



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

**NATIONAL
SENIOR CERTIFICATE**

GRADE 10

MATHEMATICS P2

NOVEMBER 2019

MARKS: 100

TIME: 2 hours

This question paper consists of 10 pages and a 15-page answer book.



INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. This question paper consists of EIGHT questions.
2. Answer ALL the questions in the SPECIAL ANSWER BOOK provided.
3. Clearly show ALL calculations, diagrams, graphs, etc. that you used to determine the answers.
4. Answers only will NOT necessarily be awarded full marks.
5. If necessary, round off answers to TWO decimal places, unless stated otherwise.
6. Diagrams are NOT necessarily drawn to scale.
7. You must use an approved scientific calculator (non-programmable and non-graphical), unless stated otherwise.
8. Write neatly and legibly.



QUESTION 1

1.1 An ice cream vendor recorded his daily sales for a period of time. The number of ice creams that he sold each day is given in the table below.

| | | | | | | | | | |
|----|----|----|----|----|----|----|----|----|----|
| 5 | 7 | 8 | 10 | 13 | 15 | 15 | 15 | 21 | 24 |
| 29 | 30 | 32 | 36 | 38 | 44 | 45 | 51 | 55 | |

1.1.1 Write down the mode of the data set. (1)

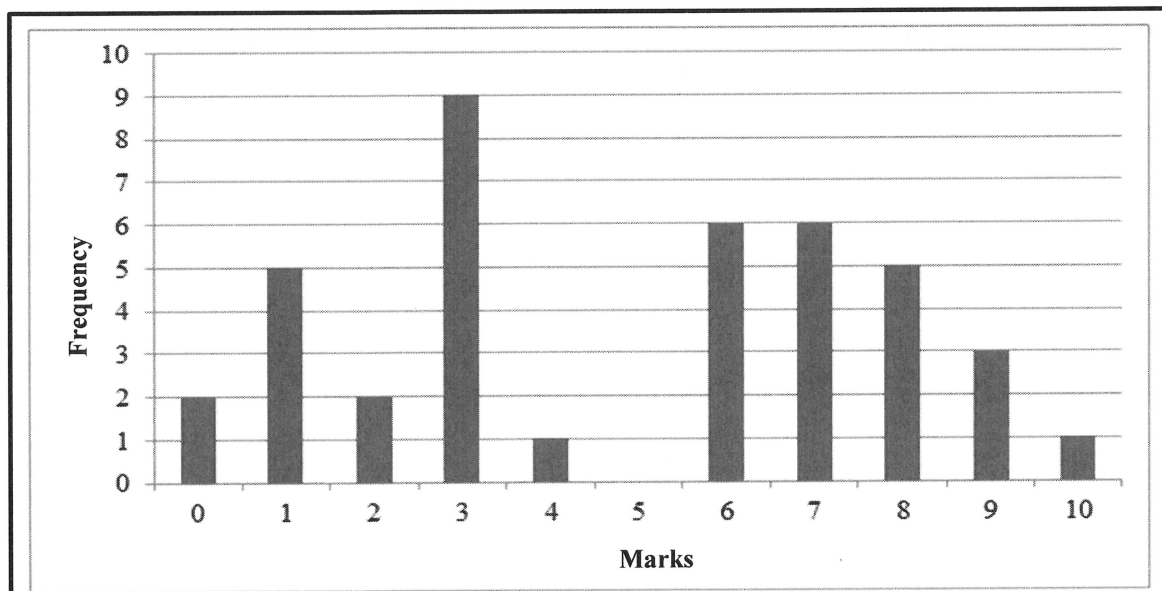
1.1.2 Determine the median of the data set. (1)

1.1.3 Calculate the interquartile range. (3)

1.1.4 On the scaled line provided in the ANSWER BOOK, draw a box and whisker diagram for the data set. (2)

1.2 Learners in a certain class wrote a Mathematics test that had a maximum mark of 10. The teacher represented the marks obtained by the learners of this class in the bar graph below.

