



1.(b)  $A(-1, -1)$   $C(7, 3)$   $B(2, -4)$

$mp = (3, 1)$   $\begin{matrix} x_2 & y_2 \\ a & b \end{matrix}$

$$m = \frac{-4 - (-1)}{2 - (-1)}$$

$$= \frac{-4 + 1}{2 + 1}$$

$$= \frac{-3}{3}$$

$$= -1$$

$$y - b = m(x - a)$$

$$y + 4 = -1(x - 2)$$

$$y + 4 = -x + 2$$

$$y = -x - 2$$

QUESTION NUMBER

1.(c)

~~$y = -12x + 87$~~

~~$y = 5x - 14$~~

~~$5x - 14 = -12x + 87$~~

~~$17x - 14 = 87$~~

~~$17x = 101$~~

~~$x = \frac{101}{17}$~~

~~$y = 5 \times \frac{101}{17} - 14$~~

$y = x - 4$

$y = 5x - 14$

$x - 4 = 5x - 14$

$-4 = 4x - 14$

$4x = 10$

$x = \frac{10}{4}$

sub  $\frac{10}{4}$  into  $y = \frac{10}{4} - 4$

$y = \frac{10}{4} - 4$

$= -\frac{3}{2}$

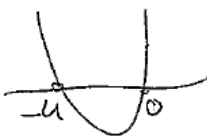
POI  $(\frac{10}{4}, -\frac{3}{2})$

DO NOT WRITE IN THIS MARGIN

## Candidate 2

2.	$2x^2 - 8x + (4-p) = 0$ $b^2 - 4ac > 0$ $(-8)^2 - 4 \times 2 \times (4-p) > 0$ $64 - 4 \times 2 \times (4-p) > 0$ $64 - 8(4-p) > 0$ $64 - 32 + 8p > 0$ $32 + 8p > 0 \quad \div 8$ $4 + p > 0$ $p > -4$ $\underline{-4 < p < 0}$	<p>two real + distinct so <math>b^2 - 4ac &gt; 0</math></p> <del><math display="block">-4 &lt; p &lt; 0</math></del>
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## Candidate 3

<p>2.</p> $2x^2 - 8x + (4-p) \neq 0$ $b^2 - 4ac \geq 0$ $(-8)^2 - 4 \times 2 \times (4-p)$ $64 - 8(4-p) \neq 0$ $= 64 - 32 + 8p \neq 0$ $8p + 32 \neq 0$ $8(p+4) \geq 0 \quad 0 \geq p \geq -4$ $p \geq 0 \quad b \geq -4$ 	$a = 2$ $b = -8$ $c = (4-p)$
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# Candidate 4

2.	$2x^2 - 8x + (4-p) = 0$ $A = 2 \quad b^2 - 4ac = 0 \quad \leftarrow \text{Real roots}$ $B = -8$ $C = (4-p) \quad 64 - 4(2)(4-p) = 0$ $64 - 8(4-p) = 0$ $64 - 32 + 8p = 0$ $8p + 32 = 0$ $\cancel{8(p + 4) = 0}$ $\cancel{p = -4}$ $8(p + 4)$ $8(p + 4) = 0$ $p = -4$			
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## Candidate 5

QUESTION  
NUMBER

3.(a)

$$4\sin x + 5\cos x = k\sin(x+a)$$

$$= k(\sin x \cos a + \cos x \sin a)$$

$$4\sin x + 5\cos x = \underline{k\cos a \sin x} + \underline{k\sin a \cos x}$$

$$k\cos a = 4$$

$$k\sin a = 5$$

$$k = \sqrt{4^2 + 5^2}$$

$$= \underline{\underline{\sqrt{41}}}$$

$\sqrt{S}$	$\sqrt{AV}$
T	C

$\therefore$  Acute

$$k\tan a = \frac{k\sin a}{k\cos a}$$

$$a = \tan^{-1}\left(\frac{5}{4}\right)$$

$$= 51.340\dots$$

$$= \underline{\underline{51.3^\circ}}$$

$$\therefore \underline{\underline{4\sin x + 5\cos x = \sqrt{41} \sin(x + 51.3^\circ)}}$$

