



**KWAZULU-NATAL PROVINCE**

EDUCATION  
REPUBLIC OF SOUTH AFRICA

**FINAL**

**NATIONAL  
SENIOR CERTIFICATE**

**GRADE 11**

**MATHEMATICS  
SEPTEMBER TEST  
2025  
MARKING GUIDELINES**

**MARKS: 75**

**These marking guidelines consist of 7 pages.**

**QUESTION 1**

<p>1.1.1</p>	$A = P(1-i)^n$ $A = 20\,000(1-0,13)^7$ $A = R7\,545,10$	<p>B/D incorrect formula</p>	<p>✓ A correct subst. into correct formula                  ✓ CA answer                  (2)</p>
<p>1.1.2</p>	$\text{Value in dollars} = \frac{R7\,545,10}{R18,45/\$1}$ $= \$408,95$	<p>Answer only: <b>Full marks</b></p>	<p>✓ CA <math>\frac{\text{Book value}}{18,45}</math>                  ✓ CA answer                  (2)</p>
<p>1.2</p>	$1+i_{\text{eff}} = \left(1 + \frac{i_{\text{nom}}}{m}\right)^m$ $1+i_{\text{eff}} = \left(1 + \frac{0,09}{4}\right)^4$ $i_{\text{eff}} = \left(1 + \frac{0,09}{4}\right)^4 - 1$ $r = 9,31\% \text{ per annum}$		<p>✓ A correct formula                  ✓ A correct substitution into formula                  ✓ CA answer                  (3)</p>
<p>1.3</p>	$A = P(1+in)$ $500050 = P(1+0,12 \times 5)$ $P = \frac{500050}{(1+0,12 \times 5)}$ $P = R312531,25$	<p>B/D incorrect formula</p>	<p>✓ A correct subst. into correct formula                  ✓ CA answer                  (2)</p>
<p>1.4</p>	$A = P(1+i)^n$ $18 = 16,25(1+i)^3$ $i = \sqrt[3]{\frac{18}{16,25}} - 1$ $r = 3,47\%$	<p>B/D incorrect formula and if A and P are swapped</p>	<p>✓ A <math>P = 16,25</math>; <math>A = 18</math>; <math>n = 3</math>                  ✓ A subst. into correct formula                  ✓ CA simplifying using <math>\sqrt[3]{\dots}</math>                  ✓ CA answer                  (4)</p>
<p>1.5</p>	$A = P(1+i)^n$ $36\,193,15 = 12\,000 \left(1 + \frac{0,1135}{m}\right)^{20}$ $1 + \frac{0,1135}{m} = \sqrt[20]{\frac{36\,193,15}{12\,000}}$ $m = \frac{0,1135}{\sqrt[20]{\frac{36\,193,15}{12\,000}} - 1}$ $m = 2$ <p>∴ it takes <b>10</b> years (account compounds half – yearly)</p>	<p><b>m must be a whole number</b></p>	<p>✓ A correct subst. of A and P                  ✓ A correct subst. of i and exponent 20                  ✓ CA simplification                  ✓ CA value of compounding period                  ✓ CA answer                  (5)</p>

