MINISTRY OF EDUCATION, ARTS AND CULTURE

NAMIBIA SENIOR SECONDARY CERTIFICATE

MATHEMATICS ORDINARY LEVEL

SPECIMEN PAPERS 1 AND 2

MARK SCHEMES FOR PAPER 1 AND 2

PAPER ANALYSIS FOR PAPER 1 AND 2

GRADES 10 - 11

THESE PAPERS AND MARK SCHEMES SERVE TO EXEMPLIFY THE SPECIFICATIONS IN THE REVISED NSSC MATHEMATICS ORDINARY LEVEL SYLLABUS

2017
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NAMIBIA SENIOR SECONDARY CERTIFICATE

MATHEMATICS ORDINARY LEVEL

PAPER 1

6131/1

Marks 80

2 hours

Additional Materials:

INSTRUCTIONS AND INFORMATION TO CANDIDATES

• Candidates answer on the Question Paper in the spaces provided.
• Write your Centre Number, Candidate Number and Name in the spaces at the top of this page.
• Write in dark blue or black pen.
• You may use a soft pencil for any diagrams or graphs.
• Do not use correction fluid.
• Do not write in the margin For Examiner’s Use.
• Answer all questions.
• If working is needed for any question it must be shown below, or where working is indicated.
• The number of marks is given in brackets [ ] at the end of each question or part question.
• Non-programmable calculators may be used.
• If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Give answers for angle sizes to one decimal place.
• For π, either use your calculator value, or use 3.142.

This document consists of 14 printed pages.

Republic of Namibia

MINISTRY OF EDUCATION, ARTS AND CULTURE
1. From the numbers listed above, write down:
   (a) a prime number, Answer (a) ......................... [1]
   (b) a cube number, Answer (b) ......................... [1]
   (c) an irrational number. Answer (c) ......................... [1]

2. (a) Insert brackets to make the number statement true \( 8 - 5 \times 4 + 3 = 15 \)
    Answer (a) .......................... [1]
   (b) Express 1.03 as a percentage of 1.
    Answer (b) .......................... % [1]

3. Find \((5 \times 10^8) \times (4 \times 10^7)\), writing your answer in standard form.
   Answer ............................. [2]

4. If 30 locusts eat 420 grams of grass in a week.
   How many days will it take 21 locusts to consume 420 grams of grass if they eat
   at the same rate?
   Answer ............................. days [2]
5 \( \sin x^\circ = -0.5 \) and \( 180^\circ \leq x \leq 270^\circ \)

Find the value of \( x \).

Answer \( x = \ldots \ldots \ldots \ldots \ldots \ldots ^\circ \) \[1\]

6 (a) How many lines of symmetry are on the diagram below?

(b) On the diagram below, shade two more squares to make a pattern that has rotational symmetry of order 2.
The diagram shows the fuel gauge in Collin’s car.

(a) Give the reading shown on the fuel gauge.

Answer (a) ........................................... [1]

(b) The total capacity of the tank is 70 litres.

Calculate the number of litres in the tank.

Answer (b) ...................... litres [2]

8 Factorise completely

(a) $12x^2 - 18x^5$

Answer (a) ................................. [2]

(b) $x^2 - 5x + 6$

Answer (b) ................................. [2]

9 The distance, $d$ in kilometres, between Oshikango and Ondangwa is 62 km correct to 2 significant figures.

Complete the statement below about the distance, $d$.

Answer .................. $\leq d < ..............$ [2]
10 At a party the ratio of boys to girls is 5 : 4.
There are 48 girls at the party.
Find the total number of children at the party.

Answer ............................. children [2]

11 Solve the simultaneous equations.

\[3x + 5y = 0,\]
\[x - 2y = 11.\]

Answer \(x = \) .......................... 
\(y = \) .......................... [3]

12 Show that \(\frac{2}{3} + \frac{3}{4} = \frac{20}{21}\)

Answer .......................... [2]
13 Tauno swims lengths of the swimming pool.
   The pool is 25 m long and he swims a total of 1.6 km.

