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MATHEMATICS P1

JUNE 2026

MARKING GUIDELINES

**STANDARDISED PROVINCIAL
ASSESSMENT**

GRADE 12

MARKS: 150

These marking guidelines consist of 14 pages.



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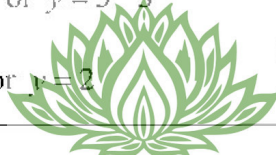
QUESTION 1

1.1.1	$x^2 - 5x - 24 = 0$ $(x+3)(x-8) = 0$ $x = -3 \text{ or } x = 8$	✓ A factors ✓ CA ✓CA answers (3)
1.1.2	$4x(x+3) = 13$ $4x^2 + 12x - 13 = 0$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $x = \frac{-(12) \pm \sqrt{(12)^2 - 4(4)(-13)}}{2(4)}$ $x = -3,85 \text{ or } x = 0,85$ <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;"> Penalty of 1 for incorrect rounding in this question only </div>	✓ A standard form ✓ CA substitution ✓ CA ✓CA answers (4)
1.1.3	$22x - 121 < x^2$ $x^2 - 22x + 121 > 0$ $(x-11)(x-11) > 0$ <div style="text-align: center;"> </div> $x < 11 \text{ or } x > 11 \quad \text{OR} \quad x \in \mathbb{R}; x \neq 11 \quad \text{OR}$ $x \in (-\infty; 11) \text{ or } x \in (11; \infty)$	✓ A $x^2 - 22x + 121 > 0$ ✓ CA factors ✓✓ CA CA answers (4)
1.1.4	$\sqrt{5+x} = \sqrt{x} + 1$ $(\sqrt{5+x})^2 = (\sqrt{x} + 1)^2$ $5+x = x + 2\sqrt{x} + 1$ $\sqrt{x} = 2$ $x = 4$ <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;"> B/D if written $(\sqrt{5+x})^2 = (\sqrt{x})^2 + 1^2$ </div> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;"> CA for answer: Conditional upon the obtained answer being rejected. </div> <p>OR</p>	✓ A squaring both sides ✓ A simplification ✓ CA isolating the surd ✓ CA answer (4) OR





	$\sqrt{5+x} = \sqrt{x} + 1$ $(\sqrt{5+x} - \sqrt{x})^2 = 1^2$ $5+x - 2\sqrt{x(x+5)} + x = 1$ $-2\sqrt{x^2+5x} = -2x-4$ $\sqrt{x^2+5x} = x+2$ $x^2+5x = (x+2)^2$ $x^2+5x = x^2+4x+4$ $x = 4$	<p>✓ A squaring both sides</p> <p>✓ A simplification</p> <p>✓ CA isolating the surd</p> <p>✓ CA answer</p> <p style="text-align: right;">(4)</p>
1.2	$2^{x-y} = 8$ $2^{x-y} = 2^3$ $x-y = 3$ $x = 3+y$ $x^2 - xy = 2y^2 + 7$ $(3+y)^2 - y(3+y) = 2y^2 + 7$ $2y^2 - 3y - 2 = 0$ $(2y+1)(y-2) = 0$ $y = -\frac{1}{2} \text{ or } y = 2$ $x = 3 - \frac{1}{2} \text{ or } x = 3 + 2$ $x = \frac{5}{2} \text{ or } x = 5$ <p>OR</p> $2^{x-y} = 8$ $2^{x-y} = 2^3$ $x-y = 3$ $y = x-3$ $x^2 - xy = 2y^2 + 7$ $x^2 - x(x-3) = 2(x-3)^2 + 7$ $2x^2 - 15x + 25 = 0$ $(2x-5)(x-5) = 0$ $x = \frac{5}{2} \text{ or } x = 5$ $y = \frac{5}{2} - 3 \text{ or } y = 5 - 3$ $y = -\frac{1}{2} \text{ or } y = 2$	<p>✓ A writing 8 as power of 2</p> <p>✓ CA making x subject of the formula</p> <p>✓ CA substitution</p> <p>✓ CA standard form</p> <p>✓ CA y-values</p> <p>✓ CA x-values</p> <p style="text-align: right;">(6)</p> <p>OR</p> <p>✓ A writing 8 as power of 2</p> <p>✓ CA making y the subject of the formula</p> <p>✓ CA substitution</p> <p>✓ CA factors</p> <p>✓ CA x-values</p> <p>✓ CA y-values</p> <p style="text-align: right;">(6)</p>