Bar graph showing distribution of marks scored in Mathematics test



1.2.1 How many learners scored 8 marks out of 10 for the test? (1)

1.2.2 How many learners are in this class? (1)

1.2.3 Calculate the range of the marks scored in the test. (2)

1.2.4 If the pass mark for the test was 50%, what percentage of the learners failed the test? (2)

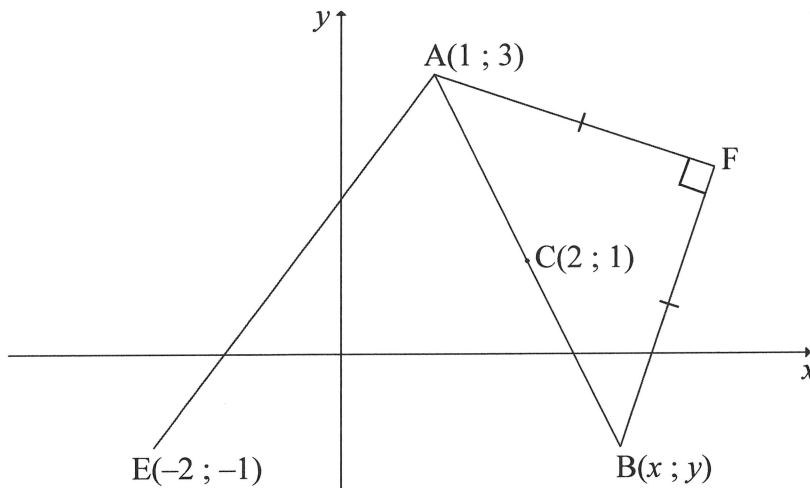
1.2.5 Calculate the mean mark scored in the test. (3)

[16]



QUESTION 2

In the diagram below, $A(1 ; 3)$, $B(x ; y)$ and $E(-2 ; -1)$ are points on a Cartesian plane. $C(2 ; 1)$ is the midpoint of AB . Also, F is a point such that $AF = FB$ and $AF \perp FB$.

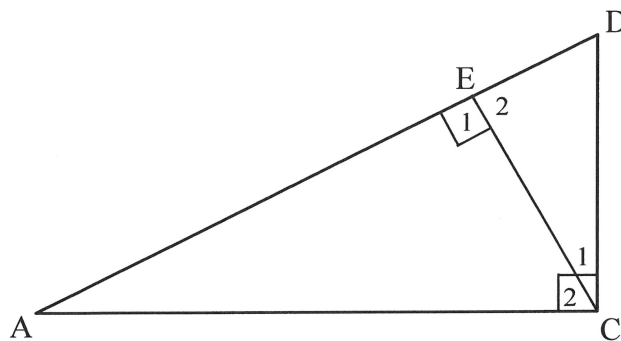


- 2.1 Determine the:
- 2.1.1 Length of AE (2)
- 2.1.2 Gradient of AC (2)
- 2.1.3 Coordinates of B (3)
- 2.2 BE is joined to form a special quadrilateral $AFBE$. Name the special quadrilateral $AFBE$. Give full justification for your answer. (3)
- 2.3 Calculate the area of $\triangle AFB$. (5)
- [15]



QUESTION 3

- 3.1 If $x = 37^\circ$ and $y = 44^\circ$, calculate the value of $\sin^2 x + 2 \cos y$. (1)
- 3.2 WITHOUT using a calculator, determine the value of $\frac{\sin 30^\circ \cdot \cot 45^\circ}{\cos 30^\circ \cdot \tan 60^\circ}$ (3)
- 3.3 In the diagram below, $\triangle ACD$ is right-angled at C . E lies on AD such that CE is perpendicular to AD .



- 3.3.1 Write down the ratio for $\cos D$ in $\triangle ACD$. (1)
- 3.3.2 Write down the ratio for $\cos D$ in $\triangle CED$. (1)
- 3.3.3 If $AD = 13$ units and $DC = 5$ units, calculate the length of ED . (2)
- 3.4 Given that $\cos \theta = \frac{5}{13}$ and $\sin \theta < 0$.

With the aid of a diagram and WITHOUT using a calculator, determine the value of:

- 3.4.1 $\sin \theta$ (3)
- 3.4.2 $\sec \theta + \tan^2 \theta + 1$ (4)
- [15]