(a) How many lengths of the pool does he swim?

Answer (a) .......................lengths  [2]

(b) Tauno swims for $1\frac{1}{4}$ hours and ends his swim at 11 05.

(i) At what time did he begin his swim?

Answer (b)(i) ......................... [1]

(ii) What is his average speed, in kilometres per hour?

Answer (b)(ii) .......................km/h  [1]

14 Solve for $k$,
   
   $2^k = 8^3$

Answer $k =$ ............................. [2]
15 (a) The profits of a company were N$523 000 in 2016 and N$742 000 in 2017. Find the percentage increase in profits from 2016 to 2017.

Answer (a) ......................... % [2]

(b) A different company had an income of N$968 000 in 2015. In 2016 this income decreased by 10%. In 2017 the income increased by 15% from the 2016 income. Find the income in 2017.

Answer (b) N$.......................... [3]

16 Solve

(a) (i) \(5x - 2 = 1\),

Answer (a) \(x = \) ......................... [1]

(ii) \(\frac{2t - 1}{4} = \frac{1 - t}{3}\).

Answer (a) \(t = \) ......................... [2]

(b) Solve the inequality \(3 - y \leq 1\),

Answer (b) ............................. [2]
17 A sequence of diagrams is made using black and white counters.

The number of black and white counters in each diagram is shown in the table below.

<table>
<thead>
<tr>
<th>Diagram number</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
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<tbody>
<tr>
<td><strong>Number of white counters</strong></td>
<td>1</td>
<td>4</td>
<td>9</td>
<td>16</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Number of black counters</strong></td>
<td>0</td>
<td>2</td>
<td>6</td>
<td>12</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(a) Complete the table for Diagram 5 and 6. [2]

(b) Write an expression, in terms of \( n \), for the number of white counters in the \( n \)th diagram.

Answer (b) .................................. [1]

(c) By considering the number patterns in the table, write an expression, in terms of \( n \), for the number of black counters in the \( n \)th diagram.

Answer (c) .................................. [1]

(d) What is the total number of counters in the 20th diagram?

Answer (d) .................................. [1]
The diagram shows a solid formed by a cylinder of radius 5 cm and length 20 cm joined to a hemisphere of radius 5 cm.

Calculate the total surface area of the solid.

\[
\text{Surface area, } A, \text{ of sphere with radius } r \text{ is } A = 4\pi r^2
\]

Answer ................................ cm\(^2\) [4]
A group of 100 learners was asked how many minutes each spent talking on their mobile phone during one day. The histogram summarizes this information.

(a) Use the histogram to find the number of learners who spent between
(i) 0 and 10 minutes,
(ii) 20 and 90 minutes.

Answer (a) (i) ................................ [1]
Answer (a) (ii) ............................. [2]

(b) John wants to draw a pie chart to represent the information shown in the histogram.
Calculate the angle of the sector that represents the learners who spent between 0 and 10 minutes talking on their mobile phones.

Answer (b) .................................. [1]
\[
\frac{1}{f} = \frac{1}{u} + \frac{1}{v}
\]

(a) Evaluate \( f \) when \( u = 3 \) and \( v = 8 \).

Answer (a) \( f = \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots [2] \)

(b) Rearrange the formula to make \( u \) the subject.

Answer (b) \( u = \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots [2] \)
In the diagram, $ABCD$ is a parallelogram.

$X$ is a point on $BC$.

$AXY$ and $DCY$ are straight lines.

$AB = 8\text{ cm}$, $AX = 7\text{ cm}$, $AD = 9\text{ cm}$ and $CY = 4\text{ cm}$.

(a) Show that triangles $ABX$ and $ADY$ are similar.

Give reasons for each of your statements.

Answer (a) ........................................................................................................................................
.........................................................................................................................................................
............................................................................................................................................................
............................................................................................................................................................
............................................................................................................................................................ [2]

(b) Calculate $AY$.

Answer (b) $AY = \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\text{ cm}$ [2]
22 \( f(x) = 2x + 1, \quad g(x) = 3x - 2 \)

(a) Find

(i) \( f(2) \),

Answer (a) (i) ..............................  [1]

(ii) \( gf(2) \).

