basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 10

MATHEMATICS P2

EXEMPLAR 2012

MARKS: 100

TIME: 2 hours

This question paper consists of 10 pages and 1 diagram sheet.

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INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. This question paper consists of 9 questions.

2. Answer ALL the questions.

3. Clearly show ALL calculations, diagrams, graphs, et cetera which you have used in determining the answers.

4. Answers only will NOT necessarily be awarded full marks.

5. You may use an approved scientific calculator (non-programmable and non-graphical), unless stated otherwise.

6. If necessary, round off answers to TWO decimal places, unless stated otherwise.

7. Diagrams are NOT necessarily drawn to scale.

8. ONE diagram sheet for QUESTION 6.1.1 and QUESTION 9 is attached at the end of this question paper. Write your centre number and examination number on this sheet in the spaces provided and insert the sheet inside the back cover of your ANSWER BOOK.

9. Number the answers correctly according to the numbering system used in this question paper.

10. Write neatly and legibly.

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QUESTION 1

A baker keeps a record of the number of scones that he sells each day. The data for 19 days is shown below.

31	36	62	74	65	63	60	34	46	56
37	46	40	52	48	39	43	31	66	

1.1 Determine the mean of the given data. (2)

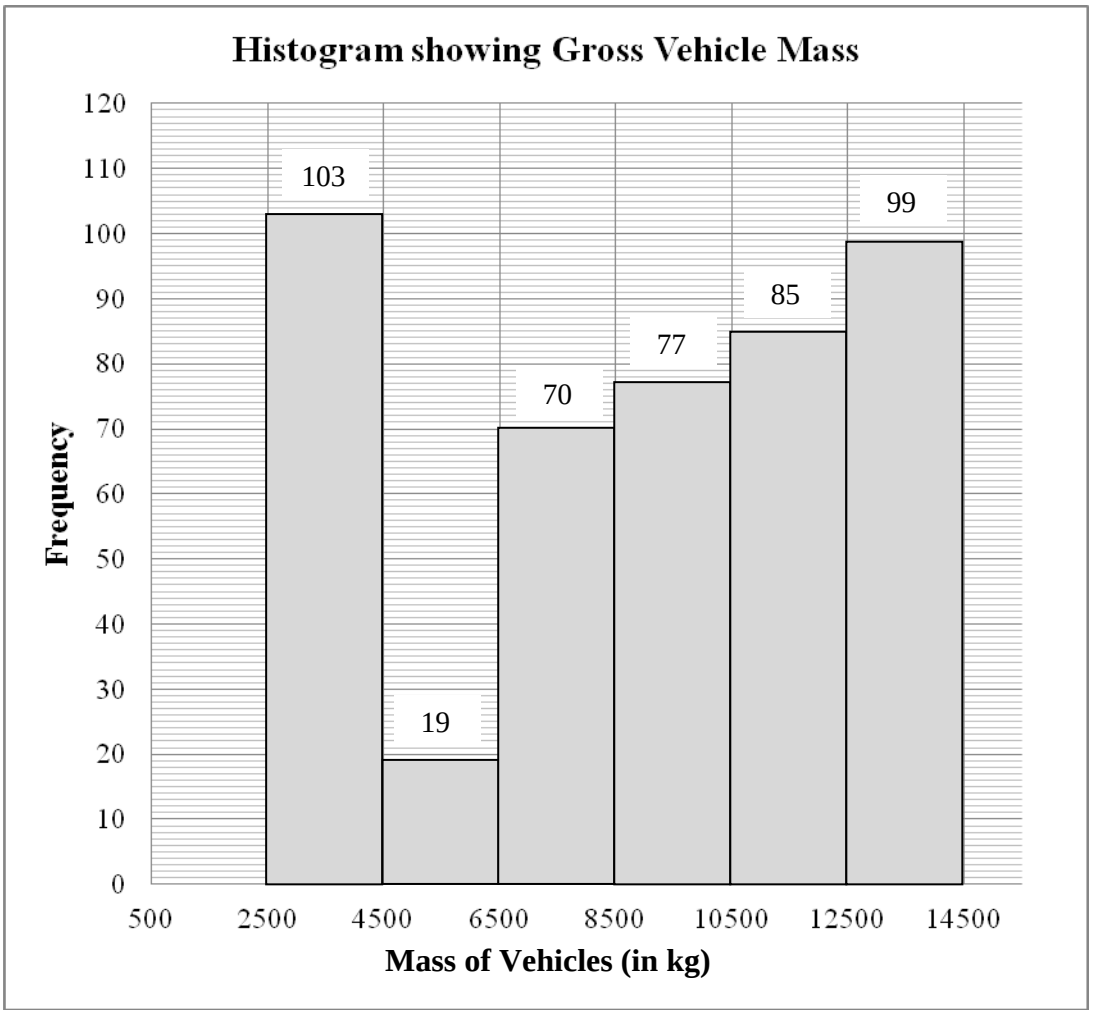
1.2 Rearrange the data in ascending order and then determine the median. (2)

