KWAZULU-NATAL PROVINCE

EDUCATION
REPUBLIC OF SOUTH AFRICA

MATHEMATICS P1

JUNE 2026

MARKING GUIDELINES

STANDARDISED PROVINCIAL ASSESSMEMT

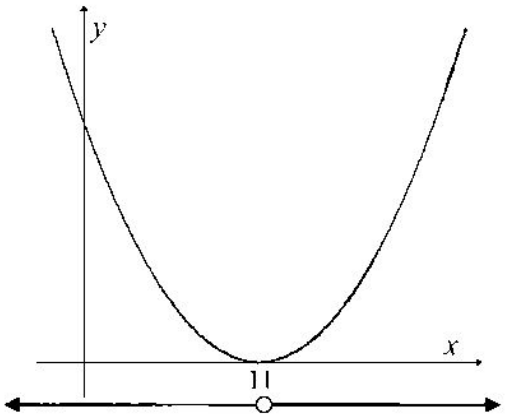
GRADE 12

MARKS: 150

These marking guidelines consist of 14 pages.

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QUESTION 1

1.1.1	$x^2-5x-24=0$ $(x+3)(x-8)=0$ $x=-3$ or $x=8$	✓ A factors ✓ CA ✓CA answers (3)
1.1.2	$4x(x+3)=13$ $4x^2+12x-13=0$ $x=\dfrac{-b\pm\sqrt{b^2-4ac}}{2a}$ $x=\dfrac{-(12)\pm\sqrt{(12)^2-4(4)(-13)}}{2(4)}$ $x=-3{,}85$ or $x=0{,}85$ Penalty of 1 for incorrect rounding in this question only	✓A standard form ✓CA substitution ✓CA ✓CA answers (4)
1.1.3	$22x-121<x^2$ $x^2-22x+121>0$ $(x-11)(x-11)>0$  $x<11$ or $x>11$ **OR** $x\in\mathbb{R};\ x\neq 11$ **OR** $x\in(-\infty;11)$ or $x\in(11;\infty)$	✓A $x^2-22x+121>0$ ✓CA factors ✓✓CA CA answers (4)
1.1.4	$\sqrt{5+x}=\sqrt{x}+1$ $\left(\sqrt{5+x}\right)^2=\left(\sqrt{x}+1\right)^2$ $5+x=x+2\sqrt{x}+1$ $\sqrt{x}=2$ $x=4$ **OR** B/D if written $\left(\sqrt{5+x}\right)^2=\left(\sqrt{x}\right)^2+1^2$ CA for answer: Conditional upon the obtained answer being rejected.	✓A squaring both sides ✓A simplification ✓CA isolating the surd ✓CA answer (4) **OR**

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

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

QUESTION 2

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

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

QUESTION 3

3.1.1	$T_5=-89$ $T_6=-63$	✓A answer ✓A answer (2)
3.1.2	$2a=-4$ $a=-2$ $3a+b=42$ $3(-2)+b=42$ $b=48$ $a+b+c=-233$ $-2+48+c=-233$ $c=-279$ $T_n=-2n^2+48n-279$	✓A value of a ✓CA value of b ✓CA value of c ✓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 $T_n'=0$ $-4n+48=0$ $n=12$ $T_{12}=-2(12)^2+48(12)-279$ $=9$ If n is not a natural number: Maximum: 2/4 **OR**	✓CA substitution ✓CA value of n ✓CA substitution ✓CA answer (4) **OR** ✓CA substitution in $T_n'=0$ ✓CA value of n ✓CA substitution ✓CA answer (4) **OR**

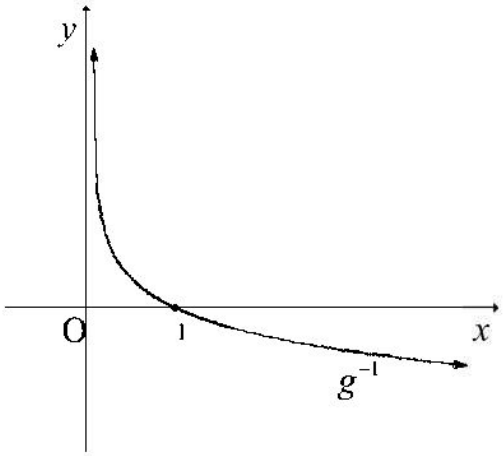
	$T_n = -2n^2 + 48n - 279$ $= -2\left(n^2 - 24n\right) - 279$ $= -2\left(n^2 - 24n + 144\right) - 279 + 288$ $= -2\left(n-12\right)^2 + 9$ $\therefore$ Maximum value of sequence = 9	✓CA ✓CA completion of the square ✓CA format $a\left(n+p\right)^2 + q$ ✓CA answer (4)
3.2.1	$a = 7p + 5$ $l = 7\left(18\right)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