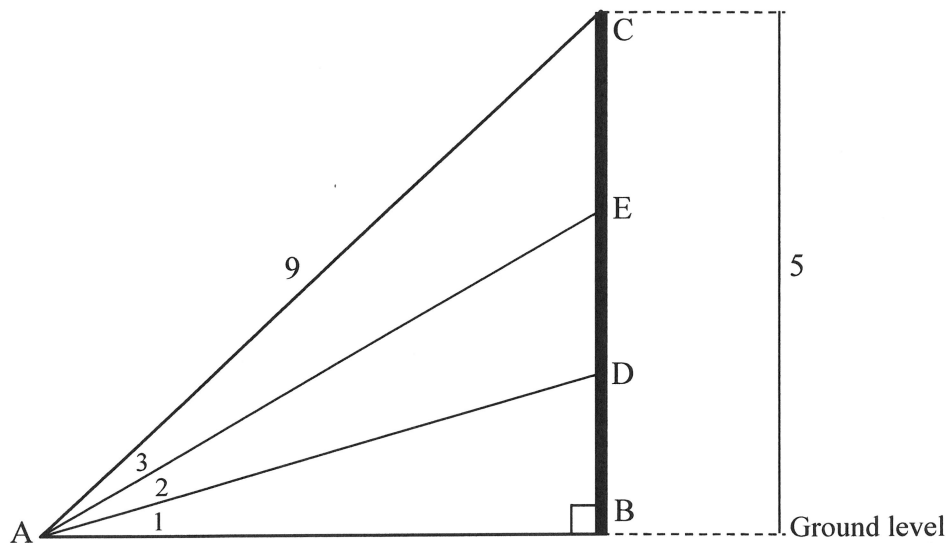
QUESTION 4

4.1 If $0^\circ \leq \theta \leq 90^\circ$, solve for θ in each of the following questions:

4.1.1 $2\sin\theta + 1 = 1,28$ (2)

4.1.2 $\tan 2\theta = 4 \cot 60^\circ$ (3)

4.2 In the diagram below, B is the foot of a multi-storey building. Three people, D, E and C, are standing at the windows on three different floors. They are all looking at object A on the ground, which is in the same horizontal plane as B. $AC = 9$ units, $BC = 5$ units and $\hat{A}_1 = \hat{A}_2 = \hat{A}_3$.



Calculate the:

4.2.1 Size of \hat{CAB} (2)

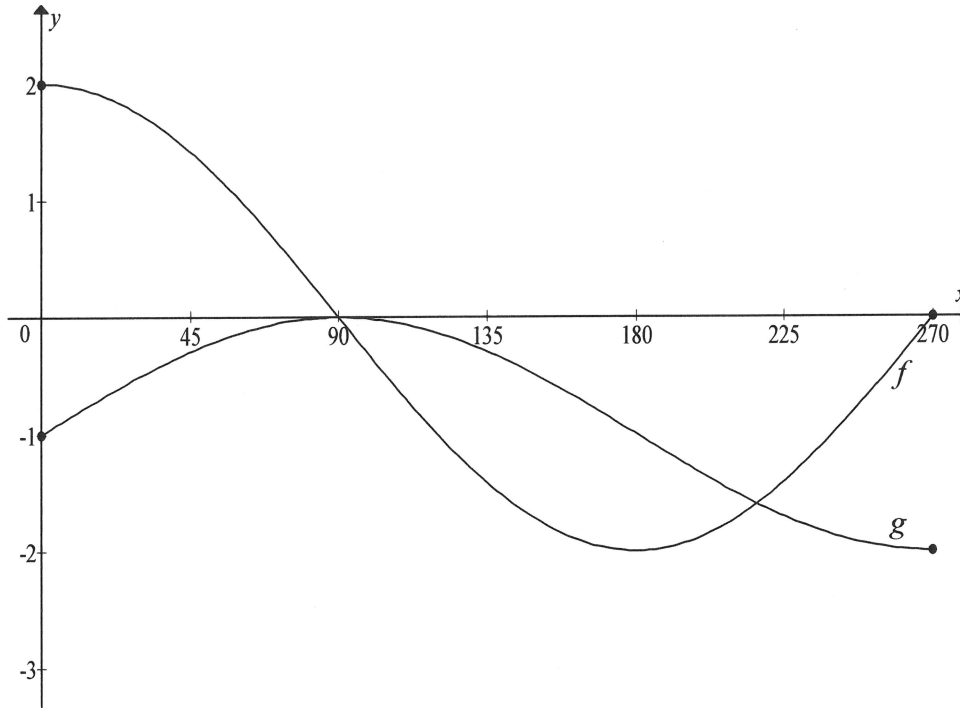
4.2.2 Length of AE (5)

4.2.3 Length of DE (4)
[16]



QUESTION 5

Sketched below are the graphs of $f(x) = 2\cos x$ and $g(x) = \sin x - 1$ for the interval $x \in [0^\circ; 270^\circ]$.

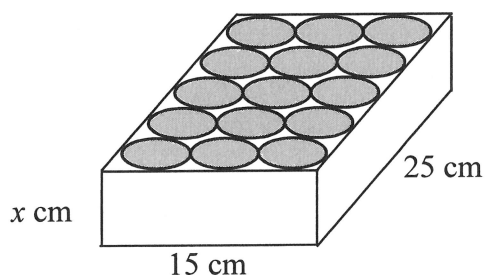


- 5.1 Write down the:
- 5.1.1 Period of f (1)
- 5.1.2 Range of g (2)
- 5.1.3 Number of solution(s) to $f(x) = g(x)$ in the interval $0^\circ \leq x \leq 270^\circ$ (1)
- 5.2 For which value(s) of x in the interval $0^\circ \leq x \leq 270^\circ$ is $f(x) \cdot g(x) \geq 0$? (2)
- 5.3 The graph h is obtained by reflecting graph g about the x -axis. Write down the coordinates of the minimum turning point of h in the interval $0^\circ \leq x \leq 270^\circ$. (2)
- [8]**



QUESTION 6

An open rectangular cardboard box has the following dimensions: length = 25 cm, breadth = 15 cm and height = x cm. The volume of the box is $3\,000\text{ cm}^3$. Fifteen (15) identical cans of cold drink fit snugly into the box, as shown in the diagram below. The box and the cans are of equal height. (Ignore the thickness of the cardboard in your calculations.)