Answer (a) (ii) ..............................  [1]

(b) Find \( f^{-1}(x) \).

Answer (b) .................................  [2]

23 \( y \) varies inversely as the square of \( x \).

When \( x = 3, y = 4 \). Find

(a) \( y \) in terms of \( x \)

Answer (a) .................................  [2]

(b) \( y \) when \( x = 2 \)

Answer (b) .................................  [1]
24 (a) Express as a single matrix \(2 \begin{pmatrix} -1 & -2 \\ 0 & 1 \end{pmatrix} - \begin{pmatrix} 1 & -3 \\ 2 & 3 \end{pmatrix}\).

Answer (a) \(\ldots\) \[2\]

(b) Find the inverse of \(\begin{pmatrix} 3 & 0 \\ 0 & 1 \end{pmatrix}\).

Answer (b) \(\ldots\) \[2\]

25 (a) Given that \(A = \{1, 2, 3, 4, 5\}\) and \(B = \{3, 4, 5, 6, 7\}\).

Find \(A \cup B\).

Answer (a) \(A \cup B = \ldots\) \[1\]

(b) \(\mathcal{E} = \{p, q, r\}\)

On the Venn diagram, write each of the letters \(p, q\) and \(r\) in its appropriate subset, given that
\(p \in X \cap Y \cap Z\),
\(q \in X' \cap Y' \cap Z'\),
\(r \in (X \cup Y)' \cap Z\).
NAMIBIA SENIOR SECONDARY CERTIFICATE

SPECIMEN PAPER 1

MARK SCHEME

ORDINARY LEVEL

MATHEMATICS

PAPER 1
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<thead>
<tr>
<th>Question Number</th>
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<td>1 (a)</td>
<td>2</td>
</tr>
<tr>
<td>1 (b)</td>
<td>8 or 1</td>
</tr>
<tr>
<td>1 (c)</td>
<td>√2</td>
</tr>
<tr>
<td>2 (a)</td>
<td>(8 - 5) \times 4 + 3 = 15</td>
</tr>
<tr>
<td>2 (b)</td>
<td>103</td>
</tr>
<tr>
<td>3</td>
<td>2 \times 10^{-16}</td>
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<tr>
<td>4</td>
<td>10</td>
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<td>5</td>
<td>210</td>
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<tr>
<td>6 (a)</td>
<td>two lines of symmetry</td>
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<td>6 (b)</td>
<td>Correct two squares shaded (R_2, C_2 or R_4, C_2)</td>
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<td>7 (a)</td>
<td>3/8 / 0.375</td>
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<td>7 (b)</td>
<td>26.25</td>
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<td>8 (a)</td>
<td>6x^2(2 - 3x^3)</td>
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<td>8 (b)</td>
<td>(x - 3)(x - 2)</td>
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<td>9</td>
<td>61.5 \leq d &lt; 62.5</td>
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<tr>
<td>10</td>
<td>108 children</td>
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<tr>
<td>11</td>
<td>x = 5, y = -3</td>
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<td>12 (b)</td>
<td>(\frac{20}{21})</td>
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## Mathematics: Ordinary Level

### Paper 1: Paper Analysis

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<td>Sum and inverse of 2 × 2 matrices</td>
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<td>11</td>
<td>4</td>
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NAMIBIA SENIOR SECONDARY CERTIFICATE

MATHEMATICS ORDINARY LEVEL

PAPER 2

Marks 120

3 hours

Additional Materials:

INSTRUCTIONS AND INFORMATION TO CANDIDATES

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MINISTRY OF EDUCATION, ARTS AND CULTURE

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Consider the list of numbers

\[ \frac{5}{8}, 6.3\%, 0.625, 0.63, 0.63, 29, \frac{29}{40} \]

From the list choose

(a) two equal numbers,

(b) the largest number,

(c) the product of \(6.3 \times 10^{-2}\),

(d) the sum of 5.2 and -4.57.

Answer (a) ........... and ...........

