Downloaded from SEE academy: www.seeacademy.co.za

GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

# PROVINCIAL EXAMINATION

# JUNE 2023

# GRADE 11

# MARKING GUIDELINES

## MATHEMATICS (PAPER 1)

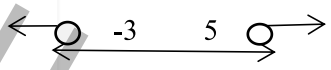
10 pages

SEE ACADEMY

Downloaded from SEE academy: www.seeacademy.co.za



**QUESTION 1**

| | | | | |
|---|---|---|---|---|
| 1.1 | 1.1.1 | $x \in \{4\ ;\ 5\}$ | ✓ answer<br>✓ answer | (2) |
| | | | | |
| | 1.1.2 | $x \in \{0\ ;\ 3\}$ | ✓ answer<br>✓ answer | (2) |
| | | | | |
| | 1.1.3 | $x \in \{1\ ;\ 2\}$ | ✓ answer<br>✓ answer | (2) |
| | | | | |
| 1.2 | 1.2.1 | $3x^2 - 4x = 0$<br>$\therefore x(3x-4) = 0$<br>$x = 0 \cdots \textbf{or} \cdots x = \frac{4}{3}$<br>**NOTE**: Any other valid method. | ✓ factors<br>✓✓ answers | (3) |
| | | | | |
| | 1.2.2 | $3x - 14 = -6x^2$<br>$\therefore\ 6x^2 + 3x - 14 = 0$<br>$\therefore\ x = \frac{-(3) \pm \sqrt{(3)^2 - 4(6)(-14)}}{2(6)}$<br>$\therefore\ x = 1{,}29$ ***or*** $x = -1{,}79$ | ✓ standard form<br>✓ substitution<br>✓✓ answers | (4) |
| | | | | |
| | 1.2.3 | $(x+1)(x-3) > 12$<br>$x^2 - 2x - 3 > 12$<br>$x^2 - 2x - 15 > 0$<br>$(x-5)(x+3) > 0$<br>$\therefore x > 5 \cdots \textbf{or} \cdots x < -3$<br> | ✓ standard form<br>✓ factors<br>✓✓ answers | (4) |
| | | | | |
| | 1.2.4 | $\sqrt{2-x} + 2 = x$<br>$\sqrt{2-x} = x - 2$<br>$(\sqrt{2-x})^2 = (x-2)^2$<br>$2 - x = x^2 - 4x + 4$<br>$0 = x^2 - 3x + 2$<br>$0 = (x-2)(x-1)$<br>$\therefore\ x = 2$ ... ***or*** ... $x = 1 (NA)$ | ✓ squaring both sides<br>✓ standard form<br>✓ factors<br>✓ answers with rejection | (4) |