QUESTION 4

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

QUESTION 5

5.1	$y > -9$ **OR** $y \in (-9;\infty)$	✓A answer (1)
5.2	At A, $x=0$, $\therefore y=\frac{1}{9}(3)^0-9$ $=\frac{-80}{9}$ $A\left(0;-\frac{80}{9}\right)$ **OR** $A(0;-8,89)$ At B, $y=0$, $\therefore \frac{1}{9}(3)^{-x}-9=0$ $3^{-x}=81$ $x=-4$ $B(-4;0)$	✓A substitute $x=0$ ✓A coordinates of A ✓A substitute $f(x)=0$ ✓A coordinates of B (4)
5.3	$\frac{1}{9}\left(\frac{1}{3}\right)^x-9=\left(\frac{1}{3}\right)^2\left(\frac{1}{3}\right)^x-9=\left(\frac{1}{3}\right)^{x+2}-9$ Translation from $\left(\frac{1}{3}\right)^{x+2}-9$ to $\left(\frac{1}{3}\right)^x$: 2 units to the right and 9 units up	✓A 2 units ✓A to the right ✓A 9 units up (3)
5.4	$g^{-1}(x)$: $x=\left(\frac{1}{3}\right)^y$ $\therefore y=\log_{\frac{1}{3}} x$ **OR** $g^{-1}(x)$: $x=3^{-y}$ $\therefore -y=\log_3 x$ $y=-\log_3 x$ Answer only: Full marks	✓A $x=\left(\frac{1}{3}\right)^y$ ✓A answer (2) **OR** ✓A $x=3^{-y}$ ✓A answer (2)

5.5		✓A shape ✓A x-intercept (2)
5.6	$g^{-1}(x) = -2$ $\log_{\frac{1}{3}} x = -2$ $x = \left(\frac{1}{3}\right)^{-2}$ $= 9$ $1 \le x \le 9$ **OR** $x \in [1;9]$	✓CA $x = 9$ ✓✓A CA answer (3)
		[15]

QUESTION 6

6.1.1	AB $= 1 - (-5) = 6$ units	✓A answer (1)
6.1.2	OC $= 10$ units	✓A answer (1)
6.1.3	$x = \frac{-b}{2a}$ $= \frac{-(-8)}{2(-2)}$ **OR** $x = \frac{-5+1}{2}$ **OR** $f'(x) = -4x - 8 = 0$ $= -2$ $= -2$ $\therefore x = -2$ $y_C = -2(-2)^2 - 8(-2) + 10$ $= 18$ $\therefore$ TS $= 18$ units	✓A method ✓CA x-value ✓CA answer (3)
6.2	$f'(x) = -k$ $10 < -k < 18$ $-18 < k < -10$ Answer only: Full marks	✓CA $10 < -k < 18$ ✓CA ✓CA $-18 < k < -10$ (3)
6.3	$x = -2$	✓CA answer (1)
		[9]

QUESTION 7

7.1

$$1+i_e=\left(1+\frac{i_N}{m}\right)^m$$

$$1+i_e=\left(1+\frac{0,085}{4}\right)^4$$

$$i_e=0,0877479....$$

Effective interest rate = 8,77% p.a.

✓A formula

✓A substitution

✓CA answer

(3)

7.2.1

$$A=P(1-i)^n$$

$$124\ 518,50=380\ 000(1-i)^5$$

$$1-i=\sqrt[5]{\frac{124\,518,50}{380\ 000}}$$

$$i=0,20$$

20% p.a. $\therefore k=20$

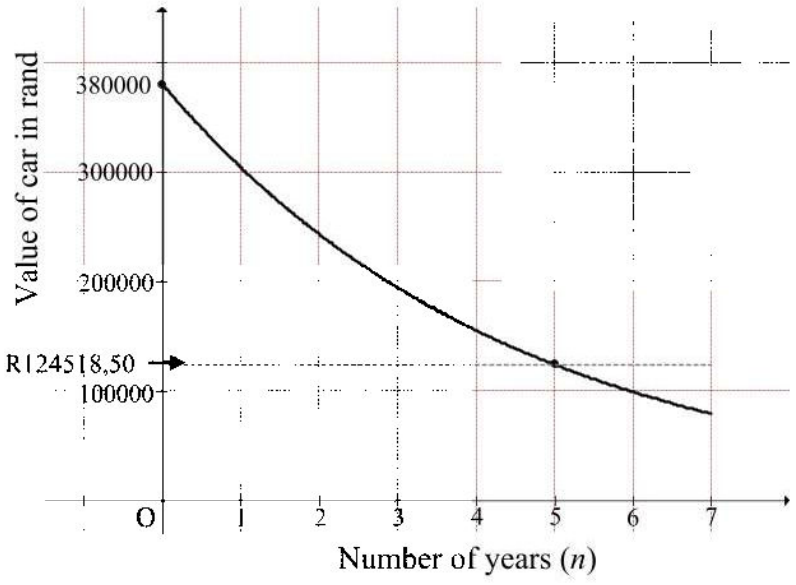
✓A substitution

✓CA simplification

✓CA answer

(3)