**QUESTION 2**

2.1.1	$P(B) = 1 - P(\text{not } B)$ $= 1 - 0,67$ $= 0,33$ <div style="border: 1px solid black; padding: 5px; display: inline-block; margin-left: 150px;">Answer only: <math>\frac{2}{2}</math></div>	✓ A subst. into correct rule ✓ A answer (2)								
2.1.2	$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$ $0,57 = P(A) + 0,33 - 0$ $P(A) = 0,24$ <div style="border: 1px solid black; padding: 5px; display: inline-block; margin-left: 150px;">B/D if <math>P(A \text{ and } B) \neq 0</math></div> <p style="text-align: center;"><b>OR</b></p> $P(A \text{ or } B) = P(A) + P(B)$ $0,57 = P(A) + 0,33$ $P(A) = 0,24$	✓ A correct rule ✓ CA substitution ✓ CA answer (3) <p style="text-align: center;"><b>OR</b></p> ✓ A correct rule ✓ CA substitution ✓ CA answer (3)								
2.2.1	$m = 4$ $p = 35$	✓ A 4 ✓ A 35 (2)								
2.2.2	$P = \frac{22}{140}$ $P = \frac{11}{70}$ <div style="border: 1px solid black; padding: 5px; display: inline-block; margin-left: 100px;">Accept <math>\frac{22}{140}</math> or 0,16 or 15,71% as answers</div>	✓ A $\frac{11}{70}$ (1)								
2.2.3	$P(\text{moderate and } R40\ 000 < x \leq R65\ 000) = \frac{12}{140}$ $= \frac{3}{35} \text{ OR } 0,09$ $P(\text{moderate}) \times P(R40\ 000 < x \leq R65\ 000) = \frac{30}{140} \times \frac{25}{140}$ $= \frac{15}{392} \text{ OR } 0,04$ $P(\text{moderate and } > R40\ 000) \neq P(\text{moderate}) \times P(> R40\ 000)$ <p>∴ the events are NOT INDEPENDENT</p>	✓ A $\frac{3}{35}$ OR 0,09 ✓ A $\frac{30}{140} \times \frac{25}{140}$ ✓ A $\frac{15}{392}$ OR 0,04 ✓ CA conclusion (4)								
2.3.1	<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 30%;"></th> <th style="width: 30%; text-align: center;">1<sup>st</sup> roll</th> <th style="width: 20%; text-align: center;">2<sup>nd</sup> roll</th> <th style="width: 20%; text-align: center;">OUTCOMES</th> </tr> </thead> <tbody> <tr> <td style="vertical-align: middle;"> </td> <td style="vertical-align: middle;">                 Wins Loses Rolls Again             </td> <td style="vertical-align: middle;">                 Wins Loses Rolls Again &amp; Loses Rolls Again &amp; Wins             </td> <td></td> </tr> </tbody> </table>		1 <sup>st</sup> roll	2 <sup>nd</sup> roll	OUTCOMES		Wins Loses Rolls Again	Wins Loses Rolls Again & Loses Rolls Again & Wins		✓ A both branches correct ✓ A correct probabilities: $\frac{1}{6}$ ; $\frac{2}{6}$ OR $\frac{1}{3}$ ; $\frac{3}{6}$ OR $\frac{1}{2}$ on 1 <sup>st</sup> roll ✓ A correct probabilities: $\frac{4}{6}$ OR $\frac{2}{3}$ ; $\frac{2}{6}$ OR $\frac{1}{3}$ on 2 <sup>nd</sup> roll ✓ A outcomes (4)
	1 <sup>st</sup> roll	2 <sup>nd</sup> roll	OUTCOMES							
	Wins Loses Rolls Again	Wins Loses Rolls Again & Loses Rolls Again & Wins								
2.3.2	$P(\text{win on the first roll}) = \frac{1}{6} \text{ OR } 0,17 \text{ OR } 16,67\%$	✓ A $\frac{1}{6}$ (1)								
2.3.3	$P(\text{loses}) = P(L) + P(\text{Rolls Again and Loses})$ $P(\text{loses}) = \frac{2}{6} + \frac{3}{6} \times \frac{4}{6}$	✓ CA $\frac{2}{6}$ OR $\frac{1}{3}$								

	$P(\text{loses}) = \frac{1}{3} + \frac{1}{3}$ $P(\text{loses}) = 66,67\%$	$\checkmark$ CA $\frac{3}{6} \times \frac{4}{6}$ <b>OR</b> $\frac{1}{2} \times \frac{2}{3}$ $\checkmark$ CA answer (3)
<b>[20]</b>		

**QUESTION 3**

3.1.1	$\bar{x} = \frac{242}{9}$ $= 26,89$ <div style="border: 1px solid black; padding: 5px; display: inline-block; margin-left: 100px;">                     Answer only: <math>\frac{2}{2}</math> </div>	$\checkmark$ A 242 $\checkmark$ CA answer <b>Note: CA only if divided by 9</b> (2)																		
3.1.2	$\sigma = 19,56$	$\checkmark$ A 19,56 (1)																		
3.1.3	$\bar{x} - \sigma = 26,89 - 19,56$ $= 7,33 \text{ (no. of learners } < \text{ ONE std deviation below the mean)}$ $\therefore 1 \text{ year}$	$\checkmark$ CA $\bar{x} - \sigma$ $\checkmark$ CA answer (2)																		
3.2.1	$8 < x \leq 12$	$\checkmark$ A answer (1)																		
3.2.2	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th style="padding: 5px;">Time waiting (in minutes)</th> <th style="padding: 5px;">Number of learners</th> <th style="padding: 5px;">Cumulative frequency</th> </tr> </thead> <tbody> <tr> <td style="padding: 5px;"><math>0 &lt; x \leq 4</math></td> <td style="padding: 5px;">6</td> <td style="padding: 5px;"><b>6</b></td> </tr> <tr> <td style="padding: 5px;"><math>4 &lt; x \leq 8</math></td> <td style="padding: 5px;">12</td> <td style="padding: 5px;"><b>18</b></td> </tr> <tr> <td style="padding: 5px;"><math>8 &lt; x \leq 12</math></td> <td style="padding: 5px;">20</td> <td style="padding: 5px;"><b>38</b></td> </tr> <tr> <td style="padding: 5px;"><math>12 &lt; x \leq 16</math></td> <td style="padding: 5px;">16</td> <td style="padding: 5px;"><b>54</b></td> </tr> <tr> <td style="padding: 5px;"><math>16 &lt; x \leq 20</math></td> <td style="padding: 5px;">6</td> <td style="padding: 5px;"><b>60</b></td> </tr> </tbody> </table>	Time waiting (in minutes)	Number of learners	Cumulative frequency	$0 < x \leq 4$	6	<b>6</b>	$4 < x \leq 8$	12	<b>18</b>	$8 < x \leq 12$	20	<b>38</b>	$12 < x \leq 16$	16	<b>54</b>	$16 < x \leq 20$	6	<b>60</b>	$\checkmark$ A 6; 18  $\checkmark$ CA 38; 54; 60 (2)
Time waiting (in minutes)	Number of learners	Cumulative frequency																		
$0 < x \leq 4$	6	<b>6</b>																		
$4 < x \leq 8$	12	<b>18</b>																		
$8 < x \leq 12$	20	<b>38</b>																		
$12 < x \leq 16$	16	<b>54</b>																		
$16 < x \leq 20$	6	<b>60</b>																		
3.2.3	60 learners	$\checkmark$ CA answer (1)																		