SEE ACADEMY

Downloaded from SEE academy: www.seeacademy.co.za

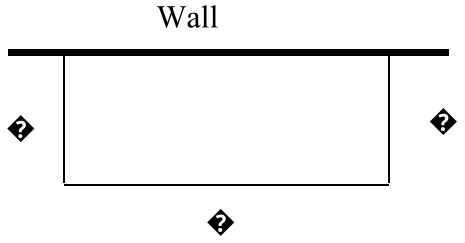


| | | | | |
|---|---|---|---|---|
| | 1.2.5 | $x-6=0$<br>$\therefore x=6$<br>$\because x=2y+3$<br>$6=2y+3$<br>$2y=3$<br>$\therefore y=\frac{3}{2}$ | ✓ value of $x$<br>✓ substitution<br>✓ value of $y$ | (3) |
| | | | | |
| 1.3 | | $y-1=2x$<br>$\therefore y=2x+1$ .....(1)<br>$x^2+xy-3x-y+2=0$ .....(2)<br>$\therefore x^2+x(2x+1)-3x-(2x+1)+2=0$<br>$x^2+2x^2+x-3x-2x-1+2=0$<br>$\therefore 3x^2-4x+1=0$<br>$(3x-1)(x-1)=0$<br>$\therefore x=\frac{1}{3}$ ... ***or*** ... $x=1$<br>$\therefore y=\frac{5}{3}$ ... ***or*** ... $y=3$ | ✓ expression for $y$<br>✓ substitution<br>✓ standard form<br>✓ $x$-values<br>✓ $y$-values | (5) |
| | | | | |
| 1.4 | | $x^2-px-p^2=2$<br>$\therefore x^2-px-p^2-2=0$<br>$\Delta=b^2-4ac$<br>$\Delta=(-p)^2-4(1)(-p^2-2)$<br>$\Delta=p^2+4p^2+8$<br>$\Delta=5p^2+8$<br>$\therefore p^2\geq 0\cdots\cdots p\in\Re$<br>$\therefore 5p^2\geq 0\cdots\cdots p\in\Re$<br>$\therefore 5p^2+8>0\cdots\cdots p\in\Re$<br>$\therefore$ roots are real and unequal. | ✓ substitute into $\Delta$<br>✓ $\Delta=5p^2+8$<br>✓ $p^2\geq 0$, $5p^2\geq 0$ and $5p^2+8>0$ | (3) |

SEE ACADEMY

Downloaded from SEE academy: www.seeacademy.co.za



| | | | |
|---|---|---|---|
| 1.5 | The 100 m fencing will make up three sides because the existing wall will make one side.<br><br><br>$fencing = 2x + y = 100$<br>$\therefore y = -2x + 100$<br>$\because A = xy$<br>$A = x(-2x + 100)$<br>$A = -2x^2 + 100x$<br>$A = -2(x^2 - 50x)$<br>$\therefore A = -2(x^2 - 50x - 625 - 625)$<br>$A = -2(x - 25)^2 - 625)$<br>Maximum area: $x = 25$<br>$A = -2(25)^2 + 100(25)$<br>$\therefore A = 1\,250$<br>$\because 1\,250 = 25y$<br>$\therefore y = 50$ | ✓ expression for $y$<br>✓ expression for $A$<br>✓ complete square<br>✓ value of $x$<br>✓ value of $A$<br>✓ value of $y$ | (7) |
| | | | **[39]** |

SEE ACADEMY

Downloaded from SEE academy: www.seeacademy.co.za



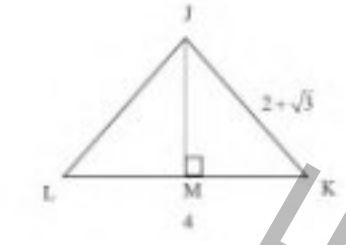
**QUESTION 2**

| | | | | |
|---|---|---|---|---|
| 2.1 | 2.1.1 | $\frac{3^{n+2}.9^{n+1}}{27^{n-1}}$<br>$\frac{3^{n+2}.3^{2n+2}}{3^{3n-3}}$<br>$\frac{3^{3n+4}}{3^{3n-3}}$<br>$3^{3n+4-3n+3}$<br>$3^7$ | ✓ $3^{2n+2}$ and $3^{3n-3}$<br>✓ $3^{3n+4-3n+3}$<br>✓ answer | (3) |
| | | | | |
| | 2.1.2 | $\frac{x^2}{1+x}$<br>$=\frac{(1+\sqrt{3})^2}{1+1+\sqrt{3}}$<br>$=\frac{1+2\sqrt{3}+3}{2+\sqrt{3}}$<br>$=\frac{4+2\sqrt{3}}{2+\sqrt{3}}$<br>$=\frac{2(2+\sqrt{3})^2}{2+\sqrt{3}}$<br>$=2$ | ✓ substitution<br>✓ simplification<br>✓ factorisation<br>✓ answer | (4) |
| | | | | |
| | 2.1.3 | $\frac{\sqrt{(a^2-b^2)}\times(a+b)^{\frac{5}{2}}}{(a-b)^{\frac{1}{2}}}$<br>$=\frac{\sqrt{(a-b)(a+b)}\times(a+b)^{\frac{5}{2}}}{(a-b)^{\frac{1}{2}}}$<br>$=\frac{(a-b)^{\frac{1}{2}}(a+b)^{\frac{1}{2}}\times(a+b)^{\frac{5}{2}}}{(a-b)^{\frac{1}{2}}}$<br>$(a+b)^{\frac{1}{2}}\times(a+b)^{\frac{5}{2}}$<br>$(a+b)^3$<br>$a^3+3a^2b+3ab^2+b^3$ | ✓ factorisation<br>✓ simplification<br>✓ simplification<br>✓ answer | (4) |