1.3 Determine the lower and upper quartiles for the data. (2)

1.4 Draw a box and whisker diagram to represent the data. (2)
[8]

QUESTION 2

Traffic authorities are concerned that heavy vehicles (trucks) are often overloaded. In order to deal with this problem, a number of weighbridges have been set up along the major routes in South Africa. The gross (total) vehicle mass is measured at these weigh bridges. The histogram below shows the data collected at a weighbridge over a month.



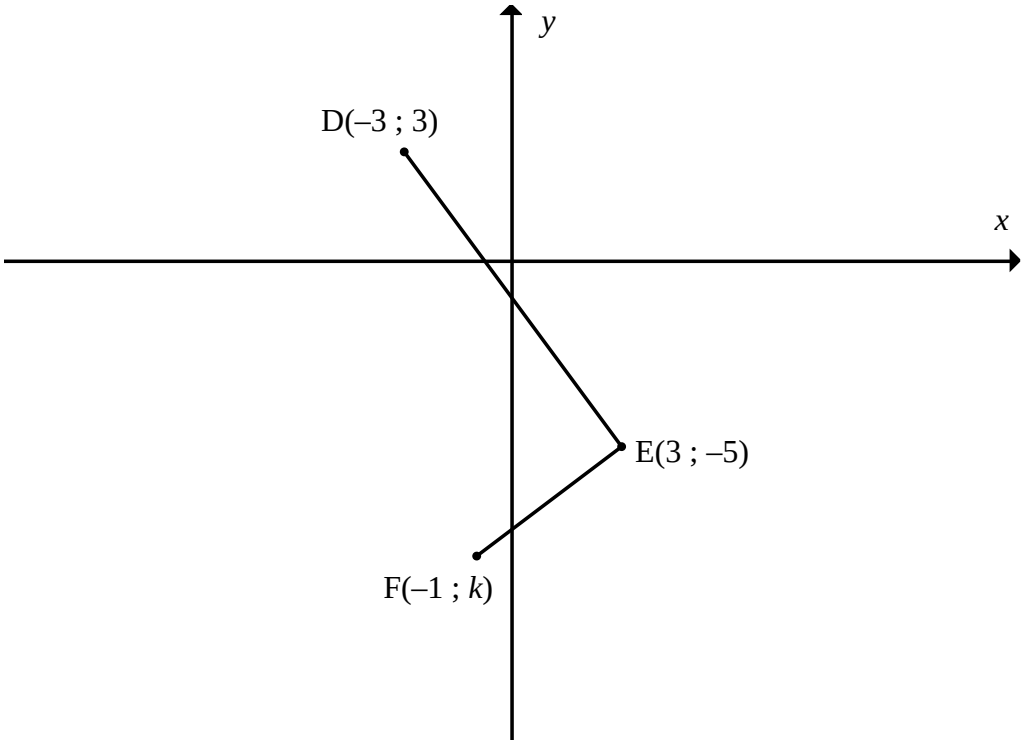
2.1 Write down the modal class of the data. (1)

