^\circ \leq A \leq 90^\circ$, calculate the value of:

3.2.1 $\tan A$  (3)

3.2.2 $1 - \sin^2 A$ (2)

3.3 If $\hat{x} = 55^\circ$ and $\hat{y} = 35^\circ$, calculate the following using a calculator:


3.3.1 $\cos(x + y)$



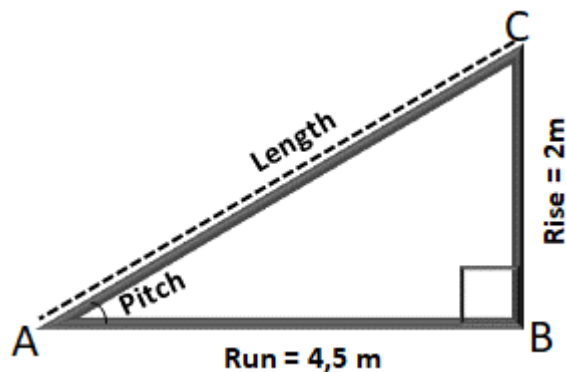
3.3.2 $\cos x + \cos y$

(2 × 2)

(4)

3.4 A builder is planning a tiled roof for a house he is building. He must ensure that the pitch (angle of elevation) of the roof is greater than 13° . Triangle ABC shown in the diagram below represents a section of the roof, from its highest point in the center that runs its length to the outside wall of the house. 

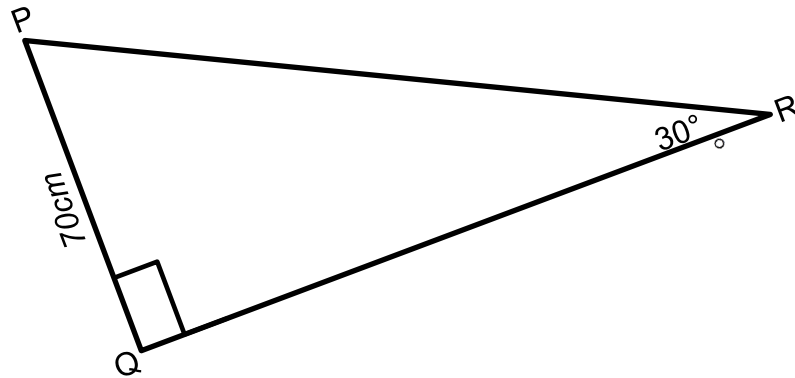
The run of the roof, AB, is 4,5 metres long and he is planning to make the rise (height), BC, 2 metres.



3.4.1 Calculate the pitch of the roof, which is the angle at A. (3)

3.4.2 Find the length of the roof, AC.  (3)

3.5 Given $\triangle PQR$, with $PQ = 70$ cm and $\angle R = 30^\circ$.



3.5.1 Find \hat{P} .  (2)

3.5.2 Calculate PR. (3)

3.6 Draw the graph of $f(x) = \cos x + 1$ on the ADDENDUM (attached). (3)



[30]

TOTAL: 100

FORMULA SHEET

$$1) \quad A_{\text{square}} = l \times l = l^2$$

$$2) \quad A_{\text{rectangle}} = l \times w$$

$$3) \quad A_{\text{triangle}} = \frac{1}{2} b \times h$$

$$4) \quad A_{\text{circle}} = \pi r^2$$

$$5) \quad C = 2\pi r$$

$$6) \quad \text{Area of parallelogram} = \text{base} \times \text{perpendicular height}$$

$$7) \quad A_{\text{hexagon}} = \frac{3\sqrt{3}}{2} L^2$$

$$8) \quad A_{\text{hexagon}} = \frac{\sqrt{3}}{2} W^2$$

$$9) \quad A_{\text{cylinder}} = 2\pi r(h + r)$$

$$10) \quad \text{Volume} = \text{Area of base} \times \text{perpendicular height}$$

$$11) \quad V_{\text{cylinder}} = \pi r^2 h$$

$$12) \quad \text{Total surface area triangular prism} = (\text{height of prism} \times \text{perimeter of base}) + 2(\text{area of base})$$

$$13) \quad m = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}$$

$$14) \quad D = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$15) \quad M = \left(\frac{x_1 + x_2}{2} ; \frac{y_1 + y_2}{2} \right)$$

$$16) \quad \theta = \tan^{-1} m$$

$$17) \quad \bar{x} = \frac{\sum x_i}{n} \quad \text{or} \quad \text{Mean} = \frac{\text{total or sum of all items}}{\text{number of items}}$$

$$18) \quad R = X_n - X_1 \quad \text{or} \quad \text{Range} = \text{highest value} - \text{lowest value}$$

$$19) Q_{j\text{position}} = \frac{j}{4}(n+1)$$

$$20) \text{ Inter-quartile range} = \text{upper quartile} - \text{lower quartile} = (Q_3 - Q_1)$$

$$21) \text{ Semi inter-quartile range} = \frac{1}{2}(\text{upper quartile} - \text{lower quartile}) = \frac{Q_3 - Q_1}{2}$$

$$22) P_{j\text{position}} = \frac{j}{100}(n+1)$$

ADDENDUM

EXAMINATION NUMBER:

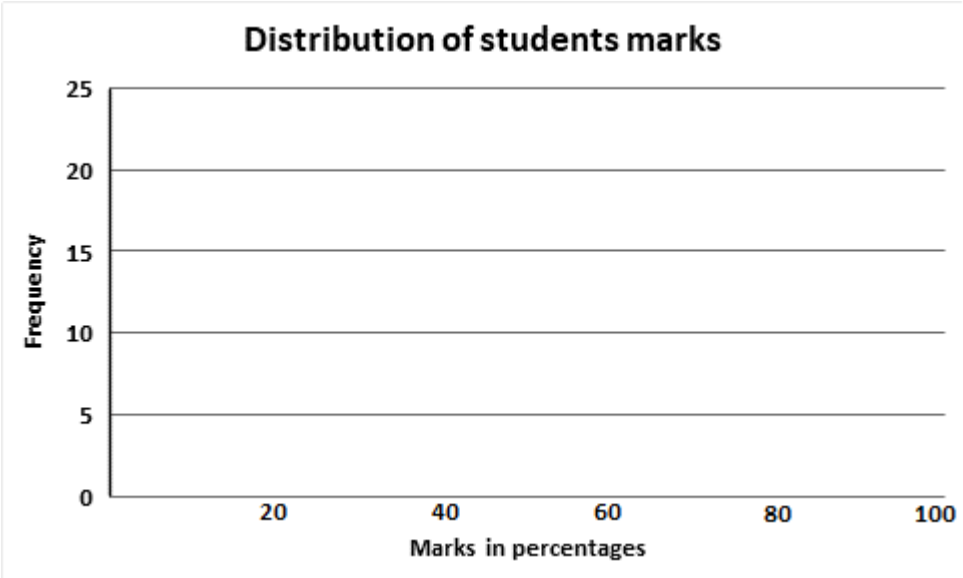
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1.4 1.4.1

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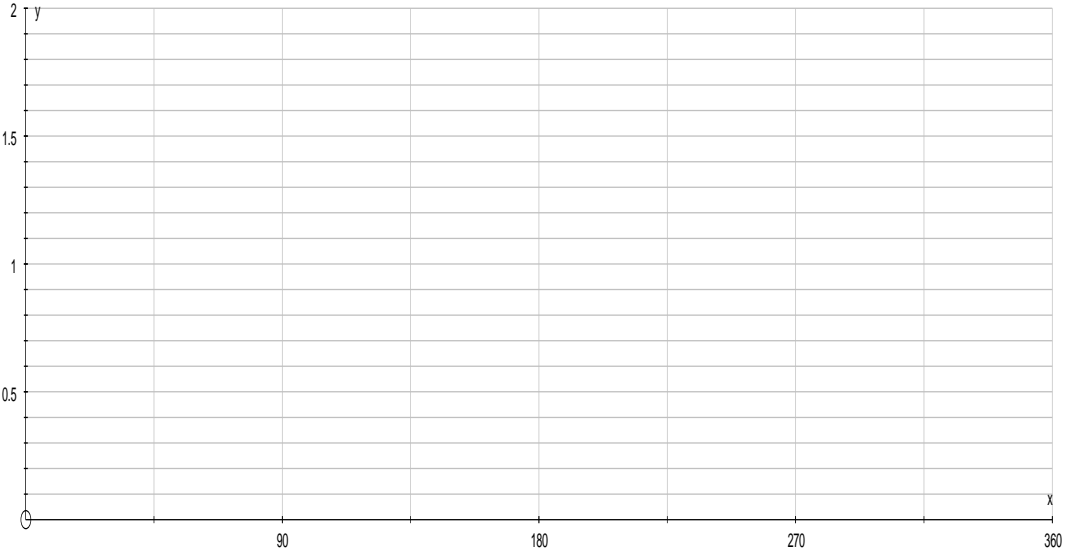
(5)

1.4 1.4.2



(5)

3.6



(3)