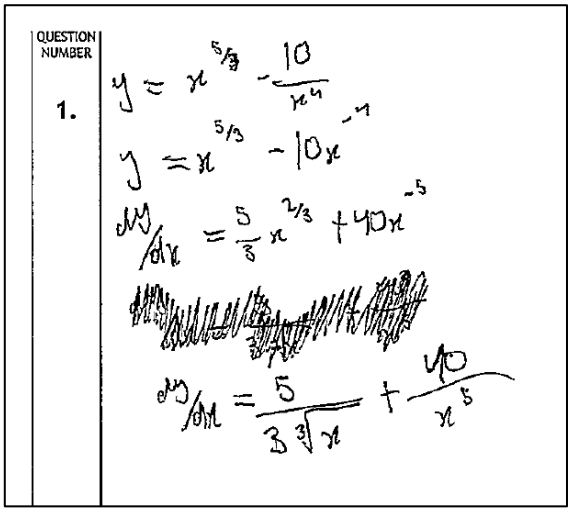
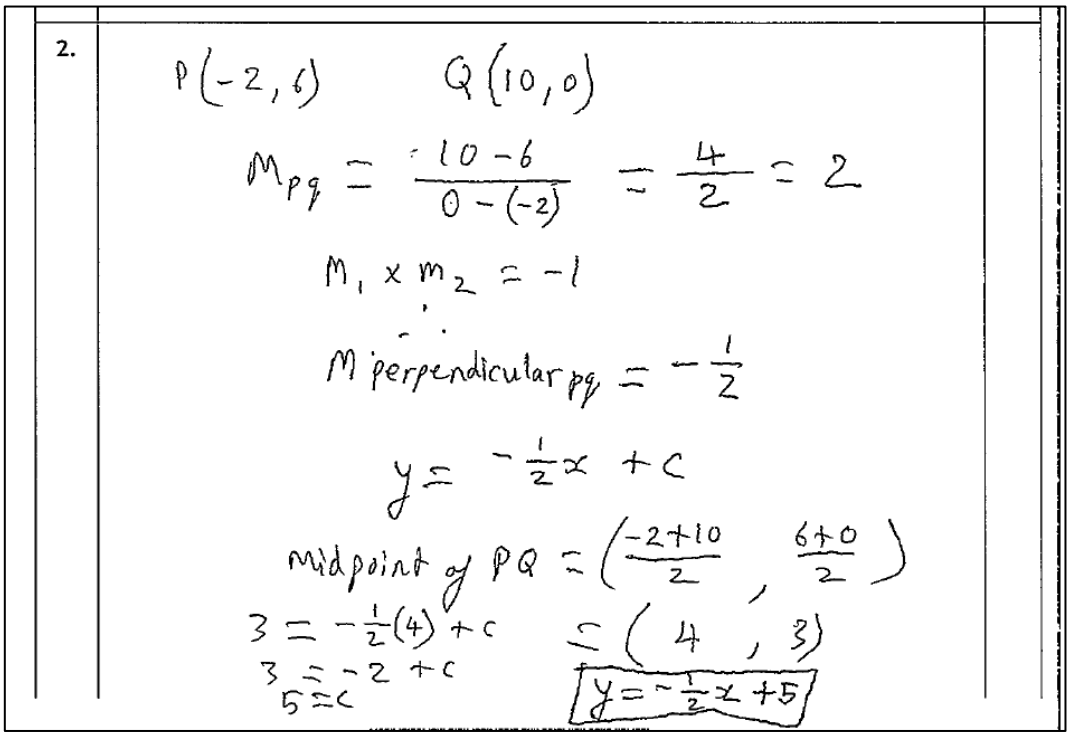
Question 1

