Province of the
EASTERN CAPE
EDUCATION

NATIONAL SENIOR CERTIFICATE

GRADE 10

NOVEMBER 2019

MATHEMATICS P2 (EXEMPLAR)

MARKS: **100**

TIME: **2 hours**

This question paper consists of 9 pages and an answer book of 15 pages.

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. This question paper consists of 7 questions.
2. Answer ALL the questions in the SPECIAL ANSWER BOOK provided.
3. Clearly show ALL calculations, diagrams, graphs, et cetera that you have used in determining your 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. Write neatly and legibly.

QUESTION 1

1.1 A tuck shop at a particular school sells soft drink cans. The economic friendly club of this school collected soft drink cans for recycling for a period of 20 days. The number of cans collected was recorded and the data is given below:

48	50	52	59	60	68	73	76	76	76
78	79	80	81	82	82	84	91	92	98

1.1.1 Determine the median of the cans collected. (1)

1.1.2 Determine the value of the upper and lower quartiles. (2)

1.1.3 Calculate the interquartile (IQR) range of the data. (2)

1.1.4 Write down the minimum and maximum value of the data. (1)

1.1.5 Represent the 5 number summary on a box and whisker diagram. (3)

1.1.6 Comment on the box and whisker diagram. (1)

1.2 Telkom conducted a survey regarding the duration of telephone calls made by people in a certain community. The information was then tabulated as indicated below:

Duration (min)	**No of calls (f_1)**	**Midpoint (x_1)**	**$(f_1) \times (x_1)$**
$2 \leq t < 5$	47	3,5	164,5
$5 \leq t < 8$	139	6,5	903,5
$8 \leq t < 11$	211	9,5	2004,5
$11 \leq t < 14$	102	12,5	1275
$14 \leq t < 17$	58	15,5	899
$17 \leq t < 20$	19	**A**	**B**

1.2.1 Calculate the values of **A** and **B**. (2)

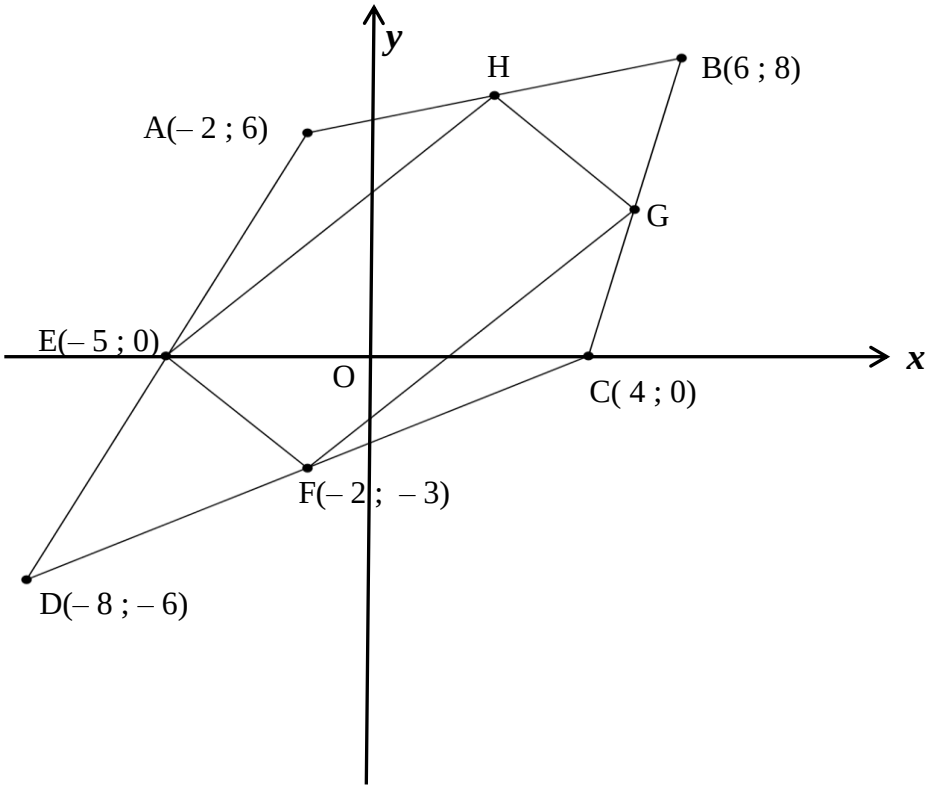
1.2.2 Determine the approximate mean for the duration of the telephone calls. (3)

1.2.3 In which interval does the 75^{th} percentile lie? (2)

[17]

QUESTION 2

In the diagram below, H and G are the midpoints of AB and BC respectively. The coordinates of A(– 2 ; 6) , B(6 ; 8) , C(4 ; 0) , D(– 8 ; – 6) , E (– 5 ; 0) and F(– 2 ; – 3) are given. The diagram is not necessarily drawn to scale.