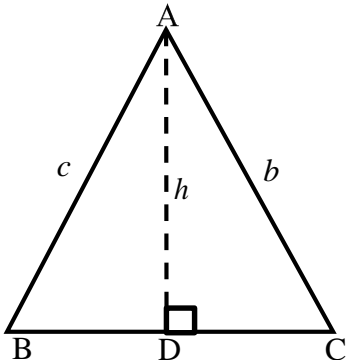
<p>3.2.4</p>	<p style="text-align: center;"><b>Ogive</b></p>	<ul style="list-style-type: none"> <li>✓ CA points plotted at upper limit</li> <li>✓ A shape: smooth curve</li> <li>✓ A grounding at (0 ; 0)</li> </ul> <p style="text-align: right;">(3)</p>
<p>3.2.5</p>	<p><math>Q_1 \approx 7,5</math>  <math>Q_3 \approx 13,5</math>  <math>IQR = 13,5 - 7,5</math>  <math>= 6</math></p>	<ul style="list-style-type: none"> <li>✓ CA <math>Q_1 = 7,5</math> (accept 7 to 8)</li> <li>✓ CA <math>Q_3 = 13,5</math> (accept 13 to 14)</li> <li>✓ CA answer (accept 6 to 7)</li> </ul> <p style="text-align: right;">(3)</p>
<b>[15]</b>		

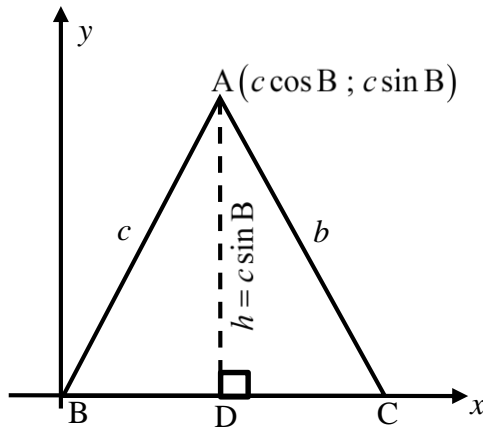
**QUESTION 4**

<p>4.1</p>	<p>Amplitude of <math>f = 1</math></p>	<p>✓ A 1</p> <p style="text-align: right;">(1)</p>
<p>4.2</p>	<p>Period of <math>g = 360^\circ</math></p>	<p>✓ A <math>360^\circ</math></p> <p style="text-align: right;">(1)</p>
<p>4.3</p>	<p><math>b = 2</math>  <math>q = 1</math>  <math>p = 30^\circ</math></p>	<ul style="list-style-type: none"> <li>✓ A <math>b = 2</math></li> <li>✓ A <math>q = 1</math></li> <li>✓ A <math>p = 30^\circ</math></li> </ul> <p style="text-align: right;">(3)</p>
<p>4.4.1</p>	<p><math>x \in [0^\circ ; 60^\circ]</math> <b>OR</b> <math>0^\circ \leq x \leq 60^\circ</math>  <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 5px auto;">                     If <math>x \in (0^\circ ; 60^\circ)</math> <b>OR</b> <math>0^\circ &lt; x &lt; 60^\circ</math> : 1 mark                 </div></p>	<ul style="list-style-type: none"> <li>✓ A critical values/endpoints</li> <li>✓ A notation</li> </ul> <p style="text-align: right;">(2)</p>
<p>4.4.2</p>	<p><math>f(x) - \sin 30^\circ = g(x) + 1</math>  <math>f(x) - \frac{1}{2} = g(x) + 1</math>  <math>f(x) = g(x) + 1,5</math>  <math>\therefore x = 90^\circ</math></p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 5px auto;">                     Also accept: <math>x = 34,4^\circ</math> or <math>x = 166,4^\circ</math> </div>	<ul style="list-style-type: none"> <li>✓ A <math>\sin 30^\circ = \frac{1}{2}</math> <b>OR</b> 0,5</li> <li>✓ A manipulation</li> <li>✓ A answer</li> </ul> <p style="text-align: right;">(3)</p>