Candidate 1

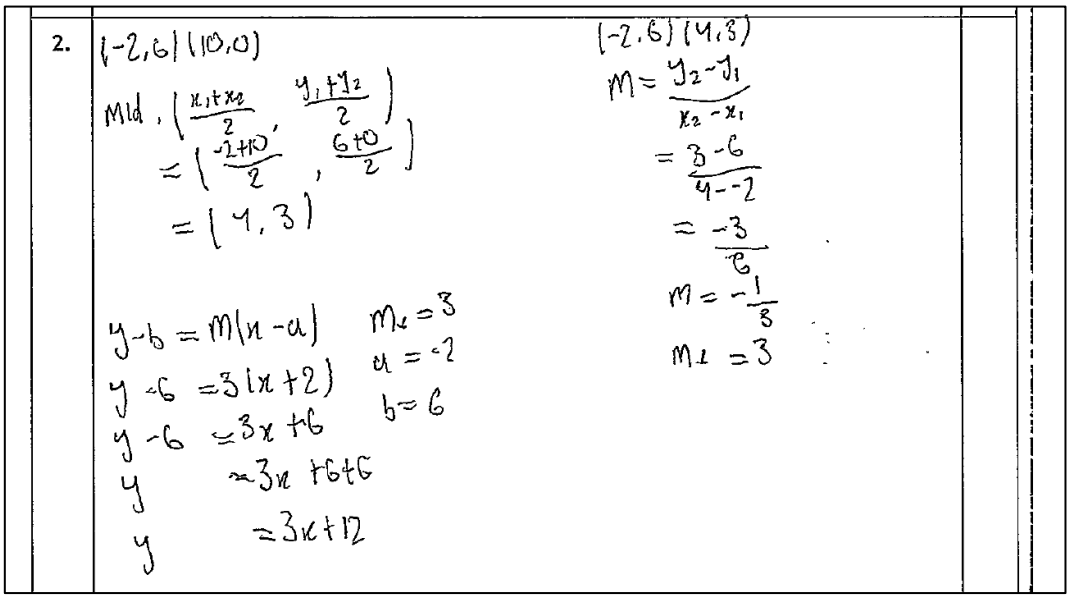


Question 2

Candidate 2

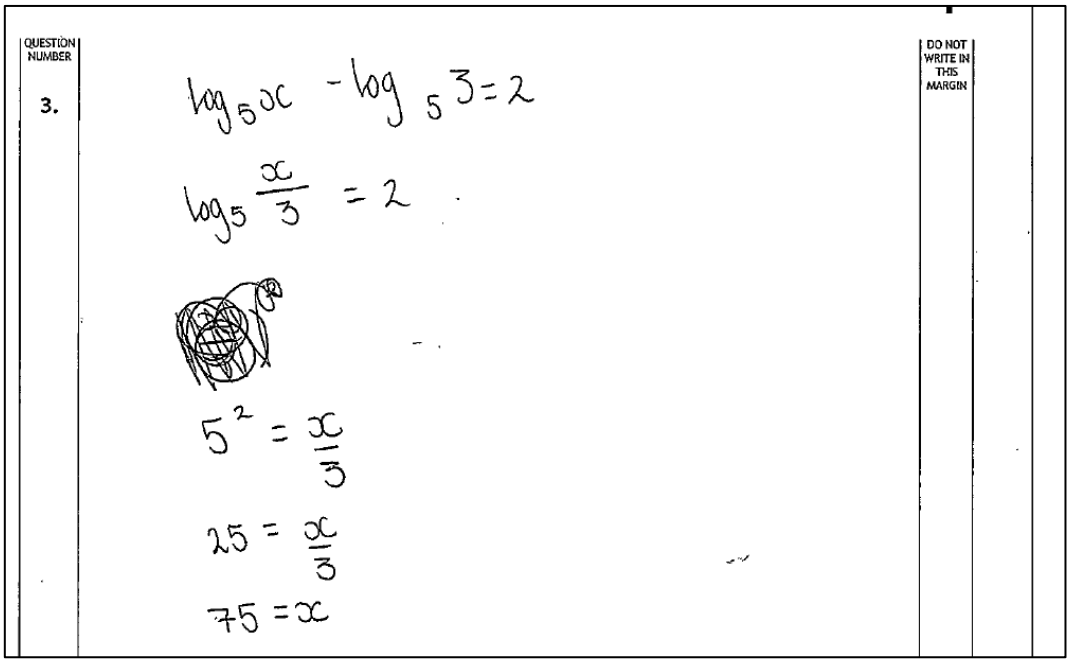


Candidate 3

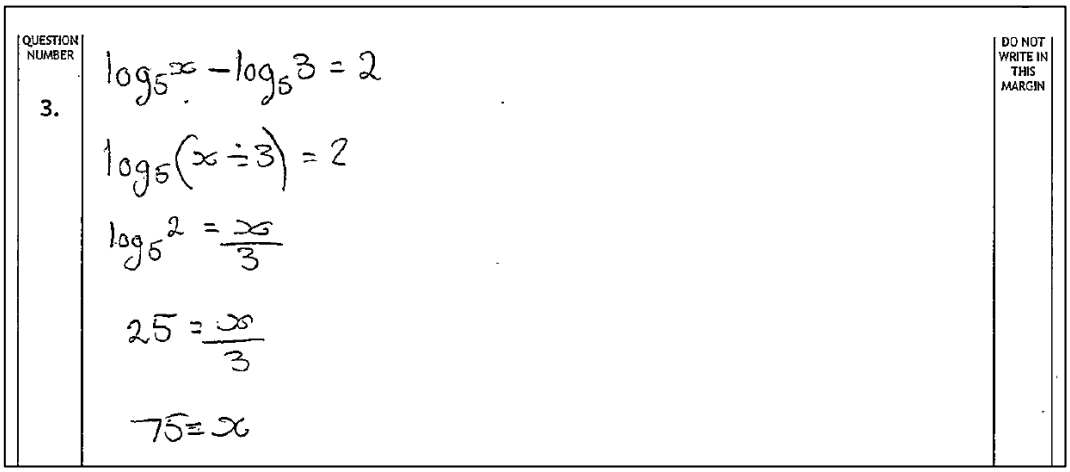


Question 3

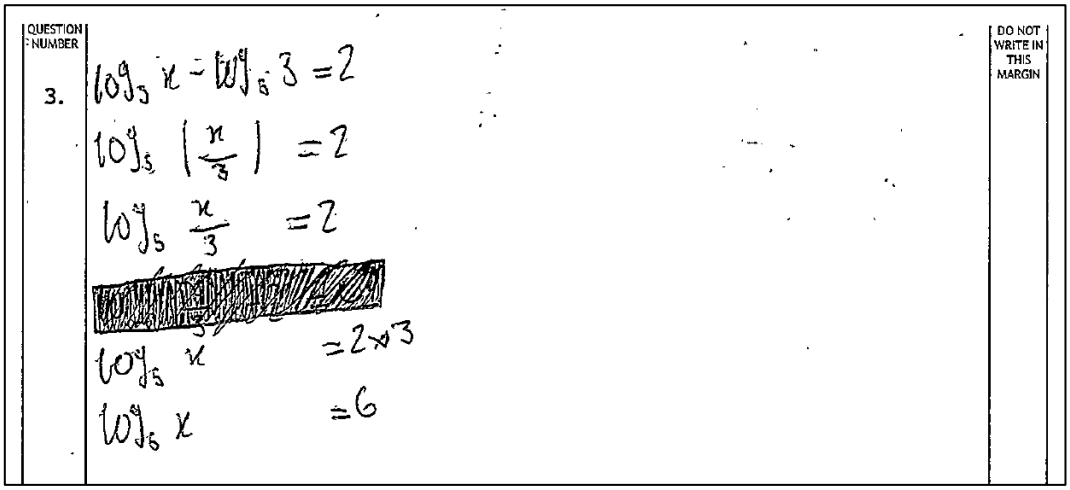
Candidate 4



