

# Question 1

## Candidate 1

QUESTION NUMBER	
1.	$y = x^{5/3} - \frac{10}{x^4}$ $y = x^{5/3} - 10x^{-4}$ $\frac{dy}{dx} = \frac{5}{3}x^{2/3} + 40x^{-5}$ <del> <math display="block">\frac{dy}{dx} = \frac{5}{3}x^{2/3} + 40x^{-5}</math> </del> $\frac{dy}{dx} = \frac{5}{3\sqrt[3]{x}} + \frac{40}{x^5}$

# Question 2

## Candidate 2


2.	$P(-2, 6) \quad Q(10, 0)$ $m_{PQ} = \frac{0-6}{10-(-2)} = \frac{-6}{12} = -\frac{1}{2}$ $m_1 \times m_2 = -1$ $m_{\text{perpendicular } PQ} = -\frac{1}{-\frac{1}{2}} = 2$ $y = -\frac{1}{2}x + c$ $\text{midpoint of } PQ = \left( \frac{-2+10}{2}, \frac{6+0}{2} \right)$ $3 = -\frac{1}{2}(4) + c \quad \Rightarrow (4, 3)$ $3 = -2 + c$ $5 = c$ $\boxed{y = -\frac{1}{2}x + 5}$
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### Candidate 3

2.	$(-2, 6)   (10, 0)$ $Mid, \left( \frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$ $= \left( \frac{-2 + 10}{2}, \frac{6 + 0}{2} \right)$ $= (4, 3)$ $y - b = m(x - a) \quad m = 3$ $y - 6 = 3(x + 2) \quad a = -2$ $y - 6 = 3x + 6 \quad b = 6$ $y = 3x + 12$	$(-2, 6)   (4, 3)$ $m = \frac{y_2 - y_1}{x_2 - x_1}$ $= \frac{3 - 6}{4 - -2}$ $= \frac{-3}{6}$ $m = -\frac{1}{2}$ $m \perp = 3$
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### Question 3

### Candidate 4

3.	$\log_5 x - \log_5 3 = 2$ $\log_5 \frac{x}{3} = 2$  $5^2 = \frac{x}{3}$ $25 = \frac{x}{3}$ $75 = x$	DO NOT WRITE IN THIS MARGIN
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## Candidate 5

QUESTION NUMBER	<p>3. <math>\log_5 x - \log_5 3 = 2</math></p> <p><math>\log_5 (x \div 3) = 2</math></p> <p><math>\log_5^2 = \frac{x}{3}</math></p> <p><math>25 = \frac{x}{3}</math></p> <p><math>75 = x</math></p>	DO NOT WRITE IN THIS MARGIN
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## Candidate 6

QUESTION NUMBER	<p>3. <math>\log_5 x = \log_5 3 = 2</math></p> <p><math>\log_5 \left( \frac{x}{3} \right) = 2</math></p> <p><math>\log_5 \frac{x}{3} = 2</math></p> <p><del>_____</del></p> <p><math>\log_5 x = 2 \times 3</math></p> <p><math>\log_5 x = 6</math></p>	DO NOT WRITE IN THIS MARGIN
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### Candidate 7

<p>QUESTION NUMBER</p> <p>3.</p>	$\log_5 x - \log_5 3 = 2$ $\log_5 x^3 = 2 \log_5 5$ $\log_5 x^3 = \log_5 5^2$ <del><math display="block">\log_5 x^3 = \log_5 25</math></del> $\log_5 x^3 = \log_5 25$	<p>DO NOT WRITE IN THIS MARGIN</p> $\log_5 x^3 = \log_5 25$ $x^3 = 25$ $x = \frac{25}{3}$
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### Candidate 8

<p>QUESTION NUMBER</p> <p>3.</p>	<del><math display="block">\log_5 x - \log_5 3 = 2</math></del> <del><math display="block">\log_5 (x+3) = 2</math></del> <del><math display="block">x = \log_5 4</math></del> <del><math display="block">x = \sqrt{3} \log_5 4</math></del> <del><math display="block">x = \log_5 4</math></del> <del><math display="block">x = \log_5 4</math></del> <del><math display="block">x = \log_5 4</math></del> <del><math display="block">x = \log_5 4</math></del>	<p>DO NOT WRITE IN THIS MARGIN</p> $\log_5 x - \log_5 3 = 2$ $\log_5 \left(\frac{x}{3}\right) = 2$ <del><math display="block">x = \log_5 4</math></del> $\frac{x}{3} = 5^2$ $\frac{x}{3} = 25$ $x = \frac{25}{3}$
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# Question 4

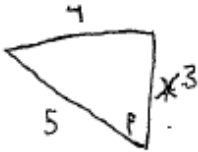
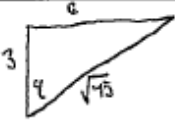
## Candidate 9

<p>QUESTION NUMBER</p> <p>4.(a) (i)</p>	<p><math>H^2 = 9^2 + 5^2</math>  <math>5^2 = 4^2 + 3^2</math>  <math>9 = 5^2</math>  <math>3 = 5</math>          SCH CAH</p> <p><math>\cos p = \frac{A}{H} = \frac{6 \cdot 4}{5}</math></p>	<p>DO NOT WRITE IN THIS MARGIN</p>
<p>4.(a) (ii)</p>	<p><math>\cos q = \frac{A}{H} = \frac{6}{\sqrt{45}}</math></p> <p><del>cos p =</del></p>	