DO NOT  
WRITE IN  
THIS  
MARGIN

3.(b)

$$4\sin x + 5\cos x = 5.5$$

$$\sqrt{41} \sin(x + 51.3^\circ) = 5.5$$

$$\sin(x + 51.3^\circ) = \frac{5.5}{\sqrt{41}}$$

$$AA: \sin^{-1}\left(\frac{5.5}{\sqrt{41}}\right)$$

$$= 59.199\dots$$

$$= \underline{\underline{59.2}}$$

$$x + 51.3 = 59.2, 120.8$$

$$x = 7.9, 69.5$$

$$= \frac{7.9\pi}{180}, \frac{69.5\pi}{180} \quad x = 0.137, 1.21\dots$$

$$x = \underline{\underline{0.1}}, \underline{\underline{1.2}}$$

## Candidate 6

QUESTION NUMBER	<p>4.(a) <math>\int_2^{-1} (x^3 - 5x^2 + 2x + 8)</math></p> <p><del><math>\int_2^{-1} (3x^2 + 10x)</math></del></p> <p><math>\int_2^{-1} \left[ \frac{x^4}{4} - \frac{5x^3}{3} + \frac{2x^2}{2} + 8x \right]</math></p> <p><math>\left[ \frac{(-1)^4}{4} - \frac{5(-1)^3}{3} + \frac{2(-1)^2}{2} + 8(-1) \right]</math></p> <p><math>\left[ -1 + \frac{5}{3} + \frac{2}{2} - 8 \right]</math></p> <p><math>\frac{-19}{3}</math></p> <p><math>\left[ \frac{(2)^4}{4} - \frac{5(2)^3}{3} + \frac{2(2)^2}{2} + 8(2) \right]</math></p> <p><math>\frac{16}{4} - \frac{40}{3} + \frac{8}{2} + 16</math></p> <p><math>4 - \frac{40}{3} + 4 + 16</math></p> <p><math>= \frac{32}{3}</math></p> <p><math>\frac{-19}{3} - \frac{32}{3} = -17 \text{ units}^2.</math></p>	DO NOT WRITE IN THIS MARGIN
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## Candidate 7

QUESTION NUMBER	$y = x^3 - 5x^2 + 2x + 8$ $\int_{-1}^2 (x^3 - 5x^2 + 2x + 8) dx$ $\int_{-1}^2 \left( \frac{x^4}{4} - \frac{5x^3}{3} + \frac{2x^2}{2} + 8x \right) + C$ $\int \left( \frac{(2)^4}{4} - \frac{5(2)^3}{3} + (2)^2 + 8(2) \right) -$ $\left( \frac{(-1)^4}{4} - \frac{5(-1)^3}{3} + (-1)^2 + 8(-1) \right)$ $= \frac{32}{4} - \left( \frac{-91}{12} \right)$ $= \frac{32}{4} + \frac{91}{12}$ $= \frac{73}{4} \text{ sq units.}$	DO NOT WRITE IN THIS MARGIN
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QUESTION  
NUMBER

4.(b)

$$\frac{73}{4} \text{ sq units}$$

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WRITE IN  
THIS  
MARGIN

$$\int_2^4 \left( \frac{x^4}{4} - \frac{5x^3}{3} + x^2 + 8x \right) dx + C$$

$$\left( \frac{(4)^4}{4} - \frac{5(4)^3}{3} + (4)^2 + 8(4) \right) -$$

$$\left( \frac{(2)^4}{4} - \frac{5(2)^3}{3} + (2)^2 + 8(2) \right)$$

$$= \frac{16}{3} - \frac{32}{3}$$

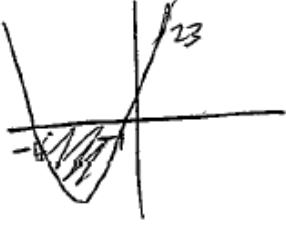
$$= -\frac{16}{3}$$

$$\text{let } -\frac{16}{3} = \frac{16}{3} \text{ sq units}$$

$$\text{Total shaded area} = \frac{73}{4} + \frac{16}{3}$$

$$= \frac{283}{12} \text{ sq units}$$

## Candidate 8

QUESTION NUMBER		WRITE IN THIS MARGIN
5.(a) (i)	$f(g(x))$ $= f(3x+5)$ $= (3x+5)^2 - 2$ $= 9x^2 + 30x + 25 - 2$ $= 9x^2 + 30x + 23$	
5.(a) (ii)	$g(f(x))$ $= g(x^2 - 2)$ $= 3(x^2 - 2) + 5$ $= 3x^2 - 6 + 5$ $= 3x^2 - 1$	
5.(b)	$9x^2 + 30x + 23 < 3x^2 - 1$ $6x^2 + 30x + 24 = 0$ $6(x^2 + 5x + 4) = 0$ $6(x+1)(x+4) = 0$ $x+1=0 \quad x+4=0$ $x = -1 \quad x = -4$ <p>When <math>-4 &lt; x &lt; -1</math></p> 	