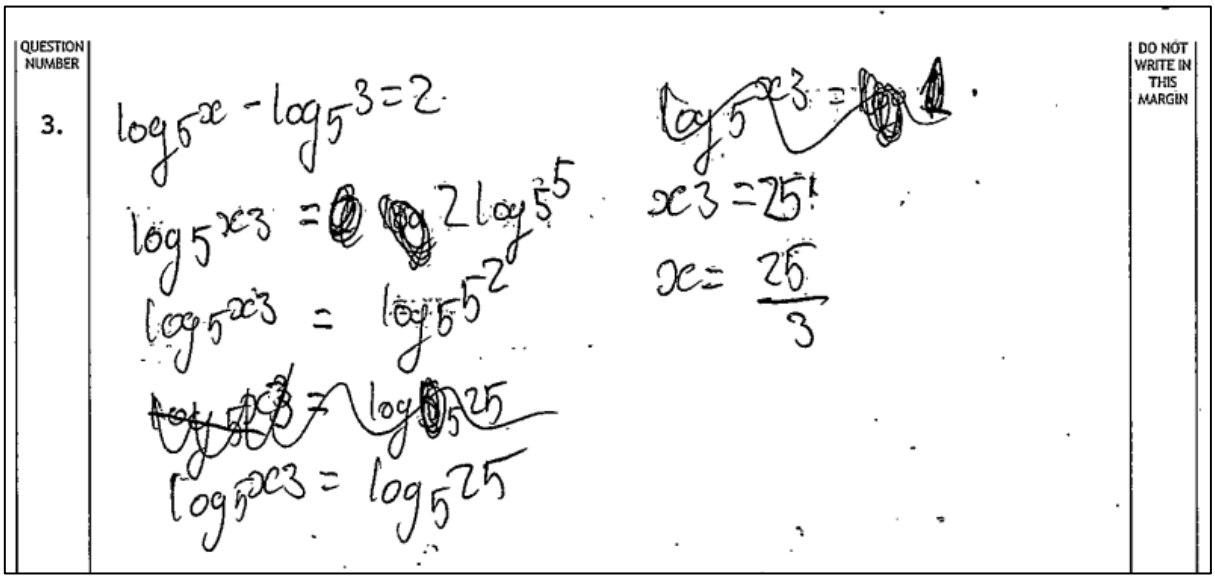
Candidate 5



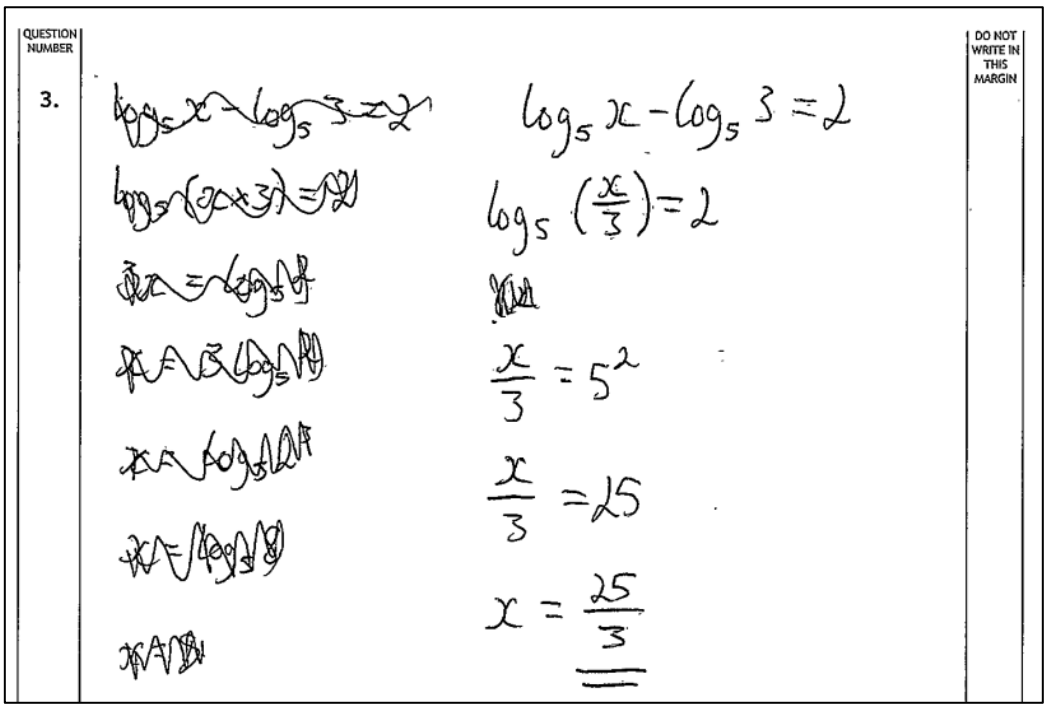
Candidate 6



Candidate 7

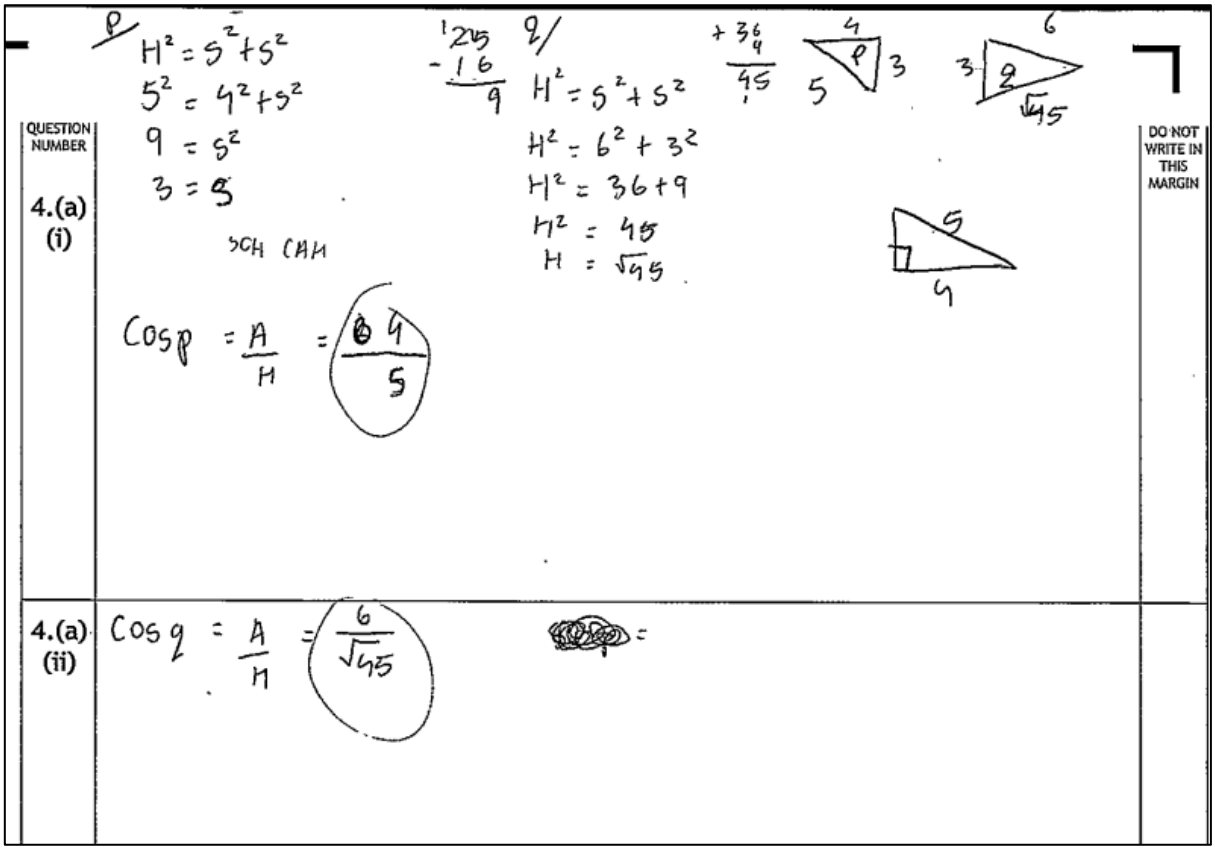


Candidate 8



Question 4

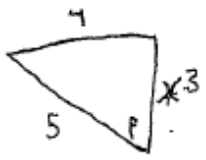
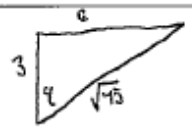
Candidate 9



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)	$c^2 = a^2 + b^2$ $= 3^2 + c^2$ $= 9 + 36$ $c^2 = 45$ $c = \sqrt{45}$ $\cos q = \frac{3}{\sqrt{45}}$ $\sin q = \frac{6}{\sqrt{45}}$	
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

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

Candidate 12

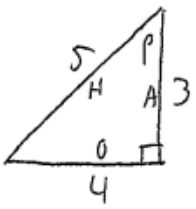
QUESTION NUMBER | DO NOT WRITE IN THIS MARGIN

4.(a) (i)

SOH CAH TOA

$\cos p = \frac{A}{H}$

$= \frac{3}{5}$



$5^2 - 4^2$

$= 25 - 16 = \sqrt{9}$

4.(a) (ii)