1.3	$2 \times 3 = 6$ $P^{\frac{1}{x}} \times P^{\frac{1}{y}} = P^{\frac{1}{z}}$ $P^{\frac{1}{x} + \frac{1}{y}} = P^{\frac{1}{z}}$ $\therefore \frac{1}{x} + \frac{1}{y} = \frac{1}{z}$ $\frac{y+x}{xy} = \frac{1}{z}$ $z = \frac{xy}{y+x}$	$\checkmark A \quad P^{\frac{1}{x}} \times P^{\frac{1}{y}} = P^{\frac{1}{z}}$ $\checkmark A \quad \text{adding exponents}$ $\checkmark A \quad \frac{y+x}{xy} = \frac{1}{z}$	(3)
			[24]

QUESTION 2

2.1.1	$x = -7$	$\checkmark A$ answer	(1)
2.1.2	$x = 9$	$\checkmark A$ answer	(1)
2.2.1	$r = \frac{T_2}{T_1} = \frac{1}{128} \div \frac{1}{64} = \frac{1}{2}$ $T_n = ar^{n-1}$ $= \frac{1}{64} \left(\frac{1}{2} \right)^{n-1}$	$\checkmark A$ value of r $\checkmark CA$ answer	(2)
2.2.2	$\frac{1}{64} \left(\frac{1}{2} \right)^{n-1} = \frac{1}{8192}$ $\left(\frac{1}{2} \right)^{n-1} = \frac{1}{128}$ $\left(\frac{1}{2} \right)^{n-1} = \left(\frac{1}{2} \right)^7$ $n = 8$ OR $\frac{1}{64} \left(\frac{1}{2} \right)^{n-1} = \frac{1}{8192}$ $\left(\frac{1}{2} \right)^{n-1} = \frac{1}{128}$ $2^{-n+1} = 2^{-7}$ $-n+1 = -7$ $n = 8$	$\checkmark CA$ equating $\checkmark CA$ LHS and RHS as powers of $\frac{1}{2}$ $\checkmark CA$ answer OR $\checkmark CA$ equating $\checkmark CA$ LHS and RHS as powers of 2	(3)
		$\checkmark CA$ answer	(3)





2.2.3	$r = \frac{1}{2}$ $\therefore -1 < r < 1$ OR Because $-1 < \frac{1}{2} < 1$	\checkmark A reason OR \checkmark A reason	(1) (1)
			[8]

QUESTION 3

3.1.1	$T_5 = -89$ $T_6 = -63$	\checkmark A answer \checkmark A answer	(2)
3.1.2	$2a = -4$ $a = -2$ $3a + b = 42$ $3(-2) + b = 42$ $b = 48$ $a + b + c = -233$ $-2 + 48 + c = -233$ $c = -279$ $T_n = -2n^2 + 48n - 279$	\checkmark A value of a \checkmark CA value of b \checkmark CA value of c \checkmark CA answer	(4)
3.1.3	Maximum when $n = \frac{-b}{2a}$: $= \frac{-(48)}{2(-2)}$ $n = 12$ $T_{12} = -2(12)^2 + 48(12) - 279$ $= 9$ OR Maximum when $T_n' = 0$ $-4n + 48 = 0$ $n = 12$ $T_{12} = -2(12)^2 + 48(12) - 279$ $= 9$	\checkmark CA substitution \checkmark CA value of n \checkmark CA substitution \checkmark CA answer OR \checkmark CA substitution in $T_n' = 0$ \checkmark CA value of n \checkmark CA substitution \checkmark CA answer	(4) (4)
OR <div style="border: 1px solid black; padding: 5px; display: inline-block;"> If n is not a natural number: Maximum: $2/4$ </div>			