## Candidate 9

QUESTION NUMBER	DO NOT WRITE IN THIS MARGIN
5.(a) (i)	$f(x) = x^2 - 2 \quad g(x) = 3x + 5$ $f(g(x))$ $= f(3x + 5)$ $= (3x + 5)^2 + 2$ $= (3x + 5)(3x + 5) + 2$ $= 9x^2 + 30x + 25 + 2$ $= 9x^2 + 30x + 27$
5.(a) (ii)	$g(f(x))$ $= g(x^2 - 2)$ $= 3(x^2 - 2) + 5$ $= 3x^2 - 6 + 5$ $= 3x^2 - 1$
5.(b)	$9x^2 + 30x + 27 + 3x^2 - 1 = 0$ $12x^2 + 30x + 26 = 0$ $2(6x^2 + 15x + 13) = 0$ $2(\cancel{6x^2} \quad \cancel{15x} \quad \cancel{13}) = 0$ $2(3x^2 + 15x + 14) < 0$ $6x^2 + 30x + 28 < 0$ $2(x^2 + 15x + 14) < 0$ $2(x+2)(x+7) < 0$ $2(3x^2 + 15x + 14) < 0$ $2(3x - 2)(x + 7) < 0$

## Candidate 10

5.(b)	$f(g(x)) < g(f(x))$ $(3x+5)^2 - 2 < 3(x^2 - 2) + 5$ $9x^2 + 30x + 25 - 2 < 3x^2 - 6 + 5$ $9x^2 + 30x + 23 - 3x^2 + 1 < 0$ $6x^2 + 30x + 24 < 0$ $6(x^2 + 5x + 4) < 0$ $6(x+4)(x+1) < 0$ $\begin{array}{l l} x+4 < 0 & x+1 < 0 \\ x < -4 & x < -1 \end{array}$
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$$(3x+5)(3x+5)$$

$$9x^2 + 15x + 15x + 25$$

$$9x^2 + 30x + 25$$

$$\frac{x+4}{x+5} + 30$$

$$x^2 + 5x + 4 < 0$$

$$(x+4)(x+1) < 0$$

$$x^2 + x + 4x + 4$$

$$x^2 + 5x + 4$$

# Candidate 11

5.(b)	$f(g(x)) < g(f(x))$ $f(3x+5) < g(x^2-2)$ $(3x+5)^2 - 2 < 3(x^2-2) + 5$ $(3x+5)(3x+5) - 2 < 3(x^2-2) + 5$ $3x^2 + 15x + 15x + 25 - 2 < 3x^2 - 6 + 5$ $3x^2 + 30x + 23 < 3x^2 - 1$ $3x^2 + 30x + 23 - 3x^2 + 1 \geq 0$ $30x + 24 \geq 0$ $30x > 24$ $x > \frac{24}{30}$	$x > \frac{4}{5}$
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## Candidate 12

QUESTION NUMBER		DO NOT WRITE IN THIS MARGIN
6.	$y = f(x)$ $\frac{dy}{dx} = 1 - \frac{3}{x^2}$ $y = 1x - 3x^{-2}$ <del><math display="block">y = 2x + 3x^{-1}</math></del> $y = x + 3x^{-1}$ $y = x + \frac{3}{x}$ $\frac{dy}{dx} = 1\left(\frac{3}{x^2}\right)$ $= 1 \cdot \frac{1}{3}$ $= \frac{2}{3} \leftarrow \text{gradient}$ <del><math display="block">y = 3 + \frac{3}{3}</math></del> <del><math display="block">y = 4</math></del> $y = x + \frac{3}{x}$ $6 = 3 + \frac{3}{3}$ $6 = 4$	

# Candidate 13

QUESTION NUMBER	<p>6. <math>y = f(x) \quad (3, 6)</math></p> $\frac{dy}{dx} = 1 - \frac{3}{x^2}$ $y = x - \frac{3x^{-2}}{-1}$ $y = \frac{x^2}{2} + 3x^{-1}$ $6 = \frac{(3)^2}{2} + 3(3)^{-1}$ $6 = \frac{11}{2}$ $x = -\frac{1}{2}$	DO NOT WRITE IN THIS MARGIN
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# Candidate 14