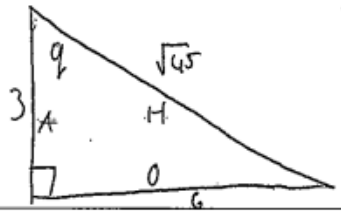
$3^2 + 6^2 = \sqrt{45}$

$9 + 36 = \sqrt{45}$

$\cos q = \frac{A}{H}$

$= \frac{3}{\sqrt{45}}$

$= \frac{1}{\sqrt{15}}$



4.(b)

$\cos(p+q)$ (a, b)

$= \cos p \cos q - \sin p \sin q$

$= \frac{3}{5} \times \frac{1}{\sqrt{15}} - \frac{4}{5} \times \frac{2}{\sqrt{15}}$

$= \frac{3}{5\sqrt{15}} - \frac{6}{5\sqrt{15}}$

$= \frac{-3}{5\sqrt{15}} \Rightarrow -\frac{3}{5\sqrt{15}}$

$\cos p = \frac{3}{5}$

$\cos q = \frac{1}{\sqrt{15}}$

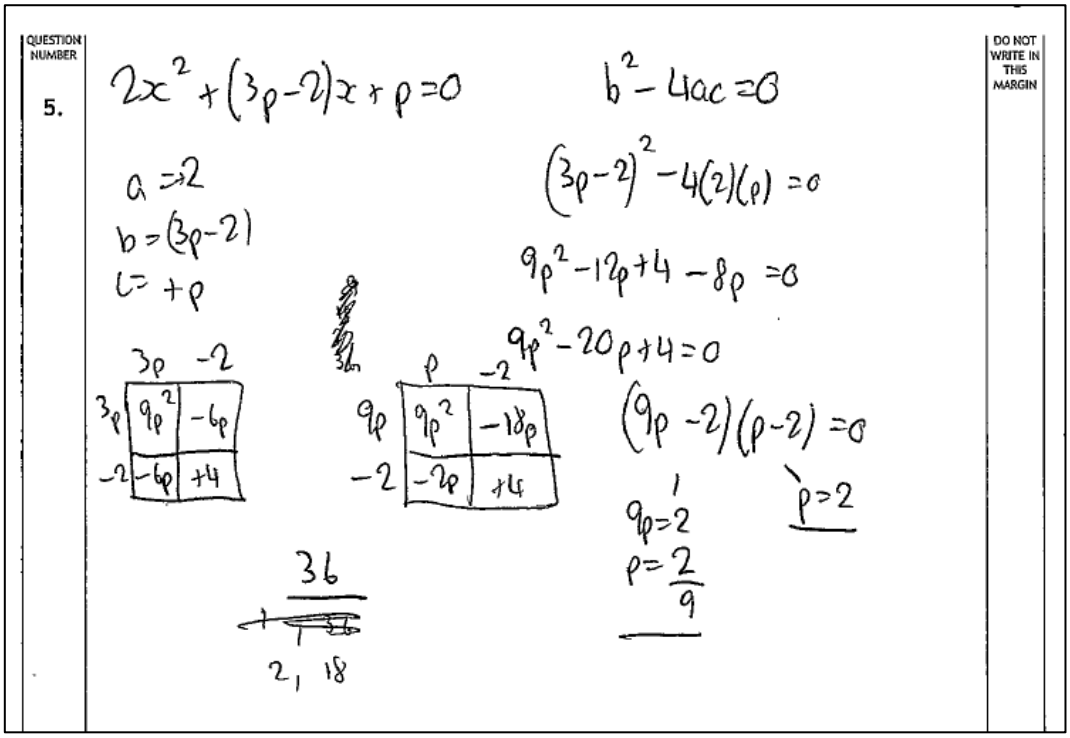
$\sin p = \frac{O}{H} \Rightarrow \frac{4}{5}$