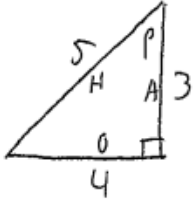
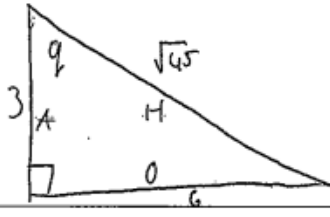
## Candidate 10

QUESTION NUMBER		DO NOT WRITE IN THIS MARGIN
4.(a) (i)	SOH CAH TOA $\cos p = \frac{3}{5}$ $\sin p = \frac{4}{5}$	
4.(a) (ii)	$c^2 = a^2 + b^2$ $= 3^2 + 6^2$ $= 9 + 36$ $c^2 = 45$ $c = \sqrt{45}$	
4.(b)	$\cos(p+q) = \cos p \cos q + \sin p \sin q$ $= \left(\frac{3}{5}\right)\left(\frac{3}{\sqrt{45}}\right) + \left(\frac{4}{5}\right)\left(\frac{6}{\sqrt{45}}\right)$ $= \frac{9}{5\sqrt{45}} + \frac{24}{5\sqrt{45}}$ $= \frac{33}{5\sqrt{45}}$	

## Candidate 11

<p>QUESTION NUMBER</p> <p>4.(a) (i)</p>	$x^2 = a^2 - b^2$ $x^2 = 5^2 - 4^2$ $x = \sqrt{25 - 16}$ $x = \sqrt{9}$ $= 3$	$\cos \theta = \frac{3}{5}$ $\sin \theta = \frac{4}{5}$ $\tan \theta = \frac{4}{3}$		<p>DO NOT WRITE IN THE MARGIN</p>
<p>4.(a) (ii)</p>	$x^2 = a^2 + b^2$ $x^2 = 3^2 + 6^2$ $x = \sqrt{9 + 36}$ $= \sqrt{45}$	$\cos \theta = \frac{3}{\sqrt{45}}$ $\sin \theta = \frac{6}{\sqrt{45}}$ $\tan \theta = \frac{6}{3} = 2$		
<p>4.(b)</p>	$\cos(\theta + \theta)$ $\cos \theta \cos \theta - \sin \theta \sin \theta$ $\frac{3}{5} \times \frac{3}{\sqrt{45}} - \frac{6}{5} \times \frac{6}{\sqrt{45}}$ $\frac{9}{5\sqrt{45}} - \frac{24}{5\sqrt{45}}$ $\frac{-15}{5\sqrt{45}} = \frac{-3}{\sqrt{45}}$			

# Candidate 12

QUESTION NUMBER		DO NOT WRITE IN THIS MARGIN
4.(a) (i)	<p style="text-align: right;">SOH CAH TOA</p> $\cos p = \frac{A}{H}$ $= \frac{3}{5}$  $5^2 - 4^2 = 25 - 16 = 9$	
4.(a) (ii)	$\cos q = \frac{A}{H}$ $= \frac{3}{\sqrt{45}}$ $= \frac{1}{\sqrt{15}}$ <p style="text-align: right;"><math>9 + 36 = \sqrt{45}</math>      <math>3^2 + 6^2 = \sqrt{45}</math></p> 	
4.(b)	$\begin{aligned} & \cos(p+q) \\ &= \cos p \cos q - \sin p \sin q \\ &= \frac{3}{5} \times \frac{1}{\sqrt{15}} - \frac{4}{5} \times \frac{2}{\sqrt{15}} \\ &= \frac{3}{5\sqrt{15}} - \frac{6}{5\sqrt{15}} \\ &= \frac{3}{5\sqrt{15}} - \frac{6}{5\sqrt{15}} \\ &= \frac{3-6}{5\sqrt{15}} = -\frac{3}{5\sqrt{15}} \end{aligned}$ $\begin{aligned} \cos p &= \frac{3}{5} \\ \cos q &= \frac{1}{\sqrt{15}} \\ \sin p &= \frac{o}{H} = \frac{4}{5} \\ \sin q &= \frac{o}{H} = \frac{6}{\sqrt{45}} \\ &= \frac{2}{\sqrt{15}} \end{aligned}$	

# Question 5

## Candidate 13

QUESTION NUMBER	<p>5. <math>2x^2 + (3p-2)x + p = 0</math>      <math>b^2 - 4ac = 0</math></p> <p><math>a = 2</math>      <math>(3p-2)^2 - 4(2)(p) = 0</math></p> <p><math>b = (3p-2)</math></p> <p><math>c = +p</math>      <math>9p^2 - 12p + 4 - 8p = 0</math></p> <p style="margin-left: 150px;"><del>36</del></p> <p style="margin-left: 150px;"><math>9p^2 - 20p + 4 = 0</math></p> <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <table border="1" style="border-collapse: collapse; text-align: center;"> <tr><td style="padding: 2px 5px;"><math>3p</math></td><td style="padding: 2px 5px;"><math>-2</math></td></tr> <tr><td style="padding: 2px 5px;"><math>9p^2</math></td><td style="padding: 2px 5px;"><math>-6p</math></td></tr> <tr><td style="padding: 2px 5px;"><math>-2</math></td><td style="padding: 2px 5px;"><math>+4</math></td></tr> </table> <table border="1" style="border-collapse: collapse; text-align: center;"> <tr><td style="padding: 2px 5px;"><math>p</math></td><td style="padding: 2px 5px;"><math>-2</math></td></tr> <tr><td style="padding: 2px 5px;"><math>9p^2</math></td><td style="padding: 2px 5px;"><math>-18p</math></td></tr> <tr><td style="padding: 2px 5px;"><math>-2</math></td><td style="padding: 2px 5px;"><math>+4</math></td></tr> </table> </div> <p style="margin-left: 150px;"><math>(9p-2)(p-2) = 0</math></p> <div style="display: flex; justify-content: space-around; align-items: center;"> <p style="margin-left: 150px;"><math>9p = 2</math></p> <p style="margin-left: 150px;"><math>p = 2</math></p> </div> <p style="margin-left: 150px;"><math>p = \frac{2}{9}</math></p>	$3p$	$-2$	$9p^2$	$-6p$	$-2$	$+4$	$p$	$-2$	$9p^2$	$-18p$	$-2$	$+4$	DO NOT WRITE IN THIS MARGIN
$3p$	$-2$													
$9p^2$	$-6p$													
$-2$	$+4$													
$p$	$-2$													
$9p^2$	$-18p$													
$-2$	$+4$													
	<p style="margin-left: 150px;"><math>\frac{36}{2, 18}</math></p>													