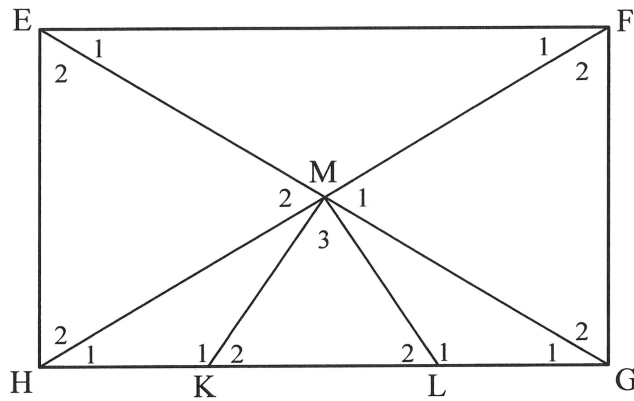
- 6.1 Calculate the height of the box. (3)
- 6.2 Calculate the radius of a can. (2)
- 6.3 If a can is filled to the top, calculate the volume of cold drink contained in the can. (2)
- 6.4 Calculate the volume of the space in between all the cans in the box. (2)
- [9]**



Give reasons for ALL geometry statements used in QUESTIONS 7 and 8.

QUESTION 7

7.1 In the diagram, EFGH is a rectangle having diagonals intersecting at M. $\hat{M}_2 = 60^\circ$ and $\hat{L}_2 = 40^\circ$.

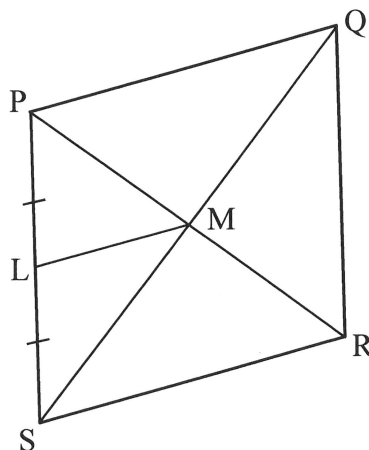


Calculate the size of:

7.1.1 \hat{F}_1 (2)

7.1.2 \hat{GML} (3)

7.2 PQRS is a rhombus with diagonals PR and SQ intersecting at M. The perimeter of the rhombus is 12 cm. L is the midpoint of PS.



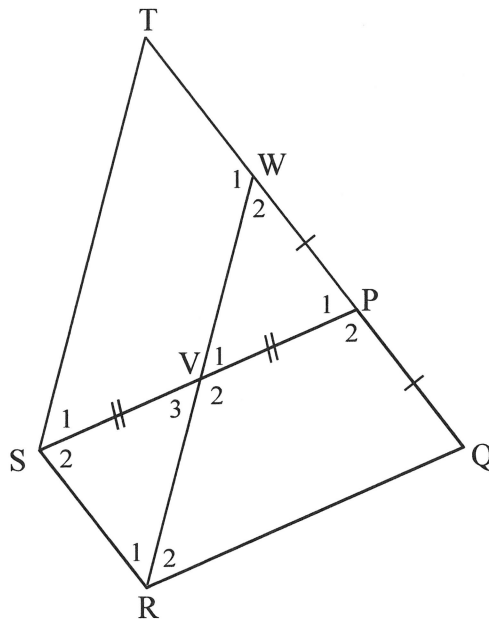
Calculate the length of LM. (4)
[9]

QUESTION 8

8.1 Complete the statement so that it is TRUE:

The diagonals of a parallelogram ... each other. (1)

8.2 In the diagram below, P is the midpoint of side WQ of $\triangle WQR$. V is on WR such that $VP \parallel RQ$. PV is produced by its own length to S. PW is produced to T and ST drawn.



8.2.1 Give a reason why $WV = VR$. (1)

8.2.2 Prove that:

(a) $\triangle VWP \cong \triangle VRS$ (3)

(b) SWPR is a parallelogram (2)

(c) PQRS is a parallelogram (3)

8.2.3 If it is further given that RSTW is a parallelogram, show that $TQ = 3SR$. (2)
[12]

TOTAL: 100