$\sin q = \frac{O}{H} \Rightarrow \frac{6}{\sqrt{45}}$

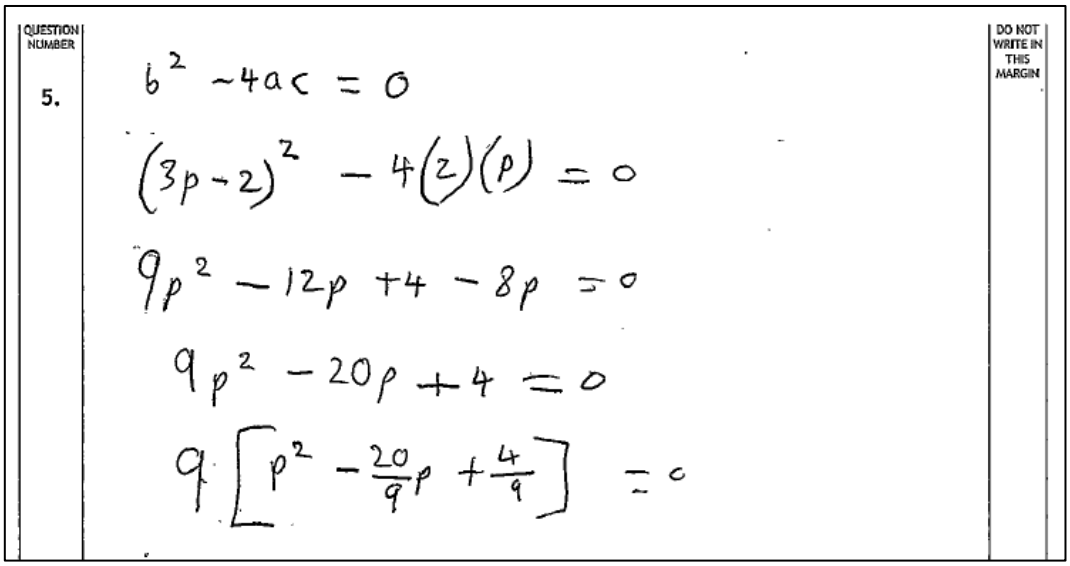
$= \frac{2}{\sqrt{15}}$

Question 5

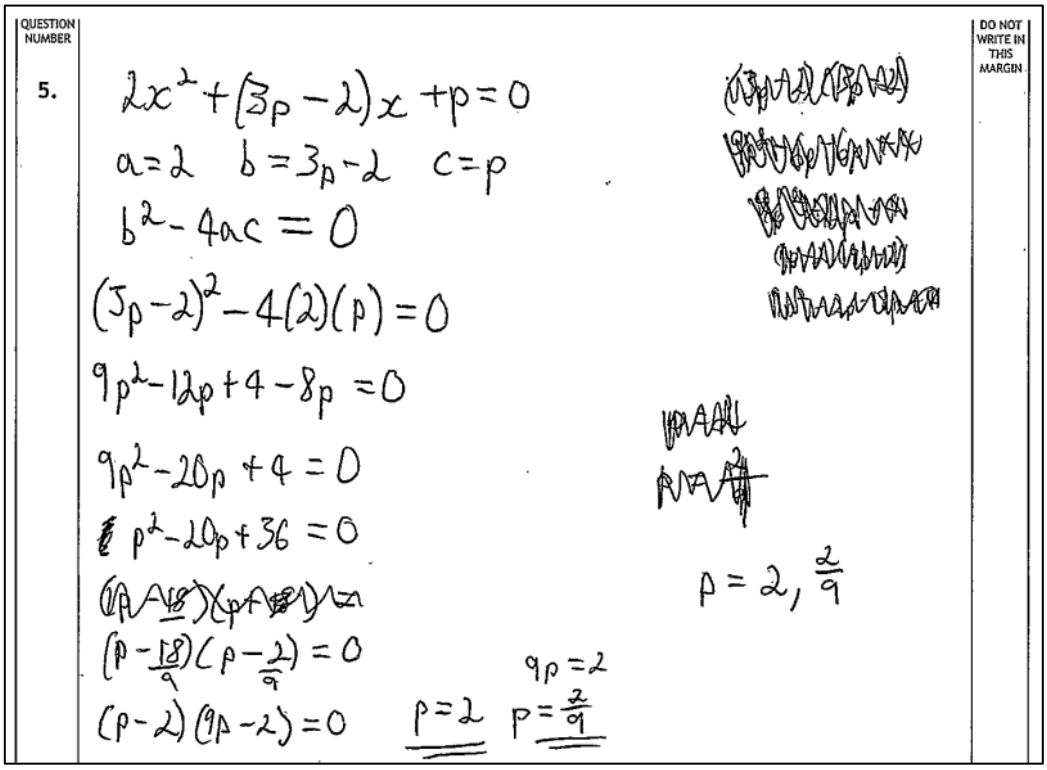
Candidate 13