7.2.2



✓A shape

(1)

7.2.3 The book value will never reach zero.

✓A answer

(1)

7.3

$$A=5\ 000\left(1+\frac{0,0725}{12}\right)^{2,5\times12}(1+0,08)^{4,5}$$

$$A=\text{R}8\ 469,46$$

✓A $i=\frac{0,0725}{12}$ and $n=2,5\times12$

✓A $5000\left(1+\frac{0,0725}{12}\right)^{2,5\times12}$

✓A $\times(1+0,08)^{4,5}$

✓CA answer

(4)

[12]

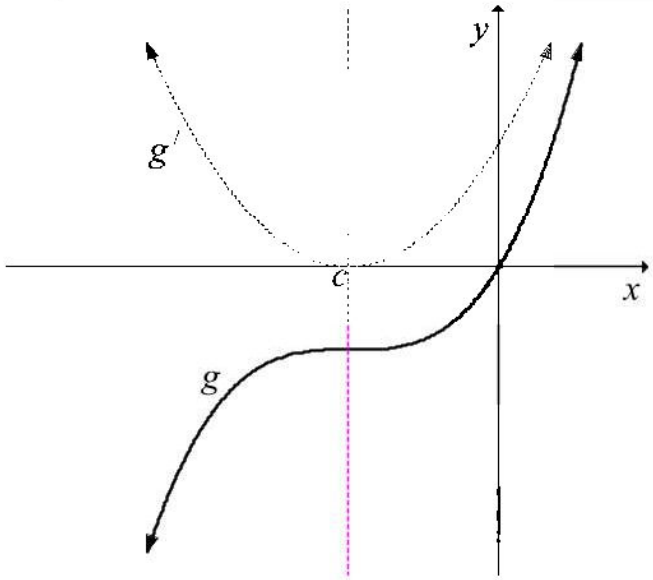
QUESTION 8

8.1	$f(x+h)=\frac{4}{x+h}$ $f'(x)=\lim_{h\to 0}\frac{f(x+h)-f(x)}{h}$ $=\lim_{h\to 0}\left[\left(\frac{4}{x+h}-\frac{4}{x}\right)\div h\right]$ $=\lim_{h\to 0}\left[\frac{4x-4(x+h)}{x(x+h)}\times\frac{1}{h}\right]$ $=\lim_{h\to 0}\left[\frac{-4h}{x^2+xh}\times\frac{1}{h}\right]$ $=\lim_{h\to 0}\left(\frac{-4}{x^2+xh}\right)$ $=-\frac{4}{x^2}$ Penalise once for notation, only in 8.1.	✓A expression for $f(x+h)$ ✓CA substitution ✓CA $\frac{4x-4(x+h)}{x(x+h)}$ ✓CA simplification ✓CA answer (5)
8.2.1	$y=x^2(6x^3-7)$ $y=6x^5-7x^2$ $\frac{dy}{dx}=30x^4-14x$	A✓ $y=6x^5-7x^2$ ✓CA $30x^4$ ✓CA $-14x$ (3)
8.2.2	$D_x\left(\frac{3}{2x^4}+5\sqrt{x^3}\right)$ $=D_x\left(\frac{3}{2}x^{-4}+5x^{\frac{3}{2}}\right)$ $=-6x^{-5}+\frac{15}{2}x^{\frac{1}{2}}$	✓A $\frac{3}{2}x^{-4}$ ✓A $+5x^{\frac{3}{2}}$ ✓CA $-6x^{-5}$ ✓CA $+\frac{15}{2}x^{\frac{1}{2}}$ (4)
8.3	$f'(x)=4-2x$ $m_{\text{line}}=-2=4-2x$ $2x=4+2$ $x=3$ $f(3)=6+4(3)-(3)^2=9$ Contact point between line and f: $(3;9)$ Substitute in $y=-2x+t$: $9=-2(3)+t$ $t=9+6=15$ **OR**	✓A $f'(x)=4-2x$ ✓CA $4-2x=-2$ ✓CA x-value of contact point ✓CA y-value of contact point ✓CA answer (5) **OR**