## Candidate 14

QUESTION NUMBER	<p>5. <math>b^2 - 4ac = 0</math></p> <p><math>(3p-2)^2 - 4(2)(p) = 0</math></p> <p><math>9p^2 - 12p + 4 - 8p = 0</math></p> <p><math>9p^2 - 20p + 4 = 0</math></p> <p><math>9 \left[ p^2 - \frac{20}{9}p + \frac{4}{9} \right] = 0</math></p>	DO NOT WRITE IN THIS MARGIN
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### Candidate 15

<p>QUESTION NUMBER</p>	<p>5. <math>2x^2 + (3p - 2)x + p = 0</math>  <math>a = 2 \quad b = 3p - 2 \quad c = p</math>  <math>b^2 - 4ac = 0</math>  <math>(3p - 2)^2 - 4(2)(p) = 0</math>  <math>9p^2 - 12p + 4 - 8p = 0</math>  <math>9p^2 - 20p + 4 = 0</math>  <del><math>p^2 - 20p + 36 = 0</math></del>  <del><math>(p - 18)(p + 2) = 0</math></del>  <math>(p - \frac{18}{9})(p - \frac{2}{9}) = 0</math>  <math>(p - 2)(p - \frac{2}{9}) = 0</math></p>	<p>DO NOT WRITE IN THIS MARGIN.</p>
	<p><del><math>(3p - 2)(3p - 2)</math></del>  <del><math>9p^2 - 12p + 4 - 8p</math></del>  <del><math>9p^2 - 20p + 4</math></del>  <del><math>p^2 - 20p + 36</math></del>  <del><math>(p - 18)(p + 2)</math></del>  <del><math>(p - 2)(p - \frac{2}{9})</math></del></p> <p><math>9p = 2</math>  <del><math>p = \frac{2}{9}</math></del></p> <p><math>p = 2, \frac{2}{9}</math></p>	
	<p><u><math>p = 2</math></u>    <u><math>p = \frac{2}{9}</math></u></p>	

### Question 6

### Candidate 16

<p>6.</p>	<p><math>\int (2x^5 - 6\sqrt{x}) dx</math>  <math>= \frac{(2x^5 - 6\sqrt{x})^2}{2x(10x^4 - 3x^{\frac{1}{2}})} + C</math>  <math>= \frac{(2x^5 - 6\sqrt{x})^2}{20x^4 - 6x^{\frac{1}{2}}} + C</math></p>	
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## Candidate 17


6.	$\int (2x^5 - 6\sqrt{x}) dx = \int (2x^5 - 6x^{\frac{1}{2}}) dx$ $= \frac{2}{6} x^6 - \frac{6}{\frac{2}{3}} x^{\frac{3}{2}}$ $= \frac{1}{3} x^6 - 9x^{\frac{3}{2}}$ $= \frac{1}{3} x^6 - 9\sqrt{x^3} + c$	$\frac{6}{1} \div \frac{2}{3}$ $\frac{6}{1} \times \frac{3}{2}$ $\frac{18}{2} = 9$		
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## Question 7

### Candidate 18

QUESTION NUMBER	$\log_2 5 + \log_2 \frac{1}{40}$ $= \log_2 (5 \times \frac{1}{40})$ $= \log_2 (\frac{1}{8})$	DO NOT WRITE IN THIS MARGIN
7.(a)		

## Candidate 19

QUESTION NUMBER		WRITE IN THIS MARGIN
7.(a)	$\log_2 5 + \log_2 \frac{1}{40}$ $\log_2 \left( 5 \times \frac{1}{40} \right)$ $\log_2 \frac{5}{40}$ $\log_2 \frac{1}{8} = 3$	
7.(b)	$\log_8 a$ $a = \frac{1}{64}$ 	

## Candidate 20

QUESTION NUMBER		DO NOT WRITE IN THIS MARGIN
7.(a)	$= \log_2 \frac{5}{40}$ $= \log_2 \frac{1}{8} = -3$ $= \cancel{2}^{-3} = \frac{1}{8}$	
7.(b)	<del>0 &lt; a &lt; 1</del>	

# Question 8

Candidate 21

QUESTION NUMBER

8.