Answer (b)..........................

Answer (c)..........................

Answer (d).......................... 

The table below shows the height of some bean plants after two weeks.

<table>
<thead>
<tr>
<th>Height (h cm)</th>
<th>0&lt; h ≤ 1</th>
<th>1&lt; h ≤ 2</th>
<th>2&lt; h ≤ 5</th>
<th>5&lt; h ≤ 9</th>
<th>9&lt; h ≤ 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of plants</td>
<td>5</td>
<td>10</td>
<td>19</td>
<td>11</td>
<td>15</td>
</tr>
</tbody>
</table>

(a) Work out the modal class.

Answer (a)..........................

(b) Calculate an estimate of the mean height of the plants.

Answer (b).......................... [4]
Suama scored $x$ goals during a netball tournament. Nadine scored 3 more goals than Suama. Vendji scored 2 times as many goals as Suama.

(a) Write down the number of goals scored by Nadine in terms of $x$.

Answer (a) ......................... goals [1]

(b) Write down the number of goals scored by Vendji in terms of $x$.

Answer (b) ......................... goals [1]

(c) Find in terms of $x$, the total number of goals scored by the three girls. Simplifying your answer.

Answer (c) ......................... goals [2]

(d) The average number of goals by the three girls is 9.

(i) Show that $4x = 24$.

Answer (d) (i) ......................... [2]

(ii) Solve the equation $4x = 24$.

Answer (d) (ii) $x = ..................$ [1]

(e) Find the number of goals scored by Vendji.

Answer (e) ......................... goals [1]
4 The diagram shows a cyclic quadrilateral, $ACDE$ with centre $O$.
Line $LAB$ and $BCP$ are tangents to the circle meeting at point $B$. Angle $AOC$ is $105^\circ$.

(a) Find the following angles giving a reason for each answer.

(i) angle $ADC$,

Answer (a) (i) $\ldots\ldOTS\ldOS
5 (a) Find the value of $x$ and $y$ in the following matrix equations.
\[
\begin{pmatrix}
3 & x \\
5 & 4
\end{pmatrix}
\begin{pmatrix}
1 \\
2
\end{pmatrix}
=
\begin{pmatrix}
7 \\
13
\end{pmatrix}
\]

Answer (a) $x = \ldots$  
$y = \ldots$  

(b) Solve the following simultaneous equations by matrix methods.
\[
\begin{align*}
2x + 3y &= 8 \\
x - 2y &= -3
\end{align*}
\]

Answer (b) $x = \ldots$  
$y = \ldots$  

6 The points $A(-4, 5)$, $B(4, 1)$, and $C(2, -4)$ are given.

Find

(a) the coordinates of the mid-point $AB$,

Answer (a) ($\ldots$, $\ldots$)  

(b) the equation of the line perpendicular to point $C$ and is parallel to the line $AB$,

Answer (b) $\ldots$  

(c) the distance between $A$ and $C$.

Answer (c) $\ldots$
7 The diagram shows the positions of three towns, $TR$ and $S$.

Town $T$ is 140 km from town $R$ and town $S$ is 128 km from town $R$.

The bearing of $R$ from $T$ is $064^\circ$.

(a) Find the bearing of $S$ from $R$.

Answer (a) ................................° [2]

(b) Calculate the distance between town $T$ and $S$.

Answer (b) ......................... km [4]

(c) Find angle $RST$.

Answer (c) .......................... [3]
8 Lukas and his sister, Sosa have N$2 500 each to invest with BANK A or B.

<table>
<thead>
<tr>
<th>BANK A</th>
<th>BANK B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Savings account</td>
<td>Savings account</td>
</tr>
<tr>
<td>7% per year</td>
<td>9% per year</td>
</tr>
<tr>
<td>SIMPLE INTEREST</td>
<td>COMPOUND INTEREST</td>
</tr>
</tbody>
</table>

(a) Lukas invests his amount with BANK A.
(i) Calculate how much he will have at the end of 13 years.

Answer (a)(i) N$ ...................... [3]

(ii) Find the percentage increase of Lukas's money.