	$T_n = -2n^2 + 48n - 279$ $= -2(n^2 - 24n) - 279$ $= -2(n^2 - 24n + 144) - 279 + 288$ $= -2(n - 12)^2 + 9$ $\therefore \text{Maximum value of sequence} = 9$	✓CA ✓CA completion of the square ✓CA format $a(n+p)^2 + q$ ✓CA answer (4)
3.2.1	$a = 7p + 5$ $l = 7(18) + 5 = 131$	✓A value of a ✓A value of l (2)
3.2.2	$n = 18 - p + 1 = 19 - p$ $S_n = \frac{n}{2}(a + l)$ $\frac{19-p}{2}(7p+5+131) = 1230$ $(19-p)(7p+136) = 2460$ $7p^2 + 3p - 124 = 0$ $p = \frac{-(3) \pm \sqrt{(3)^2 - 4(7)(-124)}}{2(7)}$ $p = 4 \text{ or } p \neq -4, 43$ <p>OR</p> $n = 18 - p + 1 = 19 - p$ $S_n = \frac{n}{2}[2a + (n-1)d]$ $\frac{19-p}{2}[2(7p+5) + (19-p-1) \times 7] = 1230$ $(19-p)(7p+136) = 2460$ $7p^2 + 3p - 124 = 0$ $p = \frac{-(3) \pm \sqrt{(3)^2 - 4(7)(-124)}}{2(7)}$ $p = 4 \text{ or } p \neq -4, 43$	✓A value of n ✓CA substitution ✓CA standard form ✓CA factors or formula ✓CA answer with rejection (5)
		✓A value of n ✓A substitution ✓CA standard form ✓CA factors or formula ✓CA answer with rejection (5)
[17]		





QUESTION 4

4.1	$x = -3$ $y = -4$	\checkmark A $x = -3$ \checkmark A $y = -4$	(2)
4.2	$f(x) = \frac{a}{x+3} - 4$ Subst. $(-5; -6)$: $\frac{a}{-5+3} - 4 = -6$ $\frac{a}{-2} = -2$ $a = 4$ $g(x) = mx - 4$ Subst. $(-5; -6)$: $m(-5) - 4 = -6$ OR $m = \frac{-4 - (-6)}{0 - (-5)}$ $m = \frac{2}{5}$ $m = \frac{2}{5}$	\checkmark A substituting $(-5; -6)$ in f \checkmark CA value of a \checkmark A substitution \checkmark A value of m	(4)
4.3	$\frac{4}{x+3} - 4 = \frac{2}{5}x - 4$ $\frac{4}{x+3} = \frac{2}{5}x$ $2x^2 + 6x = 20$ $x^2 + 3x - 10 = 0$ $(x+5)(x-2) = 0$ $x \neq -5 \text{ or } x = 2$	\checkmark CA equating f and g \checkmark CA standard form \checkmark CA value of x	(3)
4.4	$x \leq -2$ or $0 < x \leq 5$ OR $x \in (-\infty; -2]$ or $x \in (0; 5]$	\checkmark A $x \leq -2$ \checkmark CA \checkmark CA $0 < x \leq 5$ OR \checkmark A $x \in (-\infty; -2]$ \checkmark CA \checkmark CA $x \in (0; 5]$	(3)
			[12]



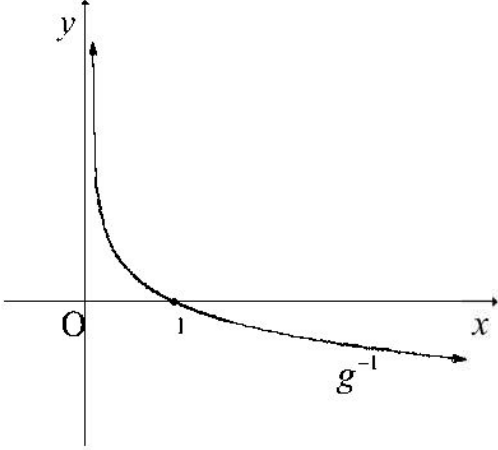


QUESTION 5

5.1	$y > -9$ OR $y \in (-9; \infty)$	✓ A answer (1)
5.2	<p>At A, $x=0$, $\therefore y = \frac{1}{9}(3)^0 - 9$ $= \frac{-80}{9}$</p> <p>$A\left(0; -\frac{80}{9}\right)$ OR $A(0; -8,89)$</p> <p>At B, $y=0$, $\therefore \frac{1}{9}(3)^{-x} - 9 = 0$ $3^{-x} = 81$ $x = -4$</p> <p>$B(-4; 0)$</p>	<p>✓ A substitute $x=0$</p> <p>✓ A coordinates of A</p> <p>✓ A substitute $f(x)=0$</p> <p>✓ A coordinates of B (4)</p>
5.3	<p>$\frac{1}{9}\left(\frac{1}{3}\right)^x - 9 = \left(\frac{1}{3}\right)^2 \left(\frac{1}{3}\right)^x - 9 = \left(\frac{1}{3}\right)^{x+2} - 9$</p> <p>Translation from $\left(\frac{1}{3}\right)^{x+2} - 9$ to $\left(\frac{1}{3}\right)^x$:</p> <p>2 units to the right and 9 units up</p>	<p>✓ A 2 units</p> <p>✓ A to the right</p> <p>✓ A 9 units up (3)</p>
5.4	<p>$g^{-1}(x): x = \left(\frac{1}{3}\right)^y$ $\therefore y = \log_{\frac{1}{3}} x$</p> <p>OR</p> <p>$g^{-1}(x): x = 3^{-y}$ $\therefore -y = \log_3 x$ $y = -\log_3 x$</p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;"> <p>Answer only: Full marks</p> </div>	<p>✓ A $x = \left(\frac{1}{3}\right)^y$</p> <p>✓ A answer (2)</p> <p>OR</p> <p>✓ A $x = 3^{-y}$</p> <p>✓ A answer (2)</p>