	$6+4x-x^2=-2x+t$ $-x^2+6x+6-t=0$ For the line to be a tangent, roots must be equal: $b^2-4ac=0$ $\therefore 6^2-4(-1)(6-t)=0$ $-4t=-60$ $t=15$	✓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	$(x+1)$ is a factor of f. For x-intercepts: $f(x)=x^3-x^2-5x-3=0$ $\therefore (x+1)(x^2-2x-3)=0$ $(x+1)(x+1)(x-3)=0$ $x=-1$ or $x=3$ x-coordinate of D = 3	✓A $(x+1)(x^2-2x-3)=0$ ✓CA $(x+1)(x+1)(x-3)=0$ ✓CA answer (3)
9.1.3	$f'(x)=3x^2-2x-5$ At the turning points: $3x^2-2x-5=0$ $\therefore (3x-5)(x+1)=0$ $x=-1$ or $x=\frac{5}{3}$ x-coordinate of E = $\frac{5}{3}$	✓A derivative of f ✓CA equating derivative to zero ✓CA factors ✓CA answer (4)
9.1.4(a)	At the point of inflection: $x=\frac{-1+\frac{5}{3}}{2}$ $=\frac{1}{3}$ Concave up for $x>\frac{1}{3}$ **OR** $x\in\left(\frac{1}{3};\infty\right)$ **OR** At the point of inflection: $f''(x)=6x-2=0$ $\therefore x=\frac{1}{3}$ Concave up for $x>\frac{1}{3}$ **OR** $x\in\left(\frac{1}{3};\infty\right)$	✓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)

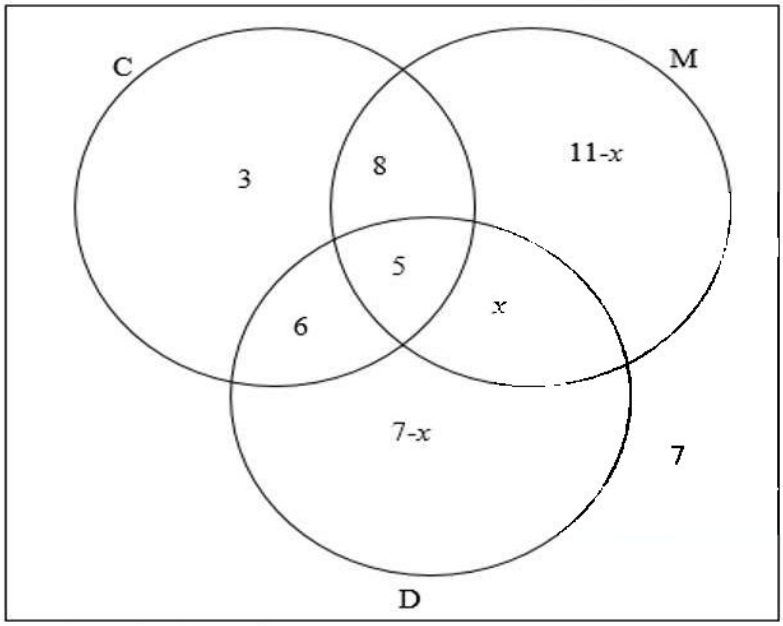
9.1.4(b)	$x<-1$ or $\frac{5}{3}<x<3$ **OR** $x\in(-\infty;-1)$ or $x\in\left(\frac{5}{3};3\right)$	✓CA $x<-1$ ✓✓CA CA $\frac{5}{3}<x<3$ (3) **OR** ✓CA $x\in(-\infty;-1)$ ✓✓CA CA $\left(\frac{5}{3};3\right)$ (3)
9.2		✓A shape: a graph with one stationary point, and no turning points ✓A an increasing graph for all x, except the stationary point (2)
		[16]

QUESTION 10

10.1	$h(0)=4\text{m}$	✓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: $t=\frac{-b}{2a}=\frac{-22}{2(-5)}$ $=2,2\text{s}$ $h(2,2)=-5(2,2)^2+22(2,2)+4$ $=28,2\text{m}$	✓A $-10t+22=0$ ✓CA value of t ✓CA $-5(2,2)^2+22(2,2)+4$ ✓CA answer (4) **OR** ✓A substitution ✓CA value of t ✓CA $-5(2,2)^2+22(2,2)+4$ ✓CA answer (4)
10.3	$h''(t)=-10\text{ m/s}^2$	✓✓CA CA answer (2)
		[7]

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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	n(S) = 45  	✓A 5 and x ✓CA 6 and $(7 - x)$ ✓CA 3 and 8 ✓CA $(11 - x)$ and 7 If $x = 2$ has been substituted into the Venn diagram, still award the marks. (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(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

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