Stationary points at ~~the~~  $f'(x) = 0$

$f'(x) = 3x^2 + 6x - 9$

$3x^2 + 6x - 9 = 0$        $\div 3$        $\frac{x+3}{x-1}$

$x^2 + 2x - 3 = 0$

$(x-1)(x+3) = 0$

$x=1, x=-3$

~~$3(-3)^3 + 3(-3)^2 - 9(-3) + 5$~~

$(-3)^3 + 3(-3)^2 - 9(-3) + 5$

~~$-27 + 27 - 27 + 5$~~

$-27 + 27 - 27 + 5$

$= -22$

~~$3(1)^3 + 3(1)^2 - 9(1) + 5$~~

$(1)^3 + 3(1)^2 - 9(1) + 5$

$1 + 3 - 9 + 5 = 0$

$4 - 9 + 5 = 0$

~~$3(-4)^2 + 6(-4) - 9$~~

$3(-4)^2 + 6(-4) - 9$

$3 \times 16 - 24 - 9$

$48 - 24 - 9 = 15$

$48$

$-24$

$24$

~~$3(-2)^2 + 6(-2) - 9$~~

$3(-2)^2 + 6(-2) - 9$

$3 \times 12 - 12 - 9$

DO NOT WRITE IN THIS MARGIN

$f(x) \quad \rightarrow \quad 1 \quad \rightarrow$

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$f'(x) \quad -ve \quad 0 \quad +ve$

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slope  $\quad \backslash \quad \rightarrow \quad /$

min tp at  $(1, 0)$

~~$3(1)^2 + 6(1) - 9$~~

$3(1)^2 + 6(1) - 9$

$3 + 6 - 9$

$+9 - 9 = -18$

~~$3(2)^2 + 6(2) - 9$~~

$3(2)^2 + 6(2) - 9$

$12 + 12 - 9$

$24 - 9$

$= 15$

max tp at  $(-3, -22)$

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$f(x) \quad \rightarrow \quad -3 \quad \rightarrow$

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$f'(x) \quad + \quad 0 \quad -$

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slope  $\quad / \quad - \quad \backslash$

### Candidate 22

QUESTION NUMBER

DO NOT WRITE IN THIS MARGIN

8.  $f(x) = x^3 + 3x^2 - 9x + 5$   
 $f'(x) = 3x^2 + 6x - 9$   
 SP's when  $f'(x) = 0$   
 $3x^2 + 6x - 9 = 0$   
 $3(x^2 + 2x - 3) = 0$   
 $3(x^2 - x + 3x - 3) = 0$   
 $3[x(x-1) + 3(x-1)] = 0$   
 $3(x-1)(x+3) = 0$

		Nature			
x	-4	-3	0	1	2
$f'(x)$	+	0	-	0	+
	/	-	/	-	/

max tp when  $x = -3$   
 min tp when  $x = 1$

$x - 1 = 0$   
 $x = 1$   
 $y = (1)^3 + 3(1)^2 - 9(1) + 5$   
 $y = 1 + 3 - 9 + 5$   
 $y = 0$

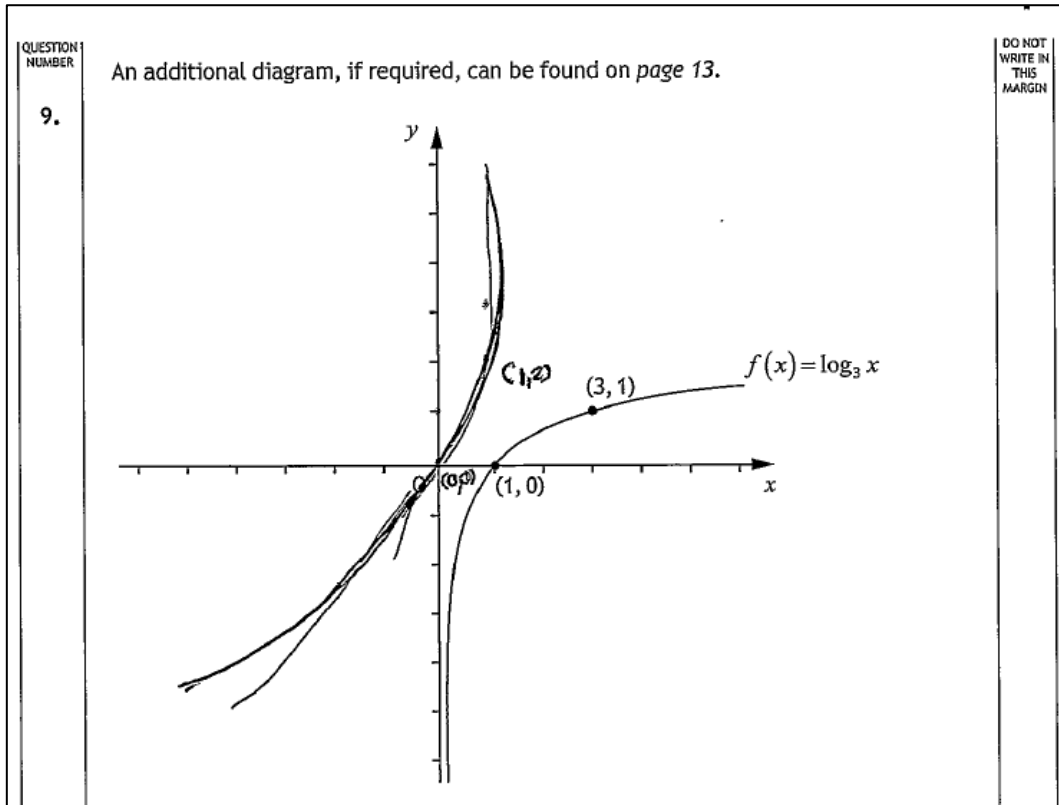
$x + 3 = 0$   
 $x = -3$   
 $y = (-3)^3 + 3(-3)^2 - 9(-3) + 5$   
 $y = -27 + 27 + 27 + 5$

