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| **NATIONAL**  **SENIOR CERTIFICATE** | | | | | |
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|  | | | **GRADE 10** |  | |
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| **NOVEMBER 2019** | | | | | |
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| **MATHEMATICS P2 (EXEMPLAR)** | | | | | |
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| **MARKS:** | | **100** | | | |
|  | |  | | | |
| **TIME:** | | **2 hours** | | | |
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|  | This question paper consists of 9 pages and an answer book of 15 pages. | | | |  |

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| **INSTRUCTIONS AND INFORMATION** | |
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| Read the following instructions carefully before answering the questions. | |
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| 1. | This question paper consists of 7 questions. |
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| 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. |
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| 7. | Diagrams are NOT necessarily drawn to scale. |
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| 8. | Write neatly and legibly. |

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| **QUESTION 1** | | | |
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| 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) (*x*1)** | | 2 *t* < 5 | 47 | 3,5 | 164,5 | | 5 *t* < 8 | 139 | 6,5 | 903,5 | | 8 *t* < 11 | 211 | 9,5 | 2004,5 | | 11 *t* < 14 | 102 | 12,5 | 1275 | | 14 *t* < 17 | 58 | 15,5 | 899 | | 17 *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 75th percentile lie? | (2) |
|  |  | | **[17]** |

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| **QUESTION 2** | |  |
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| 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. | |  |
|  | |  |
| ***x***  ***y***  A(– 2 ; 6)  C( 4 ; 0)  B(6 ; 8)  D(– 8 ; – 6)  E(– 5 ; 0)  F(– 2 ; – 3)  H  G  O | |  |
|  |  |  |
| 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  ∆AEH ||| ∆CDB. | (4) |
|  |  | **[16]** |

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| **QUESTION 3** | | | |
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| 3.1 | In the diagram below, the value of | |  |
|  | 35 28    θ | |  |
|  | 3.1.1 | Without calculating the value of , determine the value of . | (3) |
|  |  | |  |
|  | 3.1.2 | Hence, or otherwise, prove that: | (3) |
|  |  | |  |
| 3.2 | If  and , determine with the help of a diagram, the value of . | | (6) |
|  |  | |  |
| 3.3 | Solve for *x*, if *x* ∈  Give your answer correct to 1 decimal place. | |  |
|  |  | |  |
|  | 3.3.1 |  | (3) |
|  |  |  |  |
|  | 3.3.2 | cosec 2*x* = 2 | (3) |
|  |  | |  |
| 3.4 | Prove the following without the use of a calculator: | | (5) |
|  |  | |  |
| 3.5 | In the diagram below,  =  AB = 15 cm, AD = 4,4 cm,   and | |  |
|  |  | |  |
|  | A    4,4 cm     15 cm *x*  D    *y*       B C | |  |
|  | Determine the value of: | |  |
|  |  |  |  |
|  | 3.5.1 | *x* | (2) |
|  |  | |  |
|  | 3.5.2 | *y* | (2) |
|  |  | | **[27]** |

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| **QUESTION 4** | | | |
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| In the diagram below, the graph of  is drawn for | | |  |
|  | | |  |
| *y*  *f*  *x* | | |  |
|  |  |  |  |
| 4.1 | Sketch on the same axis the graph of *g(x)* = 2sin *x* for . | | (3) |
|  |  | |  |
| 4.2 | Write down the period of | | (1) |
|  |  | |  |
| 4.3 | Write down the range of | | (3) |
|  |  | |  |
| 4.4 | For which value(s) of *x*  is g decreasing? | | (2) |
|  |  | |  |
| 4.5 | For which value(s) of *x*  is | | (3) |
|  |  | | **[12]** |

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| **Give reasons for all statements and calculations in QUESTIONS 5 and 6.** | | |
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| **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. |  |
|  |  |  |
|  | G   D F       C          A B E |  |
|  |  |  |
|  | If  calculate the value of . | (4) |
|  |  |  |
| 5.2 | In ∆ABC, D, E and F lie on sides AB, BC and CA respectively, so that BD = BE and CE = CF. |  |
|  | A          D F        B E C  *x* |  |
|  |  |  |
|  | If , showing all calculations, determine the size of  in terms of *x*. | (4) |
|  |  | **[8]** |

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| **QUESTION 6** | | | |
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| 6.1 | In the diagram below, ∆ABC ||| ∆DEF. (). | |  |
|  | A    *x*    D      P Q *x*      *y*  *t* *y* *t*   B C E F | |  |
|  | 6.1.1 | If it is further given that AP = DE and AQ = DF, prove that ∆APQ ≡ ∆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. | |  |
|  | A F G        D E       B C | |  |
|  |  | |  |
|  | 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 = , determine the length of CG. | (5) |
|  |  | | **[16]** |

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| **QUESTION 7** | |  |
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| 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. | |  |
|  | *h* *s*  radius = *x*        radius = *x*  Total surface area of a cone =  where *s*  is the slant height of the cone. Total surface area of the hemisphere = |  |
|  |  |  |
|  | 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** |