QUESTION NUMBER	$\frac{dy}{dx} = 1 - \frac{3}{x^2}$	DO NOT WRITE IN THIS MARGIN
6.	<p><del><math>y = 2x^2 + \dots</math></del></p> $\frac{dy}{dx} = 1 - 3x^{-2}$ $y = x - \frac{3x^{-1}}{-1}$ $1 - \frac{3}{x^2} = 0$ $-\frac{3}{x^2} = -1$ $\frac{3}{x^2} = 1$ $3 = x^2$ $x = \sqrt{3}$ $\sqrt{3} - \frac{3\sqrt{3}}{-1}$	

## Candidate 15

QUESTION NUMBER			DO NOT WRITE IN THIS MARGIN
7.	$y = kx^n$ $\log_5 y = k \log_5 x^n$ $\log_5 y = 2 \log_5 x^n$ $\log_5 y = 2n \log_5 x$ $\log_5 y = 0$ $\log_5 x = 2$ $-1 = 2n \times 2$ $-1 = 4n$ $n = -\frac{1}{4}$ $k = 2$ $\underline{\underline{n = -\frac{1}{4}}}$	$(0, 3)$ $(2, -1)$ $\log_5 y$ $\log_5 x$ $k = \frac{y_2 - y_1}{x_2 - x_1}$ $k = \frac{-1 - 3}{2 - 0}$ $k = \frac{-4}{2}$ $k = 2$	

## Candidate 16

QUESTION NUMBER	<p>7. <math>(0, 3)</math> <math>(2, -1)</math>  <math>x_1 \ y_1</math> <math>x_2 \ y_2</math></p> $m = \frac{-1 - 3}{2 - 0} = \frac{-4}{2} = -2$ $\log_5 y = -2 \log_5 x + 3$ <del><math display="block">\log_5 y = \log_5 5x^{-2} + 3</math></del> <del><math display="block">\log_5 y (\log_5 y (x^{-2})) = 3</math></del> $4(x^{-2}) = 125$ $4\left(\frac{1}{x^2}\right) = 125$ $4 = 125x^2$ $\underline{\underline{k = 125}}$ $\underline{\underline{n = 2}}$	DO NOT WRITE IN THIS MARGIN
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## Candidate 17

QUESTION NUMBER	<p>7.</p> $y = kx^n$ $\log_5 y = \log_5 kx^n$ $\log_5 y = \log_5 k + \log_5 x^n$ $\log_5 y = n \log_5 x + \log_5 k$ $y = n \quad x + k \rightarrow \text{y intercept!}$ <p><u>gradient</u></p> $\begin{matrix} (0, 3) & (2, -1) \\ x_1 & y_1 & x_2 & y_2 \end{matrix}$ $m = \frac{y_2 - y_1}{x_2 - x_1}$ $= \frac{-1 - 3}{2 - 0}$ $= \frac{-4}{2}$ $n = \underline{\underline{-2}}$ $\log_5 k = 3$ $5^3 = k$ $k = \underline{\underline{125}}$ $\therefore y = 125x^{-2}$ $n = \underline{\underline{-2}}$ $k = \underline{\underline{125}}$	DO NOT WRITE IN THIS MARGIN
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## Candidate 18

QUESTION NUMBER  8.(a)	$A = l \times b$ $150 = l \times b$ $150 =$	DO NOT WRITE IN THIS MARGIN						
QUESTION 8b)	$A(x) = 156 - 2x - \frac{450}{x}$ $= 156 - 2x - 450x^{-1}$ $A'(x) = -2 + 450x^{-2}$ $A'(x) = 0 \quad -2 + 450x^{-2} = 0$ $450x^{-2} = 2$ $x^{-2} = \frac{1}{225}$ <del><math display="block">\frac{1}{x^2} = \frac{1}{225}</math></del> <del><math display="block">\frac{1}{x} = \sqrt{\frac{1}{225}}</math></del> $x = 50625$ <table border="1" data-bbox="363 1440 735 1608"> <tr> <td><math>x</math></td> <td></td> </tr> <tr> <td><math>A'(x)</math></td> <td>0</td> </tr> <tr> <td>graph</td> <td>→</td> </tr> </table>	$x$		$A'(x)$	0	graph	→	MARGIN
$x$								
$A'(x)$	0							
graph	→							