		nature	
x	0	1	2
$\frac{dy}{dx}$	-	0	+
$\frac{d^2y}{dx^2}$	-	-	-

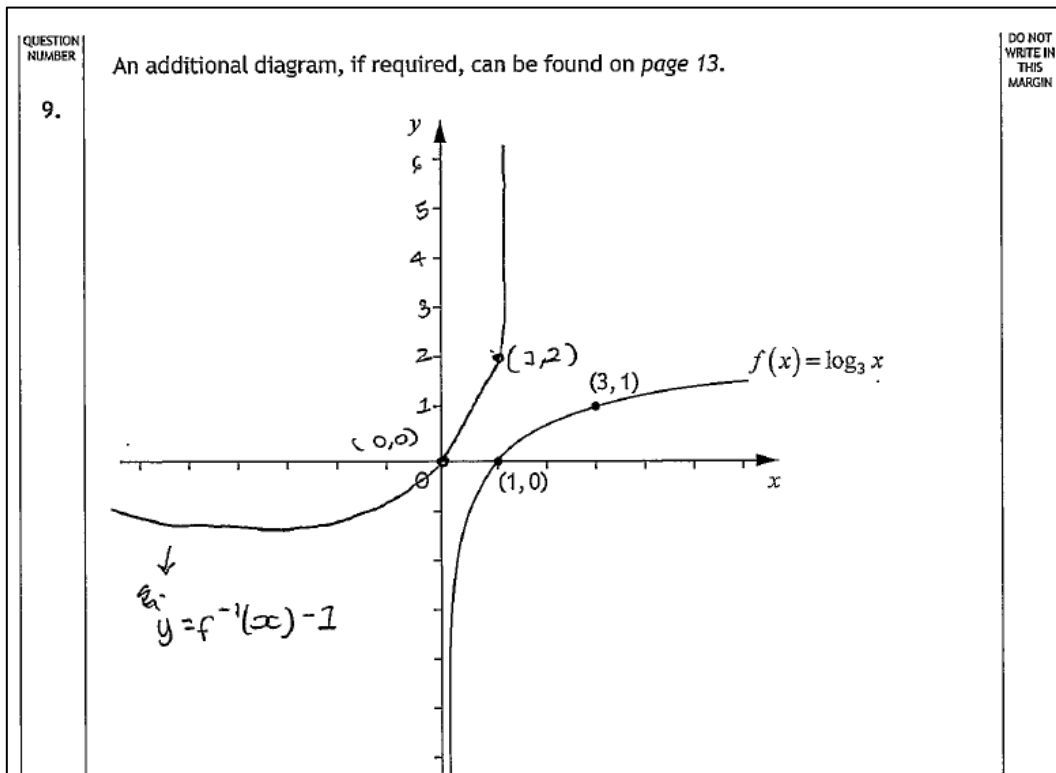
$3(-4)^2 + 6(-4) - 9 = 15$ 
 $3(0)^2 + 6(0) - 9 = -9$ 
 $3(2)^2 + 6(2) - 9 = 15$

# Question 9

## Candidate 23



# Candidate 24



# Question 10

## Candidate 25

QUESTION NUMBER	DO NOT WRITE IN THIS MARGIN
10.(a)	$  \begin{array}{r rrrrr}  -5 & 1 & 3 & -7 & 9 & -30 \\  & & -5 & 10 & -15 & +30 \\  \hline  & 1 & -2 & 3 & -6 & 0  \end{array}  $ <p><math>R=0 \therefore (x+5)</math> is a factor.</p>
10.(b)	$x^3 - 2x^2 + 3x - 6$ $  \begin{array}{r rrrr}  2 & 1 & -2 & 3 & -6 \\  & & 2 & 0 & 6 \\  \hline  & 1 & 0 & 3 & 0  \end{array}  $ $x^2 + 3$ $(x+5)(x-2)(x^2+3) = 0$ $x = -5 \quad x = 2 \quad \text{no solution.}$

## Candidate 26

<p>QUESTION NUMBER</p> <p>10.(a)</p>	$  \begin{array}{r rrrrr}  & 1 & 3 & -7 & 9 & -30 \\  -5 & \downarrow & -5 & 10 & -15 & 30 \\  \hline  & 1 & -2 & 3 & -6 & \underline{0}  \end{array}  \therefore (x+5) \text{ is a factor}  $	<p>DO NOT WRITE IN THIS MARGIN</p>
<p>10.(b)</p>	$  \begin{array}{r rrrr}  & 1 & -2 & 3 & -6 \\  2 & \downarrow & 2 & 0 & 6 \\  \hline  & 1 & 0 & 3 & \underline{0}  \end{array}  \therefore (x-2) \text{ is a factor}  $ <p><math>(x+5)(x-2)(x^2+3)</math></p> <p><math>\underline{x=-5} \quad \underline{x=2} \quad \underline{x=-\sqrt{3}}</math></p>	