<p>4.5</p>	$h(x) = \sin(-x)$ $= -\sin x$ $= \cos(90^\circ + x)$ $= \cos(x + 30^\circ + 60^\circ)$ $\therefore k = 60^\circ$ <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;">                     Answer only: <math>\frac{2}{2}</math> </div>	<p>✓ A <math>\cos(90^\circ + x)</math></p> <p>✓ A <math>k = 60^\circ</math></p> <p style="text-align: right;">(2)</p>
<b>[12]</b>		

**QUESTION 5**

<p>5.1</p>	<div style="text-align: center;">  </div> <p>Construction: Draw perpendicular height AD.</p> <p>In <math>\triangle ABD</math>: <math>\sin B = \frac{h}{c}</math></p> $\therefore h = c \sin B$ <p>In <math>\triangle ADC</math>: <math>\sin C = \frac{h}{b}</math></p> $\therefore h = b \sin C$ $\therefore c \sin B = b \sin C$ $\frac{c \sin B}{bc} = \frac{b \sin C}{bc}$ $\frac{\sin B}{b} = \frac{\sin C}{c}$ <p style="text-align: center;"><b>OR</b></p>	<p>✓ A construction</p> <p>✓ A <math>\sin B = \frac{h}{c}</math></p> <p>✓ A <math>h = c \sin B</math></p> <p>✓ A <math>h = b \sin C</math></p> <p>✓ A <math>\frac{c \sin B}{bc} = \frac{b \sin C}{bc}</math></p> <p style="text-align: right;">(5)</p>
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Construction: Draw perpendicular height AD.

In  $\triangle ABC$ :  $h = c \sin B$

In  $\triangle ADC$ :  $\sin C = \frac{h}{b}$

$$\therefore h = b \sin C$$

$$\therefore c \sin B = b \sin C$$

$$\frac{c \sin B}{bc} = \frac{b \sin C}{bc}$$

$$\frac{\sin B}{b} = \frac{\sin C}{c}$$

✓ A construction

✓ A  $y_A$  or  $h = c \sin B$

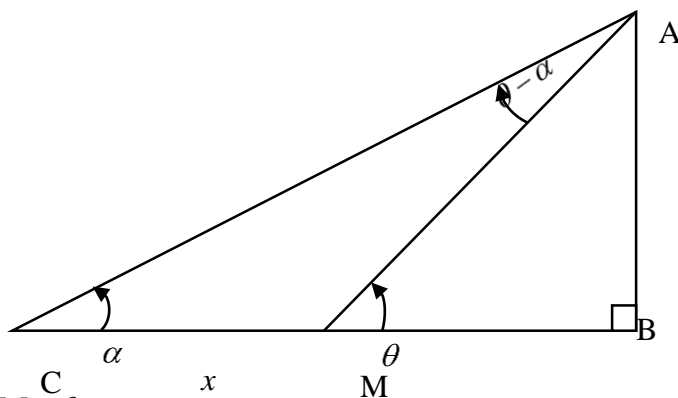
✓ A  $\sin C = \frac{h}{b}$

✓ A  $h = b \sin C$

✓ A equating and  $\div$  by  $bc$

(5)

5.2



$$\hat{C}AM = \theta - \alpha$$

In  $\triangle ACM$ :  $\frac{AM}{\sin \alpha} = \frac{x}{\sin(\theta - \alpha)}$

$$\therefore AM = \frac{x \sin \alpha}{\sin(\theta - \alpha)}$$

In  $\triangle AMB$ :  $\sin \theta = \frac{AB}{AM}$

$$\begin{aligned} \therefore AB &= AM \times \sin \theta \\ &= \frac{x \sin \alpha \cdot \sin \theta}{\sin(\theta - \alpha)} \end{aligned}$$

✓ A  $\hat{C}AM = \theta - \alpha$

✓ A correct subst. into sine rule

✓ A  $AM = \frac{x \sin \alpha}{\sin(\theta - \alpha)}$

✓ A correct trig ratio

✓ A  $AB = AM \sin \theta$

(5)

[10]

TOTAL MARK: 75