SEE ACADEMY

Downloaded from SEE academy: www.seeacademy.co.za



| | | | |
|---|---|---|---|
| 2.2 | *RTP*: $\frac{2}{1+\sqrt{2}} - \frac{8}{\sqrt{8}} = -2$<br>$\frac{2}{1+\sqrt{2}} - \frac{8}{\sqrt{8}}$<br>$= \frac{2}{1+\sqrt{2}} - \frac{8}{2\sqrt{2}}$<br>$= \frac{2(2\sqrt{2}) - 8(1+\sqrt{2})}{2\sqrt{2}(1+\sqrt{2})}$<br>$= \frac{4\sqrt{2} - 8 - 8\sqrt{2}}{2\sqrt{2} + 2\sqrt{4}}$<br>$= \frac{4\sqrt{2} - 8 - 8\sqrt{2}}{2\sqrt{2} + 4}$<br>$= \frac{-4\sqrt{2} - 8}{2\sqrt{2} + 4}$<br>$= \frac{-4\sqrt{2} + 2}{2\sqrt{2} + 2}$<br>$= -2$ | ✓ $2\sqrt{2}$<br>✓ $2\sqrt{2}(1+\sqrt{2})$<br>✓ simplification<br>✓ factorisation | (4) |
| | | | |
| 2.3 | <br>$MK = LM = 2$<br>$JM^2 = (2+\sqrt{3})^2 - 2^2$ pythag<br>$JM^2 = 4 + 4\sqrt{3} + 3 - 4$<br>$JM^2 = 4\sqrt{3} + 3$<br>$JM = \sqrt{4\sqrt{3}+3}$<br>$A = \frac{1}{2}(4)\sqrt{4\sqrt{3}+3}$<br>$A = 6{,}3\ units^2$ | ✓ MK= 2<br>✓ substitution<br>✓ simplification<br>✓ JM<br>✓ substitution into area formula<br>✓ answer | (6) |
| | | | [21] |