# Candidate 27

QUESTION NUMBER 10.(a)	$x^4 + 3x^3 - 7x^2 + 9x - 30$ $f(-5) = (-5)^4 + 3(-5)^3 - 7(-5)^2 + 9(-5) - 30$ $= 0$ <p>Since <math>f(-5) = 0</math>, <math>x + 5</math> is a factor of <math>x</math>.</p>	DO NOT WRITE IN THIS MARGIN
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10.(b)	$x^4 + 3x^3 - 7x^2 + 9x - 30 = 0$ $\Rightarrow (x + 5)(x^3 - 2x^2 + 3x - 6) = 0$ $\Rightarrow (x + 5)(x^3 - 2x^2 + 3x - 6) = 0$ $\Rightarrow (x + 5)(x^3 - 2x^2 + 3x - 6) = 0$ <p style="text-align: center;"><u><math>x = -5</math></u></p> <p style="text-align: center;">Cant simplify any further</p> <div style="display: flex; justify-content: space-around;"> <table border="1" style="border-collapse: collapse; text-align: center;"> <tr><td><math>x^2 - 3x + 6</math></td></tr> <tr><td><math>x^3 - 3x^2 + 6x</math></td></tr> <tr><td><math>+x^2 - 3x</math></td></tr> </table> <table border="1" style="border-collapse: collapse; text-align: center;"> <tr><td><math>x^2 - 1x + 6</math></td></tr> <tr><td><math>x^3 - x^2 + 6x</math></td></tr> <tr><td><math>-x^2 + 6x</math></td></tr> </table> <table border="1" style="border-collapse: collapse; text-align: center;"> <tr><td><math>x^2 - 7x</math></td></tr> <tr><td><math>x^3 - 7x^2 + 36x</math></td></tr> <tr><td><math>+5x^2 - 35x</math></td></tr> </table> <table border="1" style="border-collapse: collapse; text-align: center;"> <tr><td><math>x^2 - x + 6</math></td></tr> <tr><td><math>x^3 - 1x^2 + 6x</math></td></tr> <tr><td><math>-x^2 + 6x</math></td></tr> </table> <table border="1" style="border-collapse: collapse; text-align: center;"> <tr><td><math>x^2 - 3x + 6</math></td></tr> <tr><td><math>x^3 - 3x^2 + 6x</math></td></tr> <tr><td><math>+2x^2 - 3x + 6</math></td></tr> </table> <table border="1" style="border-collapse: collapse; text-align: center;"> <tr><td><math>x^2 - 1x</math></td></tr> <tr><td><math>x^3 - 1x^2 + 6x</math></td></tr> <tr><td><math>+3x^2 - 3x</math></td></tr> </table> </div>	$x^2 - 3x + 6$	$x^3 - 3x^2 + 6x$	$+x^2 - 3x$	$x^2 - 1x + 6$	$x^3 - x^2 + 6x$	$-x^2 + 6x$	$x^2 - 7x$	$x^3 - 7x^2 + 36x$	$+5x^2 - 35x$	$x^2 - x + 6$	$x^3 - 1x^2 + 6x$	$-x^2 + 6x$	$x^2 - 3x + 6$	$x^3 - 3x^2 + 6x$	$+2x^2 - 3x + 6$	$x^2 - 1x$	$x^3 - 1x^2 + 6x$	$+3x^2 - 3x$	
$x^2 - 3x + 6$																				
$x^3 - 3x^2 + 6x$																				
$+x^2 - 3x$																				
$x^2 - 1x + 6$																				
$x^3 - x^2 + 6x$																				
$-x^2 + 6x$																				
$x^2 - 7x$																				
$x^3 - 7x^2 + 36x$																				
$+5x^2 - 35x$																				
$x^2 - x + 6$																				
$x^3 - 1x^2 + 6x$																				
$-x^2 + 6x$																				
$x^2 - 3x + 6$																				
$x^3 - 3x^2 + 6x$																				
$+2x^2 - 3x + 6$																				
$x^2 - 1x$																				
$x^3 - 1x^2 + 6x$																				
$+3x^2 - 3x$																				

# Question 11

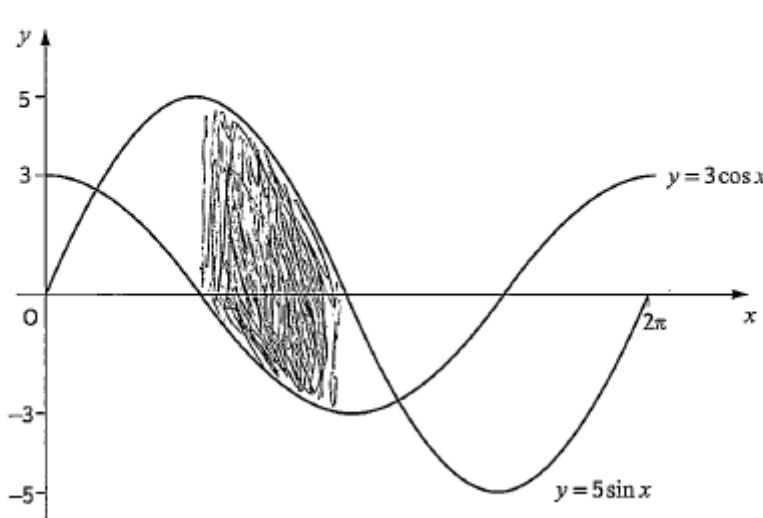
## Candidate 28

QUESTION NUMBER 11.(a)	$\int_{\frac{\pi}{2}}^{\pi} (5 \sin x - 3 \cos x) dx = \left[ -5 \cos x^2 - 3 \sin x^2 \right]_{\frac{\pi}{2}}^{\pi}$ <del><math display="block">\left[ -5 \cos(\pi)^2 - 3 \sin(\pi)^2 \right]</math></del> $= (-5 \cos(\pi)^2 - 3 \sin(\pi)^2) - (-5 \cos(\frac{\pi}{2})^2 - 3 \sin(\frac{\pi}{2})^2)$	DO NOT WRITE IN THIS MARGIN
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## Candidate 29