## Candidate 19

QUESTION NUMBER		DO NOT WRITE IN THIS MARGIN																														
8.(b)	$A(x) = 156 - 2x - \frac{450}{x}$ $= 156 - 2x - 450x^{-1}$ $A'(x) = -2 + 450x^{-2}$ <p>for stationary points <math>A'(x) = 0</math></p> $-2 + 450x^{-2} = 0$ $450x^{-2} = 2$ $x^{-2} = \frac{2}{450}$ $x = \pm \sqrt{\frac{450}{2}}$ $x = \pm 15$ <div style="display: flex; justify-content: space-around; margin-top: 20px;"> <table border="1" style="border-collapse: collapse; text-align: center;"> <tr><td style="padding: 5px;"><math>A'(x)</math></td><td style="padding: 5px;"><math>\rightarrow</math></td><td style="padding: 5px;"><math>15</math></td><td style="padding: 5px;"><math>\rightarrow</math></td><td style="padding: 5px;"><math>15</math></td></tr> <tr><td style="padding: 5px;"></td><td style="padding: 5px;"></td><td style="padding: 5px;">+</td><td style="padding: 5px;">0</td><td style="padding: 5px;">-</td></tr> <tr><td style="padding: 5px;"></td><td style="padding: 5px;"></td><td style="padding: 5px;">/</td><td style="padding: 5px;">-</td><td style="padding: 5px;">/</td></tr> </table> <table border="1" style="border-collapse: collapse; text-align: center;"> <tr><td style="padding: 5px;"><math>A'(x)</math></td><td style="padding: 5px;"><math>\rightarrow</math></td><td style="padding: 5px;"><math>-15</math></td><td style="padding: 5px;"><math>\rightarrow</math></td><td style="padding: 5px;"><math>-15</math></td></tr> <tr><td style="padding: 5px;"></td><td style="padding: 5px;"></td><td style="padding: 5px;">-</td><td style="padding: 5px;">0</td><td style="padding: 5px;">+</td></tr> <tr><td style="padding: 5px;"></td><td style="padding: 5px;"></td><td style="padding: 5px;">/</td><td style="padding: 5px;">-</td><td style="padding: 5px;">/</td></tr> </table> </div> <p style="margin-left: 10%; margin-top: 10px;">Max Tp when <math>x = 15</math></p> <p style="margin-left: 10%; margin-top: 10px;">Min Tp when <math>x = -15</math></p> $A(15) = 156 - 2 \times 15 - \frac{450}{15}$ $= \underline{\underline{96}}$ <p style="margin-left: 10%; margin-top: 10px;">Max area of the Pond is <u>96m<sup>2</sup></u></p>	$A'(x)$	$\rightarrow$	$15$	$\rightarrow$	$15$			+	0	-			/	-	/	$A'(x)$	$\rightarrow$	$-15$	$\rightarrow$	$-15$			-	0	+			/	-	/	
$A'(x)$	$\rightarrow$	$15$	$\rightarrow$	$15$																												
		+	0	-																												
		/	-	/																												
$A'(x)$	$\rightarrow$	$-15$	$\rightarrow$	$-15$																												
		-	0	+																												
		/	-	/																												