5.5		<p>✓A shape</p> <p>✓A x-intercept</p> <p style="text-align: right;">(2)</p>
5.6	$g^{-1}(x) = -2$ $\log_{\frac{1}{3}} x = -2$ $x = \left(\frac{1}{3}\right)^{-2}$ $= 9$ $1 \leq x \leq 9 \text{ OR } x \in [1;9]$	<p>✓CA $x=9$</p> <p>✓✓A CA answer</p> <p style="text-align: right;">(3)</p>
[15]		

QUESTION 6

6.1.1	$AB = 1 - (-5) = 6$ units	<p>✓A answer</p> <p style="text-align: right;">(1)</p>
6.1.2	$OC = 10$ units	<p>✓A answer</p> <p style="text-align: right;">(1)</p>
6.1.3	$x = \frac{-b}{2a}$ $= \frac{-(-8)}{2(-2)} \text{ OR } x = \frac{-5+1}{2} \text{ OR } f'(x) = -4x - 8 = 0$ $= -2 \quad \quad \quad = -2 \quad \quad \quad \therefore x = -2$ $y_c = -2(-2)^2 - 8(-2) + 10$ $= 18$ $\therefore TS = 18 \text{ units}$	<p>✓A method</p> <p>✓CA x-value</p> <p>✓CA answer</p> <p style="text-align: right;">(3)</p>
6.2	$f(x) = -k$ $10 < -k < 18$ $-18 < k < -10$ <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;"> <p>Answer only: Full marks</p> </div>	<p>✓CA $10 < -k < 18$</p> <p>✓CA ✓CA $-18 < k < -10$</p> <p style="text-align: right;">(3)</p>
6.3	$x = -2$	<p>✓CA answer</p> <p style="text-align: right;">(1)</p>
[9]		





QUESTION 7

7.1	$1+i_e = \left(1 + \frac{i_N}{m}\right)^m$ $1+i_e = \left(1 + \frac{0,085}{4}\right)^4$ $i_e = 0,0877479\dots$ <p>Effective interest rate = 8,77% p.a.</p>	<p>✓ A formula</p> <p>✓ A substitution</p> <p>✓ CA answer</p> <p>(3)</p>
7.2.1	$A = P(1-i)^n$ $124\,518,50 = 380\,000(1-i)^5$ $1-i = \sqrt[5]{\frac{124\,518,50}{380\,000}}$ $i = 0,20$ <p>20% p.a. ∴ $k = 20$</p>	<p>✓ A substitution</p> <p>✓ CA simplification</p> <p>✓ CA answer</p> <p>(3)</p>
7.2.2		<p>✓ A shape</p> <p>(1)</p>
7.2.3	<p>The book value will never reach zero.</p>	<p>✓ A answer</p> <p>(1)</p>
7.3	$A = 5\,000 \left(1 + \frac{0,0725}{12}\right)^{2,5 \times 12} (1 + 0,08)^{4,5}$ $A = R8\,469,46$	<p>✓ A $i = \frac{0,0725}{12}$ and $n = 2,5 \times 12$</p> <p>✓ A $5000 \left(1 + \frac{0,0725}{12}\right)^{2,5 \times 12}$</p> <p>✓ A $\times (1 + 0,08)^{4,5}$</p> <p>✓ CA answer</p> <p>(4)</p>