2.2 Estimate the mean gross vehicle mass for the month. (5)

2.3 Which of the measures of central tendency, the modal class or the estimated mean, will be most appropriate to describe the data set? Explain your choice. (1)
[7]

QUESTION 3

3.1 In the diagram below, D(–3 ; 3), E(3 ; –5) and F(–1 ; k) are three points in the Cartesian plane.



3.1.1 Calculate the length of DE. (2)

3.1.2 Calculate the gradient of DE. (2)

3.1.3 Determine the value of k if $D\hat{E}F = 90°$. (4)

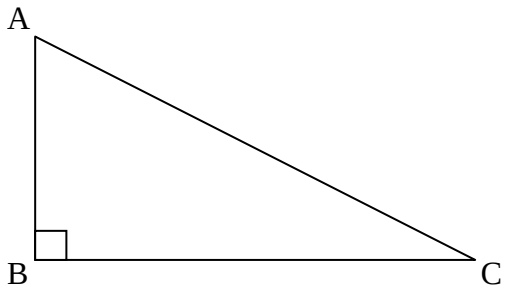
3.1.4 If $k = -8$, determine the coordinates of M, the midpoint of DF. (2)

3.1.5 Determine the coordinates of a point G such that the quadrilateral DEFG is a rectangle. (4)

3.2 C is the point (1 ; –2). The point D lies in the second quadrant and has coordinates (x ; 5). If the length of CD is $\sqrt{53}$ units, calculate the value of x. (4)
[18]

QUESTION 4

4.1 In the diagram below, ΔABC is right-angled at B.



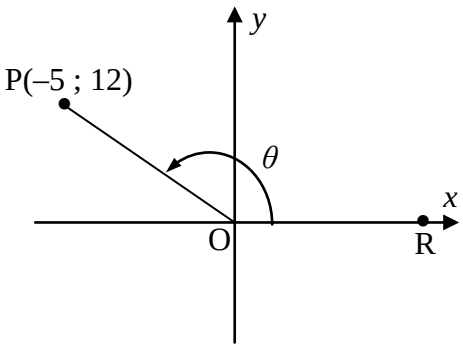
Complete the following statements:

4.1.1 $\sin C = \frac{AB}{\ldots}$ (1)

4.1.2 $\ldots A = \frac{AB}{BC}$ (1)

4.2 **Without using a calculator**, determine the value of: $\frac{\sin 60°.\tan 30°}{\sec 45°}$ (4)

4.3 In the diagram, P(–5 ; 12) is a point in the Cartesian plane and $R\hat{O}P = \theta$.



Determine the value of:

4.3.1 $\cos\theta$ (3)

4.3.2 $\text{cosec}^2\theta + 1$ (3)
[12]

QUESTION 5

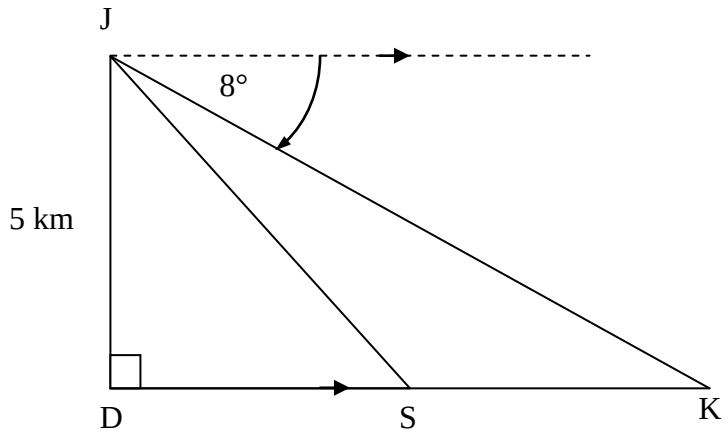
5.1 Solve for x, correct to ONE decimal place, in each of the following equations where $0^o \leq x \leq 90^o$.