# Candidate 20

QUESTION NUMBER		DO NOT WRITE IN THIS MARGIN															
8.(b)	$A(x) = 156 - 2x - \frac{450}{x}$ $A(x) = 156 - 2x - 450x^{-1}$ $A'(x) = \cancel{156} - 2 + 450x^{-2}$ $A'(x) = 450x^{-2} - 2$ <p style="text-align: right; margin-right: 20px;"><math>\frac{450}{x^2} - 2</math></p> <p>At SP <math>A'(x) = 0</math></p> $\Rightarrow 450x^{-2} - 2 = 0$ $450x^2 = 2$ $x^2 = \frac{2}{450}$ $x = \sqrt{\frac{2}{450}}$ $x = \frac{1}{15}$																
	<table style="margin-left: auto; margin-right: auto;"> <tr> <td style="border: none;"></td> <td style="border: none; text-align: center;"><math>\frac{1}{15}</math></td> <td style="border: none; text-align: center;"><math>\frac{1}{15}</math></td> <td style="border: none; text-align: center;"><math>\frac{1}{15}</math></td> <td style="border: none;"></td> </tr> <tr> <td style="border: none; text-align: center;"><math>A'(x)</math></td> <td style="border: none; text-align: center;">+</td> <td style="border: none; text-align: center;">0</td> <td style="border: none; text-align: center;">+</td> <td style="border: none;"></td> </tr> <tr> <td style="border: none; text-align: center;">Slope</td> <td style="border: none; text-align: center;">/</td> <td style="border: none; text-align: center;">-</td> <td style="border: none; text-align: center;">/</td> <td style="border: none;"></td> </tr> </table>		$\frac{1}{15}$	$\frac{1}{15}$	$\frac{1}{15}$		$A'(x)$	+	0	+		Slope	/	-	/		
	$\frac{1}{15}$	$\frac{1}{15}$	$\frac{1}{15}$														
$A'(x)$	+	0	+														
Slope	/	-	/														
	$A'(\frac{1}{20}) = (0.05) = 450(0.05)^{-2} - 2 = 179998$ $A'(2) = 450(2)^{-2} - 2 = 110.5$ $A'(0.05) = \frac{450}{x^2} - 2 = -\frac{7}{8}$ $A'(2) = \frac{450}{2^2} - 2 = 110.5$																
	<table style="margin-left: auto; margin-right: auto;"> <tr> <td style="border: none; text-align: center;"><math>x</math></td> <td style="border: none; text-align: center;"><math>\frac{1}{20}</math></td> <td style="border: none; text-align: center;"><math>\frac{1}{15}</math></td> <td style="border: none; text-align: center;"><math>2</math></td> </tr> <tr> <td style="border: none; text-align: center;"><math>A(x)</math></td> <td style="border: none; text-align: center;">-</td> <td style="border: none; text-align: center;">0</td> <td style="border: none; text-align: center;">+</td> </tr> <tr> <td style="border: none; text-align: center;">Slope</td> <td style="border: none; text-align: center;">\</td> <td style="border: none; text-align: center;">-</td> <td style="border: none; text-align: center;">/</td> </tr> </table> <p style="text-align: center; margin-top: 5px;">Minimum.</p> <p style="text-align: center; margin-top: 5px;">Min <math>x = \frac{1}{15}</math></p>	$x$	$\frac{1}{20}$	$\frac{1}{15}$	$2$	$A(x)$	-	0	+	Slope	\	-	/				
$x$	$\frac{1}{20}$	$\frac{1}{15}$	$2$														
$A(x)$	-	0	+														
Slope	\	-	/														

## Candidate 21

QUESTION NUMBER	<p>8.(b) <math>A(x) = 156 - 2x - \frac{450}{x}</math></p> <p><math>A(x) = 156 - 2x - 450x^{-1}</math></p> <p><math>A'(x) = -2 + \frac{450}{x^2}</math></p> <p><math>A'(x) = 0</math> at SP's</p> <p><math>0 = -2 + \frac{450}{x^2}</math></p> <p><math>\frac{2}{1} = \frac{450}{x^2}</math></p> <p><math>2x^2 = 450</math></p> <p><math>x^2 = 225</math></p> <p><math>x = \sqrt{225}</math></p> <p><math>x = \pm 15</math></p> <p><math>x &gt; 0 \therefore x = \underline{\underline{15}}</math></p> <p>maximum area =</p> <p><math>A(x) = 156 - 2(15) - \frac{450}{15}</math></p> <p><math>= \underline{\underline{96 \text{ m}^2}}</math></p>	DO NOT WRITE IN THIS MARGIN												
	<p><math>\frac{450}{x}</math></p> <p><math>= 450x^{-1}</math></p> <p><math>=</math></p> <p>Nature Table</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <tr> <td style="padding: 5px;"><math>x</math></td> <td style="padding: 5px;"><math>-15</math></td> <td style="padding: 5px;"><math>15^-</math></td> <td style="padding: 5px;"><math>15^+</math></td> </tr> <tr> <td style="padding: 5px;"><math>A'(x)</math></td> <td style="padding: 5px;">+</td> <td style="padding: 5px;">0</td> <td style="padding: 5px;">-</td> </tr> <tr> <td style="padding: 5px;">slope</td> <td style="padding: 5px;">/</td> <td style="padding: 5px;">-</td> <td style="padding: 5px;">\</td> </tr> </table> <p><math>A'(x) = -2 + \frac{450}{x^2}</math></p> <p><math>\therefore</math> maximum at <del>15m</del> 15m</p>	$x$	$-15$	$15^-$	$15^+$	$A'(x)$	+	0	-	slope	/	-	\	
$x$	$-15$	$15^-$	$15^+$											
$A'(x)$	+	0	-											
slope	/	-	\											