Answer (a)(ii) ....................... % [1]

(b) Sosa invests her money with BANK B.
(i) Calculate how much she will have at the end of 3 years.
   Give your answer correct to 2 decimal places.

Answer (b)(i) N$ ...................... [3]

(ii) Find the percentage increase of Sosa's money.

Answer (b)(ii) ....................... % [2]

(c) Johanna received N$3 600 from her bank.
   This includes an increase of 20% on the amount she invested.
   Calculate the amount of her original investment.

Answer (c) N$ ...................... [3]
9 (a) Vectors $\mathbf{a}$, $\mathbf{b}$ and $\mathbf{c}$ are such that

$$\mathbf{a} = \begin{pmatrix} -9 \\ 4 \end{pmatrix}, \quad \mathbf{b} = \begin{pmatrix} 2 \\ -2 \end{pmatrix}, \quad \mathbf{c} = \begin{pmatrix} -8 \\ -2 \end{pmatrix}$$

(i) Find $|\mathbf{a}|$.

(ii) Find as a single column vector $5\mathbf{b} - \mathbf{c}$.

(iii) Explain why $5\mathbf{b} - \mathbf{c}$ is parallel to $\mathbf{a}$.

(b) In the diagram, $O$ is the origin and $QR : RP = 2 : 1$. $OP = \mathbf{p}$ and $OQ = \mathbf{q}$.

Find the position vector of $R$ in terms of $\mathbf{p}$ and $\mathbf{q}$.
Give your answer in its simplest terms.

Answer (b)................................. [3]
A table of values for \( y = 6 + x - x^2 \) is given below.

<table>
<thead>
<tr>
<th>( x )</th>
<th>-3</th>
<th>-2</th>
<th>-1</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>( y )</td>
<td>( p )</td>
<td>( q )</td>
<td>6</td>
<td>( r )</td>
<td>( q )</td>
<td>0</td>
<td>( p )</td>
<td></td>
</tr>
</tbody>
</table>

(a) Calculate the values of \( p \), \( q \) and \( r \).

Answer (a) \( p = \) .................

\( q = \) .................

\( r = \) .................

(b) On the grid, draw the graph of \( y = 6 + x - x^2 \) for \(-3 \leq x \leq 4\).

(c) On the same grid draw the graph of \( y = -x - 2 \).

(d) Write down the coordinates of the points of intersection for the two graphs.

Answer (d) (.......... , ..........) and (.......... , ..........)
The grid shows shapes A, B and C.

(a) Describe fully the transformation that maps
(i) shape A onto shape B.

Answer (a)(i) .............................................................. [2]

(ii) shape B onto shape C.

Answer (a)(ii) .............................................................. [3]

(b) Shape A is mapped onto shape D by an anti-clockwise rotation of 90°, centre (3, -1). Draw and label shape D. [2]

(c) Translate shape B by the column vector \begin{pmatrix} -3 \\ 2 \end{pmatrix} and label it E. [2]
12 (a) 

\( E = \{x : x \text{ is an integer, } 4 \leq x \leq 20\} \) 

\( A = \{x : x \text{ is a composite number}\} \) 

\( B = \{x : x \text{ is a multiple of 5}\} \)

(i) Find \( n(A \cap B) \),

\[
\text{Answer (a) (i) } n(A \cap B) = \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots [2]
\]

(ii) \( (A \cup B)' \),

\[
\text{Answer (a) (ii) } (A \cup B)' = \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots [2]
\]

(b) The number of learners playing in the school teams is 33.
   Out of the total number, 26 play soccer, 14 play netball, 3 play neither soccer nor netball and \( x \) play both soccer and netball.

(i) Draw a Venn diagram to represent this information.

(ii) Hence find \( x \), the number of learners who play both netball and soccer.

\[
\text{Answer (b) (ii) } x = \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots [2]
\]
13 (a) Write \( x^2 - 2x - 1 \) in the form \( (x - 1)^2 + k \).

\[
(x - 1)^2 + k
\]

Answer (a) ......................... [2]

(b) Use your answer to part (a) to find the \( x \) - intercepts.