SEE ACADEMY

Downloaded from SEE academy: www.seeacademy.co.za



**QUESTION 3**

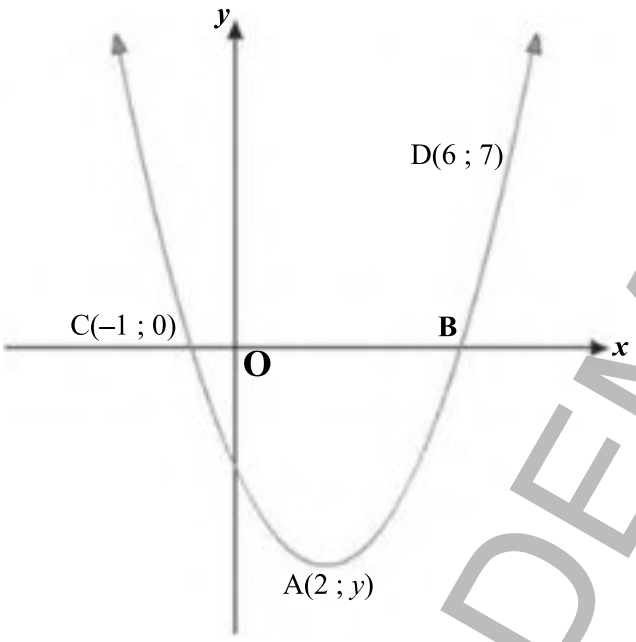
| | | | | |
|---|---|---|---|---|
| 3.1 | | $T_2 - T_1 = T_3 - T_2$<br>$4x + 5 - x = 10x - 5 - (4x + 5)$<br>$3x + 5 = 10x - 5 - 4x - 5$<br>$3x + 5 = 6x - 10$<br>$\therefore 3x = 15$<br>$\therefore x = 5$ | ✓ method<br><br><br><br><br>✓ answer | (2) |
| | | | | |
| 3.2 | 3.2.1 | $-3n + 20 = -106$<br>$3n = 126$<br>$\therefore n = 42$ | ✓ equating<br><br>✓ answer | (2) |
| | | | | |
| | 3.2.2 | $-3n + 20 < 0$<br>$20 < 3n$<br>$\therefore \frac{20}{3} < n$<br>$\therefore n = 7$ | ✓ $T_n < 0$<br><br><br>✓ answer | (2) |
| | | | | |
| | 3.2.3 | Odd valued terms:<br>17; 11; 5; ……..<br>General term: $T_n = -6n + 23$<br>$T_n = -6(20) + 23$<br>$\therefore T_n = -97$ | ✓ sequence<br>✓ $T_n$<br><br>✓ answer | (3) |
| | | | | |
| 3.3 | | 3; $a$; 10; $b$; 21<br>$a-3$; $10-a$; $b-10$; $21-b$ $1^{st}$ difference<br>$2^{nd}$ differences:<br>$10 - a - a + 3 = 1$<br>$-2a + 13 = 1$<br>$-2a = -12$<br>$\therefore a = 6$<br>and<br>$21 - b - b + 10 = 1$<br>$-2b + 31 = 1$<br>$-2b = -30$<br>$\therefore b = 15$ | ✓ $1^{st}$ differences<br><br>✓ equating $2^{nd}$ difference in terms of $a$, then $b$.<br><br>✓ value of $a$<br><br><br><br>✓ value of $b$ | (4) |
| | | | | [12] |

SEE ACADEMY

Downloaded from SEE academy: www.seeacademy.co.za



**QUESTION 4**




| | | | |
|---|---|---|---|
| 4.1 | B(5; 0)<br><br>**NOTE**: Must be in coordinate form. | ✓✓ answer | (2) |
| 4.2 | $y = a(x - x_1)(x - x_2)$<br>$\therefore 7 = a(6-(-1))(6-5)$<br>$7 = 7a$<br>$\therefore a = 1$<br>$\therefore y = 1(x+1)(x-5)$<br>$y = x^2 - 5x + x - 5$<br>$\therefore y = x^2 - 4x - 5$ | ✓ substitute roots and point D(6;7)<br>✓ value for $a$<br>✓ $y = x^2 - 5x + x - 5$ | (3) |
| 4.3 | B(5 ; 0) C(0 ; –5)<br><br>$m_{BC} = \frac{-5-0}{0-5}$<br>$m_{BC} = \frac{-5}{-5}$<br>$\therefore m_{BC} = 1$<br>$\therefore m_h = -1$<br>$\therefore y - y_1 = m(x - x_1)$<br>$y - (-1) = -1(x-0) \cdots\cdots pt(-1;0)$<br>$\therefore y = -x - 1$ | ✓ $m_{BC}$<br>✓ $m_h$<br>✓ answer | (3) |