# Candidate 22

8.(b)  $A(x) = -2x^2 + 450x$   
 for SP  $A(x) = 0$

~~$2x^3 - 450 = 0$~~   
 ~~$2x^3 = 450$~~   
 ~~$2x = 225$~~   
 ~~$x = 112.5$~~   
 ~~$= 6$~~

$A'(x) = -2 + 450x^{-2}$   
 for SP  $A'(x) = 0$   
 $-2 + \frac{450}{x^2} = 0$   
 $-2x^2 + 450 = 0$   
 $2x^2 = 450$   
 $x^2 = 225$   
 $x = 15$

$x$	5	6.1	7
$A'(x)$		+	0
Shape		max at 6.1	

$x$	14	15	16
$A(x)$	+	0	-
Shape		max at 15	

$A = 156 - 2(15) - 450$   
 $A = 156 - 30 - 30$   
 $A = 96m^2$

~~$A = 156 - 2(6.1) - 450$~~   
 ~~$156 - 6.1 - 450$~~   
 ~~$= 70m^2$~~

# Candidate 23

QUESTION NUMBER	<p>9.(a) <math>x^2 + y^2 - 4x - 6y - 7 = 0</math></p> <p><math>x^2 + (3x+7)^2 - 4x - 6(3x+7) - 7 = 0</math></p> <p><math>x^2 + 9x^2 + 42x + 49 - 4x - 18x - 42 - 7 = 0</math></p> <p><math>10x^2 + 20x</math></p> <p><math>10(x^2 + 2) = 0</math></p> <p><math>(x+1)(x+1) = 0</math></p> <p><math>x = -1 \quad x = -1</math></p> <p><math>y = 3(-1) + 7 \quad y = 3(-1) + 7</math></p> <p><math>= 4 \quad = 4</math></p> <p><math>(-1, 4) \quad (-1, 4)</math></p>	DO NOT WRITE IN THIS MARGIN
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QUESTION NUMBER	<p>9.(b) <math>x^2 + y^2 - 4x - 6y - 7 = 0</math></p> $x^2 + y^2 + 2gx + 2fy + c = 0$ $c = -7$ $2g = -4 \quad 2f = -6$ $g = -2 \quad f = -3$ $\text{centre} = (-g, -f) = (2, 3)$ $\text{radius} = \sqrt{g^2 + f^2 - c}$ $= \sqrt{(-2)^2 + (-3)^2 + 7}$ $= \sqrt{4 + 9 + 7}$ $= \sqrt{20}$ $\text{equation} = (x + 2)^2 + (y + 3)^2 = \sqrt{20}$	DO NOT WRITE IN THIS MARGIN
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## Candidate 24

10.(a)	$P = 4.99087(42.5 - t)^{1.81}$ $P = 4.99087(42.5 - 24.55)^{1.81}$ $P = 4.99087(17.95)^{1.81}$ $P = 89.88 \dots^{1.81}$ $P = 6.11$	THIS MARGIN
10.(b)	$P = 0.188807(D - 210)^k$ $850 = 0.18807(600 - 210)^k$ $850 = 0.18807(390)^k$ $850 = 73.35^k$ $6.745 = 73.35$ $k = 66.605$ $k = \underline{\underline{6.745}}$	

# Candidate 25

10.(b)	$P = 0.188807 (0 - 210)^k$ $850 = 0.188807 (600 - 210)^k$ $4501.95 = 600 - 210^k$ $3901.95 = -210^k$ $-210^k = 3901.95$ $\ln -210^k = \ln 3901.95$ $k = \frac{\ln 3901.95}{-210}$ $k =$	
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## Candidate 26

QUESTION NUMBER		DO NOT WRITE IN THIS MARGIN
10.(a)	$P = 4.99087(42.3 - T)^{1.81}$ $P = 4.99087(42.5 - 24.55)^{1.81}$ $P = 4.99087(17.95)^{1.81}$ $P = 4.99087(186.1472651)$ $P = 929 \text{ points}$	
10.(b)	$P = 0.188807(D - 210)^k$ $850 = 0.188807(600 - 210)^k$ $850 = 0.188807(390)^k$ $\frac{850}{0.188807} = (390)^k$ $4501.951728 = (390)^k$	