Answer (b) \( x = \) ................. or ................. [2]

(c) Hence, sketch the graph of \( y = x^2 - 2x - 1 \).
   Show the turning point and all the intercepts.
14 There are 20 mangoes in a box.
   8 mangoes are small and 12 mangoes are large.
   (a) Write down the probability that a mango chosen at random is large.

   Answer (a) ............................ [1]

   (b) Two of the 20 mangoes are chosen at random, without replacement.
       Draw the tree diagram and indicate the probability on each branch.

   (c) Use your tree diagram to find the probability that
       (i) both mangoes are small,

   Answer (c) (i) ........................... [2]

       (ii) one mango is small and the other mango is large.

   Answer (c) (ii) ........................... [3]
15 (a) \( \log x = 2 \log p - \log q \)

Find \( x \) in terms of \( p \) and \( q \)

Answer (a) \( x = \ldots \) [3]

(b) Find the quotient and a reminder when \( 2x^3 + x^2 + 2x - 3 \) is divided by \( x + 1 \).

Answer (a) Quotient = \ldots \[3]

Remainder = \ldots \[3]
NAMIBIA SENIOR SECONDARY CERTIFICATE

SPECIMEN PAPER 2

MARK SCHEME

ORDINARY LEVEL

MATHEMATICS

PAPER 2
<table>
<thead>
<tr>
<th>Question Number</th>
<th>P2 Mark Scheme Details</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (a)</td>
<td>$\frac{5}{8}$ and 0.625</td>
<td>1</td>
</tr>
<tr>
<td>(b)</td>
<td>$\frac{29}{40}$</td>
<td>1</td>
</tr>
<tr>
<td>(c)</td>
<td>6.3%</td>
<td>1</td>
</tr>
<tr>
<td>(d)</td>
<td>0.63</td>
<td>1</td>
</tr>
<tr>
<td>2 (a)</td>
<td>$9 &lt; h \leq 10$</td>
<td>M1 for $15 \div 1$ seen 2</td>
</tr>
<tr>
<td>(b)</td>
<td>5.0583....</td>
<td>M3 for $(\frac{3.5 \times 5}{(1.5 \times 10)} + (3.5 \times 19) + (7 \times 11) + (9.5 \times 15)) \div 60$ M2 for mid-points multiplied by frequency M1 for all mid-points seen 4</td>
</tr>
<tr>
<td>3 (a)</td>
<td>$x + 3$</td>
<td>c.a.o 1</td>
</tr>
<tr>
<td>(b)</td>
<td>2x</td>
<td>c.a.o 1</td>
</tr>
<tr>
<td>(c)</td>
<td>$4x + 3$</td>
<td>M1 for $x + x + 3 + 2x$ 2</td>
</tr>
<tr>
<td>(d)(i)</td>
<td>$4x = 9 \times 3 - 3$ or $4x = 27 - 3$</td>
<td>M1 for $\frac{4x + 3}{3} = \frac{9}{1}$ or $4x + 3 = 9 \times 3$ or $4x + 3 = 27$ 2</td>
</tr>
<tr>
<td>(d)(ii)</td>
<td>6</td>
<td>c.a.o 1</td>
</tr>
<tr>
<td>(e)</td>
<td>12</td>
<td>Ft1 for using their (b) correctly 1</td>
</tr>
<tr>
<td>4 (a)(i)</td>
<td>52.5° An angle at the centre is twice an angle at the circumference (subtended by the same arc)</td>
<td>B1 B1 2</td>
</tr>
<tr>
<td>(a)(ii)</td>
<td>90° An angle between a tangent and a radius is 90°</td>
<td>B1 B1 2</td>
</tr>
<tr>
<td>(a)(iii)</td>
<td>90° An angle in a semi-circle is 90°</td>
<td>B1 B1 2</td>
</tr>
<tr>
<td>(b)(i)</td>
<td>52.5°</td>
<td>c.a.o 1</td>
</tr>
<tr>