5.1.1 $5\cos x = 3$ (2)

5.1.2 $\tan 2x = 1{,}19$ (3)

5.1.3 $4\sec x - 3 = 5$ (4)

5.2 An aeroplane at J is flying directly over a point D on the ground at a height of 5 kilometres. It is heading to land at point K. The angle of depression from J to K is 8°. S is a point along the route from D to K.



5.2.1 Write down the size of $J\hat{K}D$. (1)

5.2.2 Calculate the distance DK, correct to the nearest metre. (3)

5.2.3 If the distance SK is 8 kilometres, calculate the distance DS. (1)

5.2.4 Calculate the angle of elevation from point S to J, correct to ONE decimal place. (2)

[16]

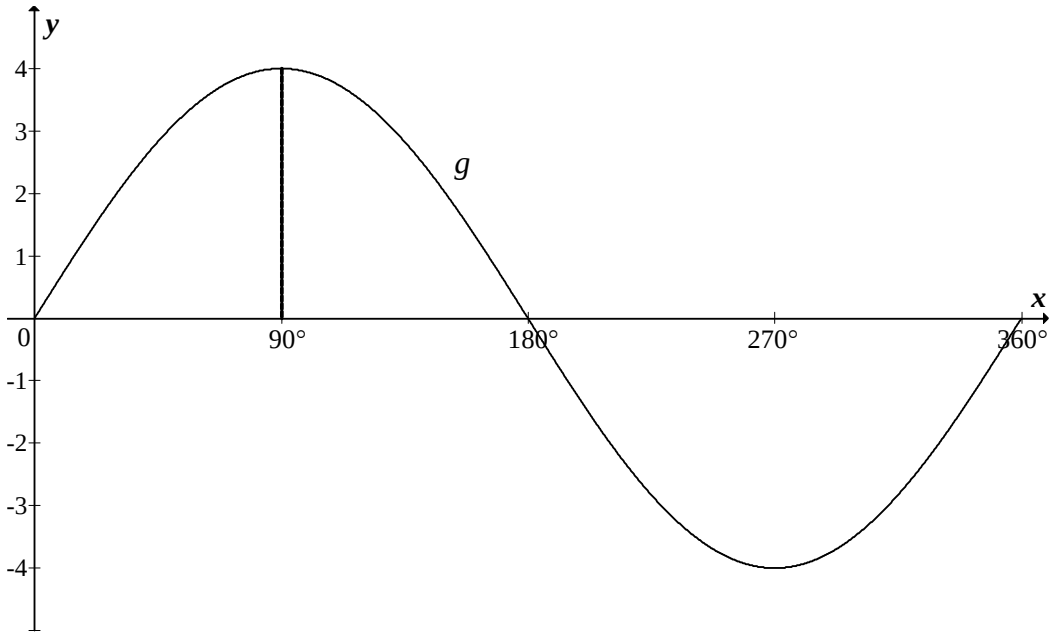
QUESTION 6

6.1 Consider the function $y = 2\tan x$.

6.1.1 Make a neat sketch of $y = 2\tan x$ for $0° \le x \le 360°$ on the axes provided on DIAGRAM SHEET 1. Clearly indicate on your sketch the intercepts with the axes and the asymptotes. (4)

6.1.2 If the graph of $y = 2\tan x$ is reflected about the x-axis, write down the equation of the new graph obtained by this reflection. (1)

6.2 The diagram below shows the graph of $g(x) = a\sin x$ for $0° \le x \le 360°$.

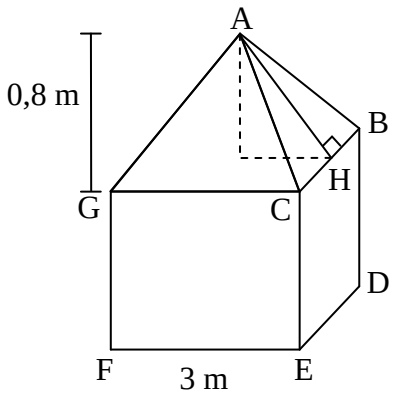


6.2.1 Determine the value of a. (1)

6.2.2 If the graph of g is translated 2 units upwards to obtain a new graph h, write down the range of h. (2)
[8]

QUESTION 7

7.1 The roof of a canvas tent is in the shape of a right pyramid having a perpendicular height of 0,8 metres on a square base. The length of one side of the base is 3 metres.