QUESTION NUMBER 11.(a)	<del>XXXXXXXXXX</del> <del>XXXXXXXXXX</del> $\int_{\frac{\pi}{2}}^{\pi} (5 \sin x - 3 \cos x) dx$ $\left[ -\frac{1}{5} \cos x - \frac{1}{3} \sin x \right]_{\frac{\pi}{2}}^{\pi}$ <del><math display="block">\left[ -\frac{1}{5} \cos x - \frac{1}{3} \sin x \right]_{\frac{\pi}{2}}^{\pi}</math></del> <del><math display="block">\left[ -\frac{1}{5} \cos x - \frac{1}{3} \sin x \right]_{\frac{\pi}{2}}^{\pi}</math></del> $\left[ \frac{1}{5} \cos \pi - \frac{1}{3} \sin \pi \right] - \left[ -\frac{1}{5} \cos \frac{\pi}{2} - \frac{1}{3} \sin \frac{\pi}{2} \right]$ $\left[ \frac{1}{5} \cos 180 - \frac{1}{3} \sin 180 \right] - \left[ -\frac{1}{5} \cos 90 - \frac{1}{3} \sin 90 \right]$ <del><math display="block">\left[ \frac{1}{5} \cos 180 - \frac{1}{3} \sin 180 \right] - \left[ -\frac{1}{5} \cos 90 - \frac{1}{3} \sin 90 \right]</math></del> $= \left[ \frac{1}{5}(-1) - \frac{1}{3}(0) \right] - \left[ -\frac{1}{5}(0) - \frac{1}{3}(1) \right]$ $= \left[ -\frac{1}{5} \right] - \left[ -\frac{1}{3} \right] = \frac{8}{15}$	DO NOT WRITE IN THIS MARGIN
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## Candidate 30

<p>QUESTION NUMBER</p> <p>11.(a)</p>	$\int_{\frac{\pi}{2}}^{\pi} (5\sin x - 3\cos x) dx$ $= \left[ -5\cos x + 3\sin x \right]_{\frac{\pi}{2}}^{\pi}$ $= \left[ -5\cos \pi + 3\sin \pi \right] - \left[ -5\cos \frac{\pi}{2} + 3\sin \frac{\pi}{2} \right]$	<p>DO NOT WRITE IN THIS MARGIN</p>
<p>11.(b)</p>	<p>An additional diagram, if required, can be found on page 14.</p> 	

# Candidate 31

<p>QUESTION NUMBER</p> <p>11.(a)</p>	<div style="text-align: right; margin-bottom: 10px;"> </div> $\int_{\frac{\pi}{2}}^{\pi} (5 \sin x - 3 \cos x) dx$ $\left[ -5 \cos x - 3 \sin x \right]_{\frac{\pi}{2}}^{\pi}$ $\left[ -5 \cos\left(\frac{\pi}{2}\right) - 3 \sin\left(\frac{\pi}{2}\right) \right] - \left[ -5 \cos\left(\frac{\pi}{2}\right) - 3 \sin\left(\frac{\pi}{2}\right) \right]$ <p><del>Handwritten scribbles</del></p> $\left[ -5(-1) - 3(0) \right] - \left[ -5(1) - 3(1) \right]$ $\left[ +5 \right] - \left[ -3 \right] = \left[ 5 \right] - \left[ -3 \right]$ $= 8 \text{ units}^2$ <div style="text-align: right; margin-top: 10px;"> </div>	<p>DO NOT WRITE IN THIS MARGIN</p>
<p>11.(b)</p>	<p>An additional diagram, if required, can be found on page 14.</p>	

# Candidate 32

<p>QUESTION NUMBER</p> <p>11.(a)</p>	<div style="display: flex; justify-content: space-between;"> <div style="flex: 1;"> <math display="block">\int_{\frac{\pi}{2}}^{\pi} (5\sin x - 3\cos x) dx</math> <math display="block">\int_{\frac{\pi}{2}}^{\pi} (5\cos x + 3\sin x) dx</math> <math display="block">5(\cos \pi) + 3(-) [5(\cos \pi + 3\sin \pi)] - [5(\cos(\frac{\pi}{2}) + 3\sin(\frac{\pi}{2}))]</math> <math display="block">[5(-1) + 3(0)] - [5(0) + 3(1)]</math> <math display="block">-5 - 3</math> <math display="block">= -8</math> <math display="block">\underline{\underline{-8}}</math> </div> <div style="flex: 0.5; text-align: center;"> <math>d \begin{matrix} \uparrow S \\ \downarrow C \\ -5 \end{matrix} i</math> </div> </div> <div style="margin-top: 10px;"> <p style="text-align: right; font-size: small;">DO NOT WRITE IN THIS MARGIN</p> </div>
<p>11.(b)</p>	<p>An additional diagram, if required, can be found on page 14.</p>

# Question 12

## Candidate 33

QUESTION NUMBER	<p>12. <math>-2x^2 - 12x + 7</math>      <math>a(x+b)^2 + c</math></p> <p><math>-2x^2 - 12x + 7 = 0</math></p> <p><math>2x^2 + 12x - 7</math></p> <p><math>2(x^2 + 6x) - 7</math></p> <p><math>2(x + 3)^2 - 9 - 7</math></p> <p><math>2(x + 3)^2 - 18 - 7</math></p> <p><u><math>2(x + 3)^2 - 25</math></u></p>	DO NOT WRITE IN THIS MARGIN
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## Candidate 34