<td>(b)(ii)</td>
<td>75°</td>
<td>M1 for $180° - (52.5° + 52.5°)$ o.e 2</td>
</tr>
<tr>
<td>(b)(iii)</td>
<td>37.5°</td>
<td>M1 for $180° - (90° + 52.5°)$ o.e 2</td>
</tr>
<tr>
<td>5 (a)</td>
<td>$x = 2; y = -1$</td>
<td>B1 for any correct value of $x$ or $y$ M1 for $3 + 2x = 7$ o.e M1 for $5y + 12 = 7$ o.e 3</td>
</tr>
<tr>
<td>(b)</td>
<td>$x = 1; y = 2$</td>
<td>B1 for any correct value of $x$ or $y$ M2 for $\begin{pmatrix} -2 &amp; -3 \ 2 &amp; -3 \end{pmatrix}$ M1 for $\begin{pmatrix} 2 &amp; 3 \ 1 &amp; -4 \end{pmatrix} \begin{pmatrix} x \ y \end{pmatrix} = \begin{pmatrix} 8 \ -3 \end{pmatrix}$ 3</td>
</tr>
<tr>
<td>6 (a)</td>
<td>(0, 3)</td>
<td>c.a.o 1</td>
</tr>
<tr>
<td>(b)</td>
<td>$y = 2x - 8$</td>
<td>M1 for gradient $-\frac{1}{2}$ M1 for substituting $(2, -4)$ into $y = (\text{their } m)x + c$ o.e 3</td>
</tr>
<tr>
<td>(c)</td>
<td>10.8</td>
<td>M1 for (change in $x$)$^2$ or (change in $y$)$^2$</td>
</tr>
<tr>
<td>-------</td>
<td>-------</td>
<td>-------------------------------------------------</td>
</tr>
<tr>
<td>7 (a)</td>
<td>119</td>
<td>M1 for $360^\circ - (116^\circ - 125^\circ)$ o.e</td>
</tr>
</tbody>
</table>
| (b)   | 238   | M2 for $\sqrt{140^2 + 128^2 - 2(140)(128)\cos 125}$  
M1 for $r^2 = 140^2 + 128^2 - 2(140)(128) \cos 125^\circ$  
A1 for 56 540.97948  
A1 for $r = \sqrt{56540.97948}$ | 4 |
| (c)   | 28.8  | M2 for $\sin RST = \frac{140\sin 125}{238}$  
M1 for $\sin \frac{5}{140} = \frac{\sin 125}{238}$ | 3 |
|       | or 28.80 - 28.85 |                                  |    |
| 8 (a)(i) | 4 775 | M2 for $\frac{2500 \times 7 \times 13}{100} + 2500$  
M1 for $\frac{2500 \times 7 \times 13}{100}$ o.e | 3 |
| (a)(ii) | 91    | c.a.o                                            | 1 |
| (b)(i) | 3 237.57 | B2 for 3 238 or 3 237.5725  
M1 for $2500 \left( 1 + \frac{9}{100} \right)^3$ o.e | 3 |
| (b)(ii) | 29.5  | M1 for $\frac{737.57}{2500} \times 100$         | 2 |
| (c)   | 3000.00 | M2 for $3600 \times \frac{100}{120}$ o.e  
M1 for identifying 3 600 as = 120% | 3 |
| 9 (a)(i) | 9.85  | M1 for $\sqrt{(-9)^2 + 4^2}$                      | 2 |
| (a)(ii) | $\begin{pmatrix} 18 \\ -8 \end{pmatrix}$ | B1 for $\begin{pmatrix} 10 \\ -10 \end{pmatrix}$ seen | 2 |
| (a)(iii) | one is a multiple of the other o.e |                                           | 1 |
| (b)   | $-\frac{2}{3}p + \frac{1}{3}q$ o.e or $\frac{1}{3}q + \frac{2}{3}p$ o.e | M1 for $\overrightarrow{PQ} = -p + q$ or $\overrightarrow{QP} = -q + p$  
or $\overrightarrow{PR} = \frac{1}{3}(-p + q)$ o.e  
or $\overrightarrow{QR} = \frac{2}{3}(-q + p)$ o.e  
M1 for $\overrightarrow{OR} = p + \frac{1}{3}(-p + p)$ o.e or $q + \frac{2}{3}(-q + p)$ | 3 |
10  (a) $p = -6; q = 4; r = 6$  
   B1 for each correct value  
   3  