7.1.1 Calculate the length of AH. (2)

7.1.2 Calculate the surface area of the roof. (2)

7.1.3 If the height of the walls of the tent is 2,1 metres, calculate the total amount of canvas required to make the tent if the floor is excluded. (2)

7.2 A metal ball has a radius of 8 millimetres.

7.2.1 Calculate the volume of metal used to make this ball, correct to TWO decimal places. (2)

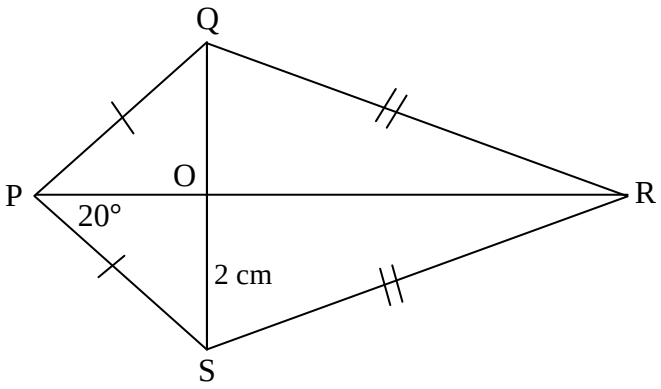
7.2.2 If the radius of the ball is doubled, write down the ratio of the new volume : the original volume. (2)

7.2.3 You would like this ball to be silver plated to a thickness of 1 millimetre. What is the volume of silver required? Give your answer correct to TWO decimal places. (2)
[12]

Give reasons for your statements in the answers to QUESTIONS 8 and 9.

QUESTION 8

PQRS is a kite such that the diagonals intersect in O.
OS = 2 cm and $O\hat{P}S = 20°$.



8.1 Write down the length of OQ. (2)

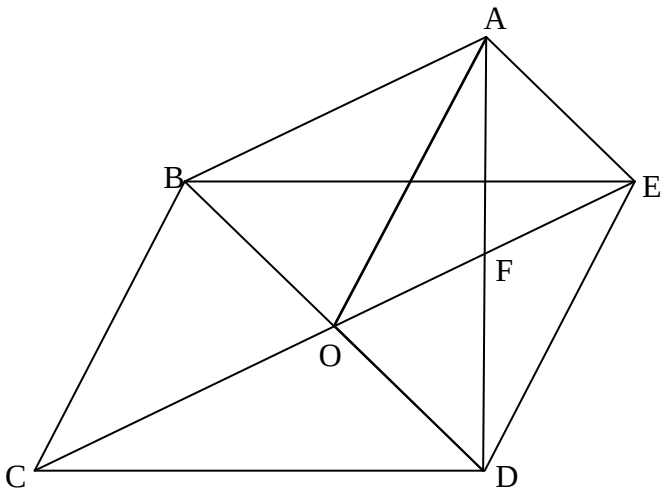
8.2 Write down the size of $P\hat{O}Q$. (2)

8.3 Write down the size of $Q\hat{P}S$. (2)

[6]

QUESTION 9

In the diagram, BCDE and AODE are parallelograms.