2.1 Show by calculation that AB = BC. (5)

2.2 If it is further given that AD = DC, what type of quadrilateral is ABCD? Motivate your answer. (2)

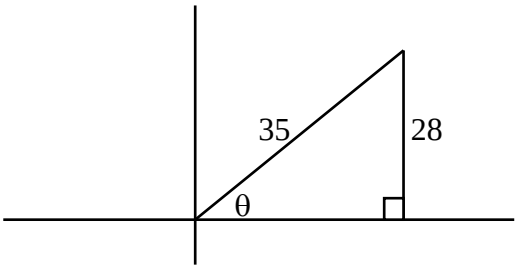
2.3 Determine the coordinates of G and H. (5)

2.4 If line BD is drawn and it is also given that EH || BD, prove that ΔAEH ||| ΔCDB. (4)

[16]

QUESTION 3

3.1 In the diagram below, the value of $\sin\theta = \frac{28}{35}$



3.1.1 Without calculating the value of θ, determine the value of $\cos\theta$. (3)

3.1.2 Hence, or otherwise, prove that: $\sin^2\theta + \cos^2\theta = 1$ (3)

3.2 If $37\sin\theta + 35 = 0$ and $\tan\theta > 0$, determine with the help of a diagram, the value of $24\sec\theta - 70\cot\theta$. (6)

3.3 Solve for x, if $x \in [0°; 90°]$. Give your answer correct to 1 decimal place.

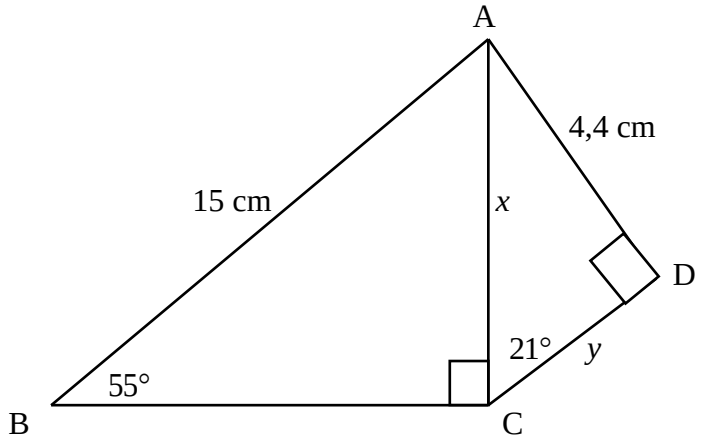
3.3.1 $8\cos(x+10°) = 5$ (3)

3.3.2 cosec $2x = 2$ (3)

3.4 Prove the following without the use of a calculator:

$$\frac{\sin 30° \times \tan 60°}{\tan 30° \times \cos 60°} = 3$$ (5)

3.5 In the diagram below, $A\hat{C}B = 90°$, AB = 15 cm, AD = 4,4 cm, $\hat{B} = 55°$, $A\hat{C}D = 21°$ and $A\hat{D}C = 90°$.



Determine the value of:

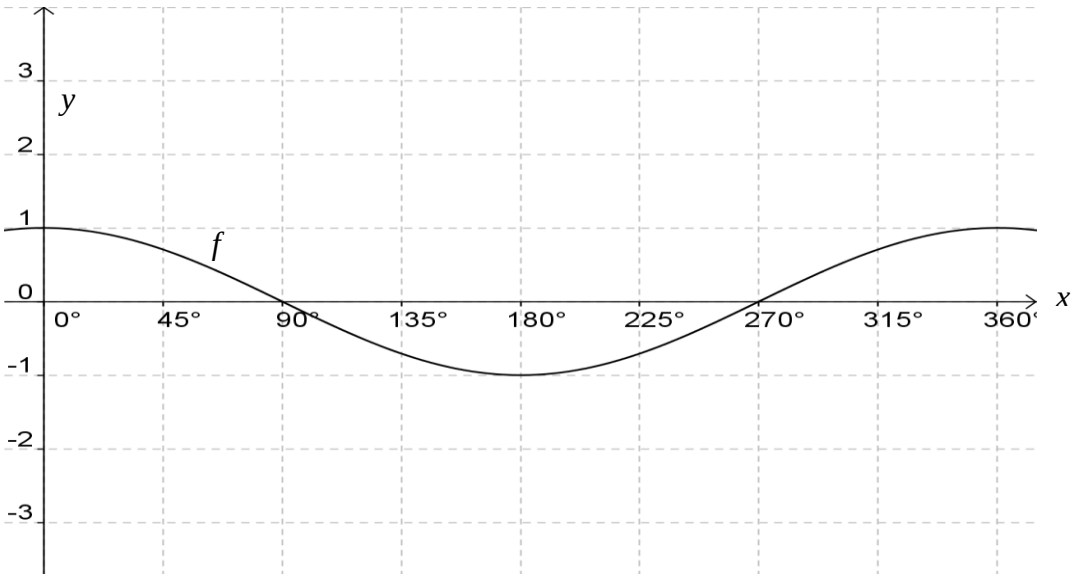
3.5.1 x (2)

3.5.2 y (2)

[27]

QUESTION 4

In the diagram below, the graph of $f(x) = \cos x$ is drawn for $x \in [0°; 360°]$



4.1 Sketch on the same axis the graph of $g(x) = 2\sin x$ for $x \in [0°; 360°]$. (3)

4.2 Write down the period of g. (1)

4.3 Write down the range of $m(x)$ *if* $m(x) = -3f(x) + 1$. (3)

4.4 For which value(s) of x is g decreasing? (2)

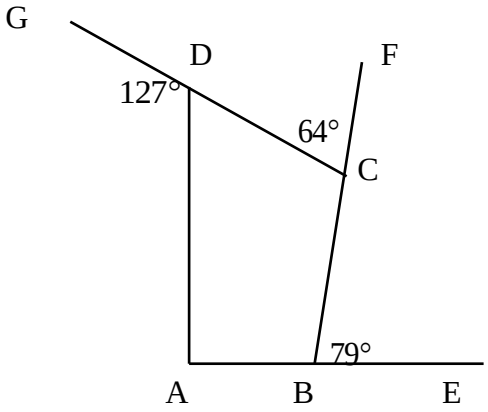
4.5 For which value(s) of x is $f(x) \times g(x) < 0$? (3)

[12]

Give reasons for all statements and calculations in QUESTIONS 5 and 6.

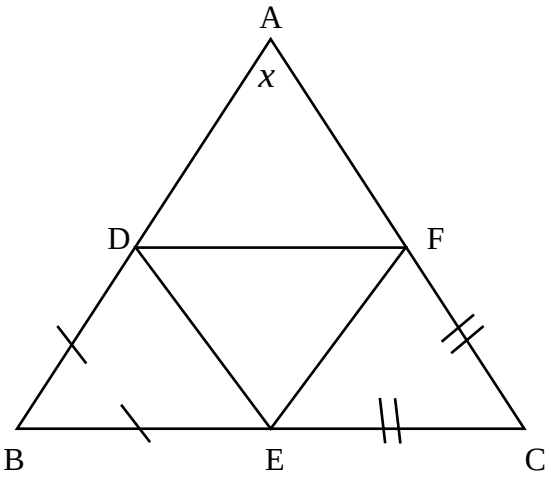
QUESTION 5

5.1 The sides of a quadrilateral ABCD are produced such that AB is produced to E, BC is produced to F and CD is produced to G.



If $E\hat{B}C = 79°$, $F\hat{C}D = 64°$ and $G\hat{D}A = 127°$, calculate the value of $B\hat{A}D$. (4)