   (b)  Correct plotting and curve  
   ![Graph](image)  
   P2 for at least 5 or 6 correct plots  
   P1 for at least 3 or 4 correct plots  
   4  

   (c) $y = -x - 2$ is ruled correctly to intersect the curve twice  
   B1 for $y$ - intercept = -2  
   B1 for $x$ - intercept = -2  
   2  

   (d) (-2, 0) B1 and (4, -6) B1  
   c.a.o  
   2  

11  (a)(i) Reflection in the line $x = 0$ or $y$ - axis  
   B1 for only one description given  
   2  

   (a)(ii) Enlargement, centre (-4, -2), scale factor of 2  
   B1 for each  
   3  

   (b) Image at (3,-1), (0, -2), (1,-3)  
   B1 for clockwise rotation $90^\circ$  
   2  

   (c) Image at (-3,4), (-5, 2), (-4,5)  
   B1 for two correct vertices  
   2  

12  (a)(i) 3  
   M1 for $B = \{5, 10, 15, 20\}$ seen or $A = \{4, 6, 8, 9, 10, 12, 14, 15, 16, 18, 20\}$ seen  
   2  

   (a)(ii) $\{7, 11, 13, 17, 19\}$  
   B1 for elements of $A \cup B$  
   2  

   (b)(i) ![Venn Diagram](image)  
   B1 for two or three correctly placed  
   2  

   (b)(ii) $x = 10$  
   M1 for $43 - x = 33$ seen o.e  
   2  

Senior Secondary Phase, Specimen Paper 1 & 2
<p>| | | |</p>
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<tr>
<td>13</td>
<td>(a)</td>
<td>$(x - 1)^2 - 2$</td>
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<td>M1 for $(x - 1)^2$ seen</td>
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<td>(b)</td>
<td>$- 0.414\ldots$ or $2.414\ldots$</td>
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<td>M1 for $x - 1 = \pm \sqrt{2}$</td>
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<td>M1 for parabola vertex down</td>
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<td>A1 for $(0,-1)$ and $(1 - \sqrt{2})$ or and $(1 + \sqrt{2})$ o.e</td>
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<tr>
<td>14</td>
<td>(a)</td>
<td>$\frac{3}{5}$ o.e</td>
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<tr>
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<td>(b)</td>
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<td>B1 for each pair of branches</td>
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<td>(c)(i)</td>
<td>$\frac{14}{95}$ o.e</td>
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<td>M1 for $\frac{8}{20} \times \frac{7}{19}$ o.e Ft of their tree</td>
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<tr>
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<td>(c)(ii)</td>
<td>$\frac{48}{95}$ o.e</td>
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<tr>
<td></td>
<td></td>
<td>M2 for $\left(\frac{12}{20} \times \frac{8}{19}\right) + \left(\frac{\frac{8}{20} \times \frac{12}{19}}{8}</td>
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</table><p>ight)$ o.e Ft their tree |
|    |   | M1 for $\left(\frac{12}{20} \times \frac{8}{19}\right)$ or $\left(\frac{\frac{8}{20} \times \frac{12}{19}}{8}\right)$ o.e Ft their tree |
| 15 | (a) | $\frac{p^2}{q}$ |
|    |   | M1 for $\log p^2$ |
|    |   | M1 for correct use of $\log a - \log b = \log \frac{a}{b}$ |
|    | (b) | $2x^2 - x + 3$ and - 6 |
|    |   | B2 for $2x^2 - x + 3$ |
|    |   | B1 for - 6 |
|    |   | M1 for correct process allowing one mistake |</p>
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<th>Syll. Ref</th>
<th>Topic/ Context</th>
<th>Target Grades</th>
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