QUESTION 8

8.1	$f(x+h) = \frac{4}{x+h}$ $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ $= \lim_{h \rightarrow 0} \left[\left(\frac{4}{x+h} - \frac{4}{x} \right) \div h \right]$ $= \lim_{h \rightarrow 0} \left[\frac{4x - 4(x+h)}{x(x+h)} \times \frac{1}{h} \right]$ $= \lim_{h \rightarrow 0} \left[\frac{-4h}{x^2 + xh} \times \frac{1}{h} \right]$ $= \lim_{h \rightarrow 0} \left(\frac{-4}{x^2 + xh} \right)$ $= -\frac{4}{x^2}$ <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;">Penalise once for notation, only in 8.1.</div>	<p>✓ A expression for $f(x+h)$</p> <p>✓ CA substitution</p> <p>✓ CA $\frac{4x-4(x+h)}{x(x+h)}$</p> <p>✓ CA simplification</p> <p>✓ CA answer</p> <p style="text-align: right;">(5)</p>
8.2.1	$y = x^2(6x^3 - 7)$ $y = 6x^5 - 7x^2$ $\frac{dy}{dx} = 30x^4 - 14x$	<p>A ✓ $y = 6x^5 - 7x^2$</p> <p>✓ CA $30x^4$ ✓ CA $-14x$</p> <p style="text-align: right;">(3)</p>
8.2.2	$D_x \left(\frac{3}{2x^4} + 5\sqrt{x^3} \right)$ $= D_x \left(\frac{3}{2}x^{-4} + 5x^{\frac{3}{2}} \right)$ $= -6x^{-5} + \frac{15}{2}x^{\frac{1}{2}}$	<p>✓ A $\frac{3}{2}x^{-4}$ ✓ A $+5x^{\frac{3}{2}}$</p> <p>✓ CA $-6x^{-5}$ ✓ CA $+\frac{15}{2}x^{\frac{1}{2}}$</p> <p style="text-align: right;">(4)</p>
8.3	$f'(x) = 4 - 2x$ $m_{\text{line}} = -2 = 4 - 2x$ $2x = 4 + 2$ $x = 3$ $f(3) = 6 + 4(3) - (3)^2 = 9$ <p>Contact point between line and f: (3;9)</p> <p>Substitute in $y = -2x + t$:</p> $9 = -2(3) + t$ $t = 9 + 6 = 15$ <p>OR</p>	<p>✓ A $f'(x) = 4 - 2x$</p> <p>✓ CA $4 - 2x = -2$</p> <p>✓ CA x-value of contact point</p> <p>✓ CA y-value of contact point</p> <p>✓ CA answer</p> <p style="text-align: right;">(5)</p>





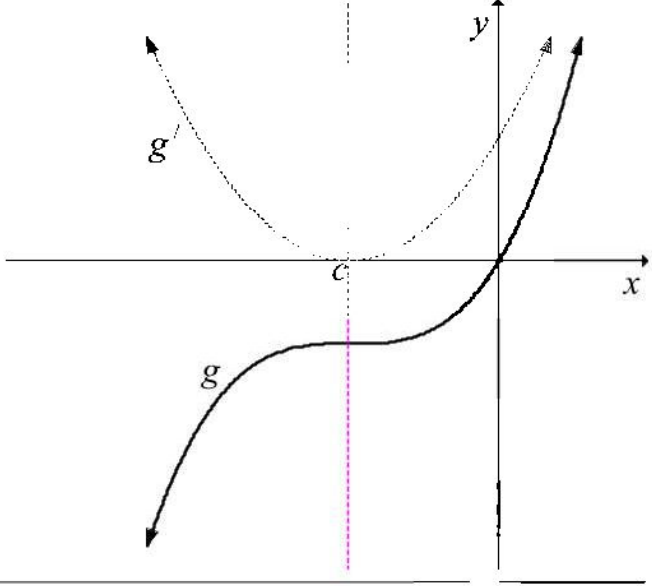
$6 + 4x - x^2 = -2x + t$ $-x^2 + 6x + 6 - t = 0$ <p>For the line to be a tangent, roots must be equal:</p> $b^2 - 4ac = 0$ $\therefore 6^2 - 4(-1)(6 - t) = 0$ $-4t = -60$ $t = 15$	✓ A equating ✓ A standard form ✓ A $b^2 - 4ac = 0$ ✓ CA substitution ✓ CA answer (5)
[17]	