5.2 In ΔABC, D, E and F lie on sides AB, BC and CA respectively, so that BD = BE and CE = CF.

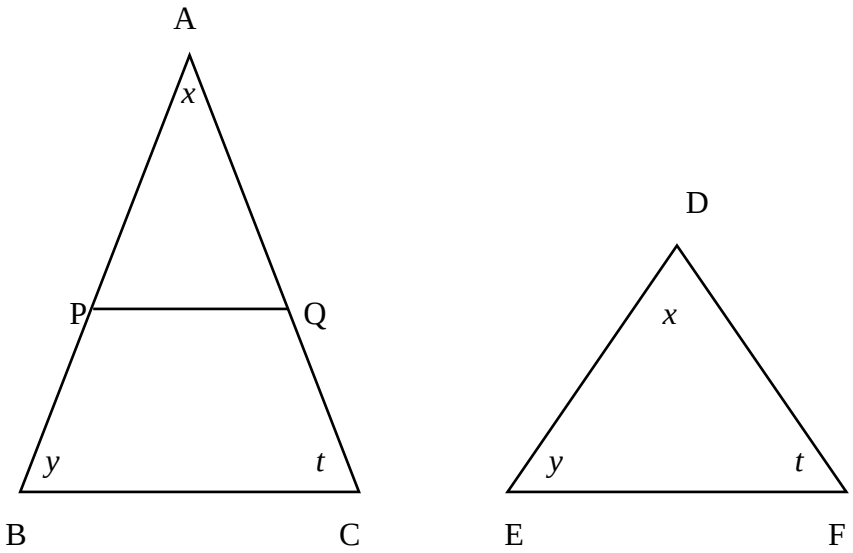


If $\hat{A} = x$, showing all calculations, determine the size of $D\hat{E}F$ in terms of *x*. (4)

[8]

QUESTION 6

6.1 In the diagram below, $\Delta ABC \,|||\, \Delta DEF$. ($\hat{A} = \hat{D} = x$, $\hat{B} = \hat{E} = y$ and $\hat{C} = \hat{F} = t$).

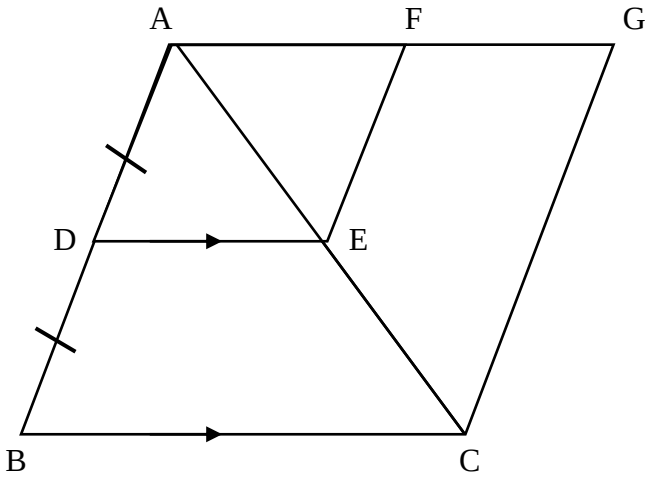


6.1.1 If it is further given that AP = DE and AQ = DF, prove that $\Delta APQ \equiv \Delta DEF$. (3)

6.1.2 Hence, or otherwise, prove that PQ || BC. (3)

6.1.3 If it is further given that AP = 3,5 cm, PB = 4 cm and AC = 8cm, determine the length of DF. (4)

6.2 In the diagram below, D is the midpoint of AB and DE || BC.



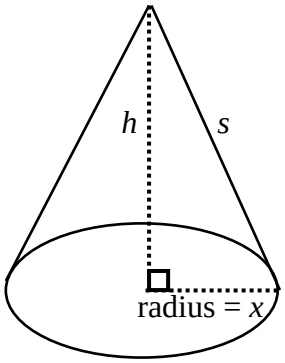
6.2.1 Give a reason why E is the midpoint of AC. (1)

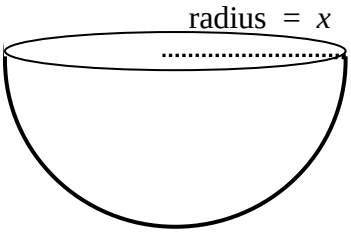
6.2.2 If it is further given that F is the midpoint of AG, ADEF is a parallelogram and that BD = $\sqrt{32}$, determine the length of CG. (5)

[16]

QUESTION 7

A fowl run is designed in the shape of a cone. A hemispherical bowl of water is placed close by for the chickens to drink from it. The cone and the hemisphere are drawn as shown below.





Total surface area of a cone $= \pi r^2 + \pi r s$, where s is the slant height of the cone.
Total surface area of the hemisphere $= 3\pi r^2$.

The radius of both the cone and the hemisphere is given as x units and it is further given that the total surface area of the cone = total surface area of the hemisphere .
Find an expression for h, the height of the cone, in terms of x. (4)

[4]

TOTAL: 100