9.1 Prove that OF || AB. (4)

9.2 Prove that ABOE is a parallelogram. (4)

9.3 Prove that $\Delta ABO \equiv \Delta EOD$. (5)

[13]

TOTAL: 100

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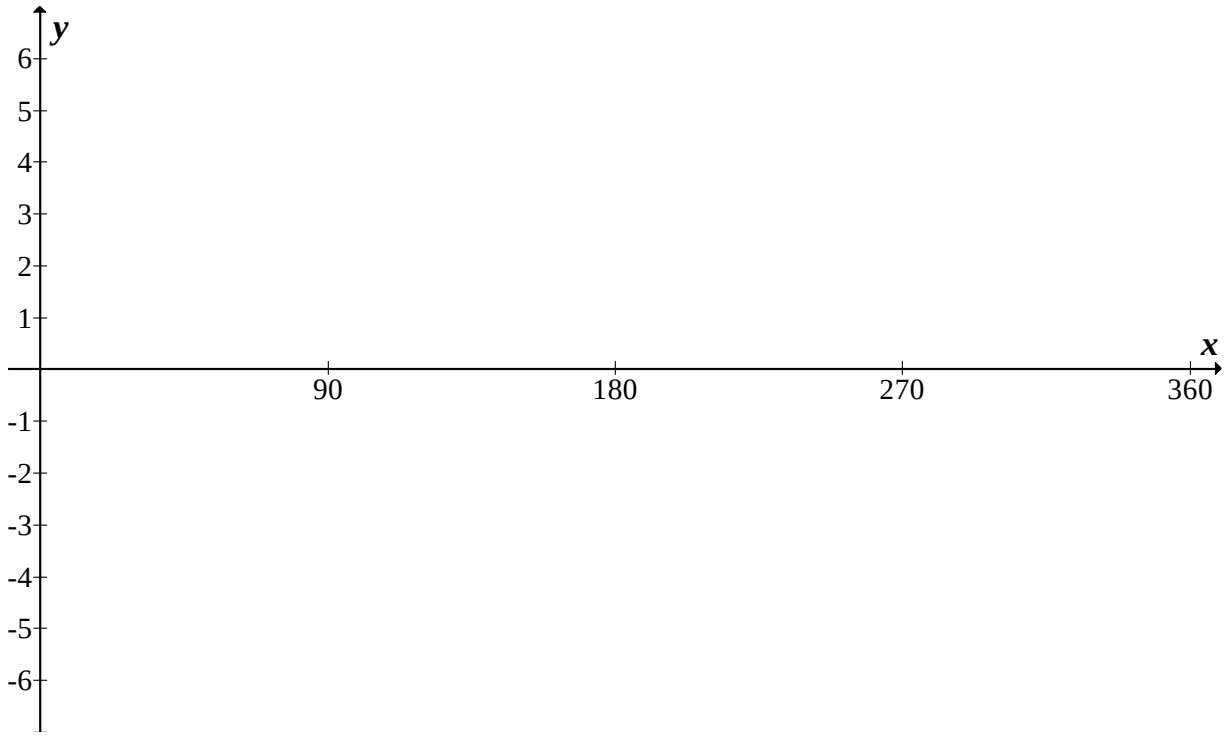
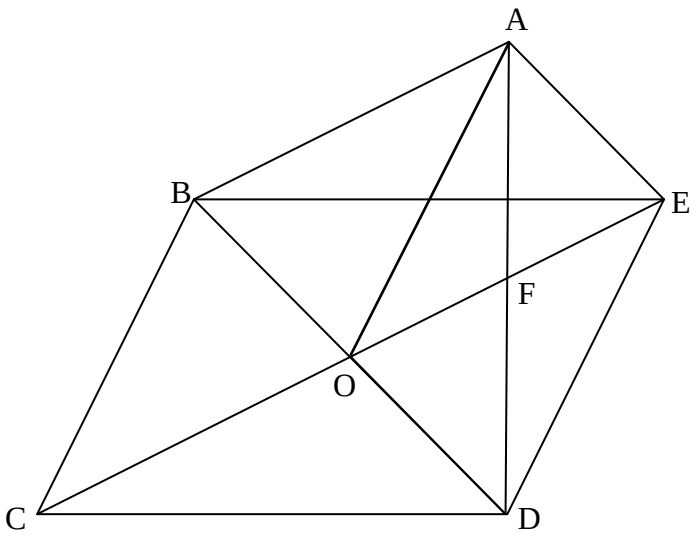
DIAGRAM SHEET 1

QUESTION 6.1.1



QUESTION 9



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