QUESTION 9

9.1.1	$f(-1) = (-1)^3 - (-1)^2 - 5(-1) - 3 = 0$	✓ A answer (1)
9.1.2	<p>$(x+1)$ is a factor of f.</p> <p>For x-intercepts:</p> $f(x) = x^3 - x^2 - 5x - 3 = 0$ $\therefore (x+1)(x^2 - 2x - 3) = 0$ $(x+1)(x+1)(x-3) = 0$ $x = -1 \text{ or } x = 3$ <p>x-coordinate of D = 3</p>	✓ A $(x+1)(x^2 - 2x - 3) = 0$ ✓ CA $(x+1)(x+1)(x-3) = 0$ ✓ CA answer (3)
9.1.3	$f'(x) = 3x^2 - 2x - 5$ <p>At the turning points:</p> $3x^2 - 2x - 5 = 0$ $\therefore (3x-5)(x+1) = 0$ $x = -1 \text{ or } x = \frac{5}{3}$ <p>x-coordinate of E = $\frac{5}{3}$</p>	✓ A derivative of f ✓ CA equating derivative to zero ✓ CA factors ✓ CA answer (4)
9.1.4(a)	<p>At the point of inflection: $x = \frac{-1 + \frac{5}{3}}{2}$</p> $= \frac{1}{3}$ <p>Concave up for $x > \frac{1}{3}$ OR $x \in \left(\frac{1}{3}; \infty\right)$</p> <p>OR</p> <p>At the point of inflection: $f''(x) = 6x - 2 = 0$</p> $\therefore x = \frac{1}{3}$ <p>Concave up for $x > \frac{1}{3}$ OR $x \in \left(\frac{1}{3}; \infty\right)$</p>	✓ CA $x = \frac{-1 + \frac{5}{3}}{2}$ ✓ CA x -value of point of inflection ✓ CA answer (3) OR ✓ CA $f''(x) = 6x - 2 = 0$ ✓ CA x -value of point of inflection ✓ CA answer (3)





9.1.4(b)	$x < -1$ or $\frac{5}{3} < x < 3$ OR $x \in (-\infty; -1)$ or $x \in \left(\frac{5}{3}; 3\right)$	\checkmark CA $x < -1$ $\checkmark\checkmark$ CA CA $\frac{5}{3} < x < 3$ (3) OR \checkmark CA $x \in (-\infty; -1)$ $\checkmark\checkmark$ CA CA $\left(\frac{5}{3}; 3\right)$ (3)
9.2		\checkmark A shape: a graph with one stationary point, and no turning points \checkmark A an increasing graph for all x , except the stationary point (2)

[16]

QUESTION 10

10.1	$h(0) = 4\text{m}$	\checkmark A answer (1)
10.2	At the max. height: $h'(t) = 0$ $-10t + 22 = 0$ $t = 2, 2\text{s}$ $h(2, 2) = -5(2, 2)^2 + 22(2, 2) + 4$ $= 28, 2\text{m}$ OR Maximum height will be at the turning point: $t = \frac{-b}{2a} = \frac{-22}{2(-5)}$ $= 2, 2\text{s}$ $h(2, 2) = -5(2, 2)^2 + 22(2, 2) + 4$ $= 28, 2\text{m}$	\checkmark A $-10t + 22 = 0$ \checkmark CA value of t \checkmark CA $-5(2, 2)^2 + 22(2, 2) + 4$ \checkmark CA answer (4) OR \checkmark A substitution \checkmark CA value of t \checkmark CA $-5(2, 2)^2 + 22(2, 2) + 4$ \checkmark CA answer (4)
10.3	$h''(t) = -10 \text{ m/s}^2$	$\checkmark\checkmark$ CA CA answer (2)

[7]





QUESTION 11

11.1.1	$P(A \text{ and } B) = 0$	✓A answer (1)
11.1.2	$P(A \text{ and } C) = 0,2 \times 0,7$ $P(A \text{ or } C) = P(A) + P(C) - P(A \text{ and } C)$ $= 0,2 + 0,7 - (0,2 \times 0,7)$ $= 0,76$	✓A $P(A \text{ and } C) = 0,2 \times 0,7$ ✓CA substitution ✓CA answer (3)
11.2.1	7	✓A answer (1)
11.2.2	<p style="text-align: right;">$n(S) = 45$</p>	✓A 5 and x ✓CA 6 and $(7-x)$ ✓CA 3 and 8 ✓CA $(11-x)$ and 7 <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;"> If $x = 2$ has been substituted into the Venn diagram, still award the marks. </div> (4)
11.2.3	$22 + (7-x) + (11-x) + x + 7 = 45$ $x = 2$	✓CA setting up equation ✓CA answer (2)
11.2.4	$P(\text{likes exactly 2 games}) = \frac{2+8+6}{45}$ $= \frac{16}{45} = 0,36$	✓CA $P = \frac{2+8+6}{45}$ ✓CA answer (2)
[13]		

TOTAL: 150