QUESTION NUMBER	<p>12. <del><math>f(g(x)) = f(4x)</math></del>      <del><math>g(\frac{\pi}{6}) = 2 \cdot \frac{\pi}{6}</math></del>      <del><math>f(\frac{\pi}{3}) = 2 \sin(\frac{\pi}{3})</math></del></p> <p><del><math>= 2 \sin 4x</math></del>      <del><math>= \frac{\pi}{3}</math></del>      <del><math>=</math></del></p> <p><del><math>f(g(\frac{\pi}{6})) = 2 \sin 2(\frac{\pi}{6})</math></del></p> <p><math>-2x^2 - 12x + 7</math></p> <p><math>= -2(x^2 - 6x) + 7</math></p> <p><math>= -2(x - 3)^2 + 7 + 18</math></p> <p><u><math>= -2(x - 3)^2 + 25</math></u></p> <p><del><math>(x-3)(x-3)</math></del></p> <p><del><math>= x^2 - 6x + 9</math></del></p>	DO NOT WRITE IN THIS MARGIN
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# Question 13

## Candidate 35

QUESTION NUMBER	$f(x) = 2 \sin x$ $g(x) = 2x$  $f(g(x)) = 2 \sin 2x$ $f(g(\frac{\pi}{6})) = 2 \sin 2(\frac{\pi}{6}) = 2 \sin \frac{\pi}{3}$	DO NOT WRITE IN THIS MARGIN
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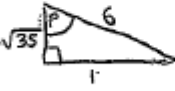
## Candidate 36

QUESTION NUMBER	DO NOT WRITE IN THIS MARGIN
13.(a) (i)	$g(\lambda) = z\left(\frac{\lambda}{6}\right) = \frac{z\lambda}{6}$ $f(g) = z \sin\left(\frac{z\lambda}{6}\right) = z \sin\left(\frac{\lambda}{3}\right) = 1$
13.(a) (ii)	$z \sin\left(\frac{z\lambda}{6}\right)$ $z \sin\left(\frac{\lambda}{3}\right)$
13.(b) (i)	$f(p) = \frac{1}{3} \quad z \sin(p) = \frac{1}{3}$ $\underline{\underline{\sin p = \frac{1}{6}}}$
13.(b) (ii)	$f(g(p))$ $f\left(g\left(\frac{1}{6}\right)\right)$ $f\left(z\left(\frac{1}{6}\right)\right)$ $f\left(\frac{z}{6}\right)$ $= z \sin\left(\frac{z}{6}\right)$ $= \underline{\underline{\frac{1}{6}}}$

## Candidate 37

QUESTION NUMBER	DO NOT WRITE IN THIS MARGIN
13.(a) (i)	$f(g(\frac{\pi}{3})) = 2\sin(g(x)) = 2\sin(\frac{\pi}{3})$ $= 2\sin(2x) = 2\sin(60)$ $f(g(\frac{\pi}{6})) = 2\sin(2(\frac{\pi}{6})) = 2 \times \frac{\sqrt{3}}{2} = \frac{2\sqrt{3}}{2} = \underline{\underline{\sqrt{3}}}$
13.(a) (ii)	$f(g(x)) = 2\sin(g(x))$ $f(g(x)) = \underline{\underline{2\sin(2x)}}$
13.(b) (i)	$f(p) = \frac{1}{3} \quad \frac{1}{3} = 2\sin p$ $f(p) = 2\sin p \quad 2\sin p = \frac{1}{3}$ $\sin p = \underline{\underline{\frac{1}{6}}}$
13.(b) (ii)	$f(g(p)) = 2\sin(g(p)) \quad g(p) = 2p$ $\& \quad = 2\sin(2p)$ $= \underline{\underline{\frac{1}{12}}}$

# Candidate 38

QUESTION NUMBER		DO NOT WRITE IN THIS MARGIN
13.(a) (i)	$f(g(x)) = 2 \sin x$ <del><math>f(g(x)) = 2 \sin x</math></del> $f\left(2\left(\frac{\pi}{6}\right)\right) = 2 \sin 2 \times \frac{\pi}{6}$ $\Rightarrow 2 \times \sin\left(\frac{\pi}{3}\right)$ $\Rightarrow 2 \times \frac{1}{2}$ $\Rightarrow \underline{\underline{1}}$	
13.(a) (ii)	$f(g(x)) = 2 \sin x$ $f(2x) = 2 \sin(2x)$ $\Rightarrow 2 \sin 2x$ $\Rightarrow \underline{\underline{4 \sin x \cos x}}$	
13.(b) (i)	$f(p) = \frac{1}{3}$ $\sin p = \frac{1}{6}$	
13.(b) (ii)	<del><math>f(g(p)) = 2 \sin x</math></del> <del><math>f(p)</math></del>  $a^2 = c^2 - b^2$ $a^2 = 6^2 - 1^2$ $a^2 = 36 - 1$ $a = \sqrt{35}$	$\sin p = \frac{1}{6}$ $\cos p = \frac{\sqrt{35}}{6}$ $4 \sin x \cos x$ $\Rightarrow 4 \times \sin p \times \cos p$ $\Rightarrow 4 \times \frac{1}{6} \times \frac{\sqrt{35}}{6}$ $\Rightarrow \frac{4\sqrt{35}}{36}$ $\Rightarrow \underline{\underline{\frac{\sqrt{35}}{9}}}$