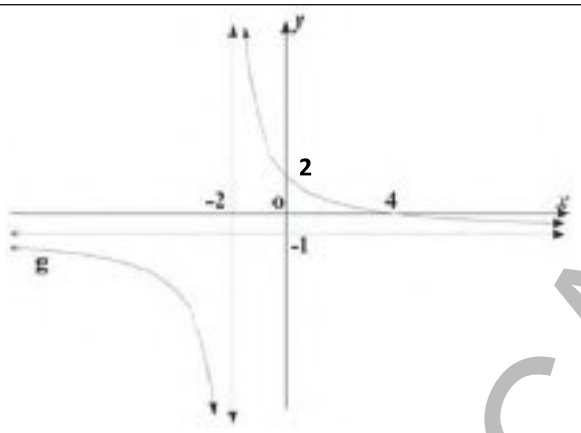
SEE ACADEMY

Downloaded from SEE academy: www.seeacademy.co.za



| | | | |
|---|---|---|---|
| 4.4 | $-1 \le x \le 0$<br><br>$x \ge 5$<br><br>**OR**<br><br>$x \in [-1\ ;\ 0]$ **or** $[5\ ;\ \infty]$<br>**NOTE**: Deduct 1 mark if brackets are incorrect in the alternative solution. | ✓ all critical values (independent)<br>✓ answers<br><br>✓ all critical values (independent)<br>✓ answers | (2) |
| | | | **[10]** |

**QUESTION 5**

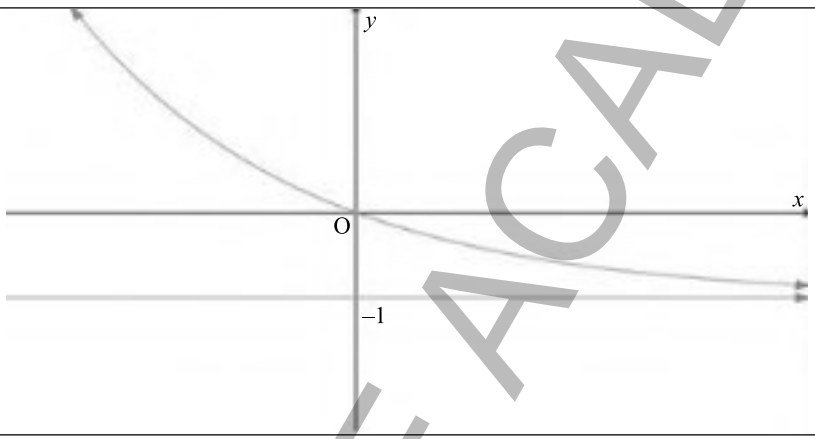
| | | | |
|---|---|---|---|
| 5.1 | <br><br>**NOTE**: If the candidate calculates the intercepts and lists the asymptotes but does not sketch the graph, award 2 marks. | ✓ asymptotes<br>✓ intercepts<br>✓ shape | (3) |
| | | | |
| 5.2 | $\tan 135° = -1$<br>$y - y_1 = m(x - x_1)$<br>$y - (-1) = -1(x - (-2))$<br>$y + 1 = -x - 2$<br>$y = -x - 3$ | ✓ $m = -1$<br>✓ subs. point $(2;-1)$<br>✓ answer | (3) |
| | | | |
| 5.3 | $x < -2$ | ✓ answer | (1) |
| | | | |
| 5.4 | 5.4.1 5 units right<br>**NOTE**: Accept an answer of 5 units. | ✓ answer | (1) |
| | | | |
| | 5.4.2 3 units up<br>**NOTE**: Accept an answer of 3 units. | ✓ answer | (1) |
| | | | **[9]** |

SEE ACADEMY

Downloaded from SEE academy: www.seeacademy.co.za



**QUESTION 6**

| | | | | |
|---|---|---|---|---|
| 6.1 | 6.1.1 | $y = -6$ | ✓ answer | (1) |
| | | | | |
| | 6.1.2 | $h(x) = 3.2^x - 6$<br>$0 = 3.2^x - 6$<br>$6 = 3.2^x$<br>$2 = 2^x$<br>$x = 1$ | ✓ equate to 0<br>✓ answer | (2) |
| | | | | |
| | 6.1.3 | $h(x) = 3.2^x - 6$<br>$y = 3.2^\circ - 6$<br>$y = -3$ | ✓ answer | (1) |
| | | | | |
| | 6.1.4 | $x > 1$ | ✓ answer | (1) |
| | | | | |
| 6.2 | |  | ✓ $x$-intercept<br>✓ asymptote<br>✓ shape | (3) |
| | | | | **[8]** |
| | | | | |
| | | | **TOTAL:** | **100** |

SEE ACADEMY