Candidate 14

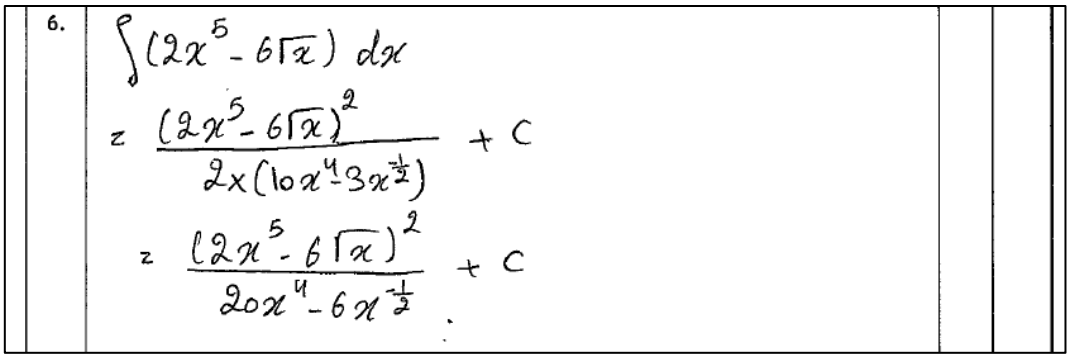


Candidate 15

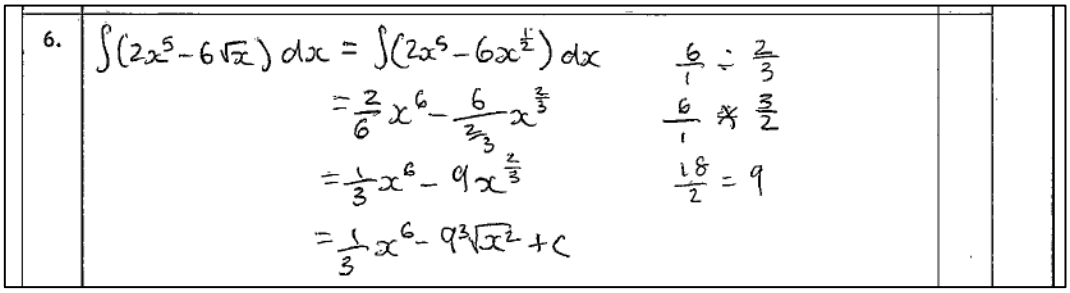


Question 6

Candidate 16

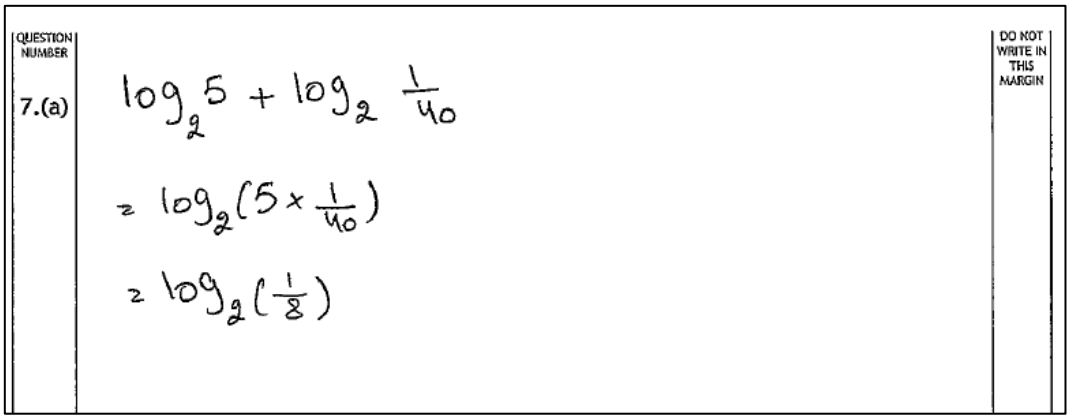


Candidate 17

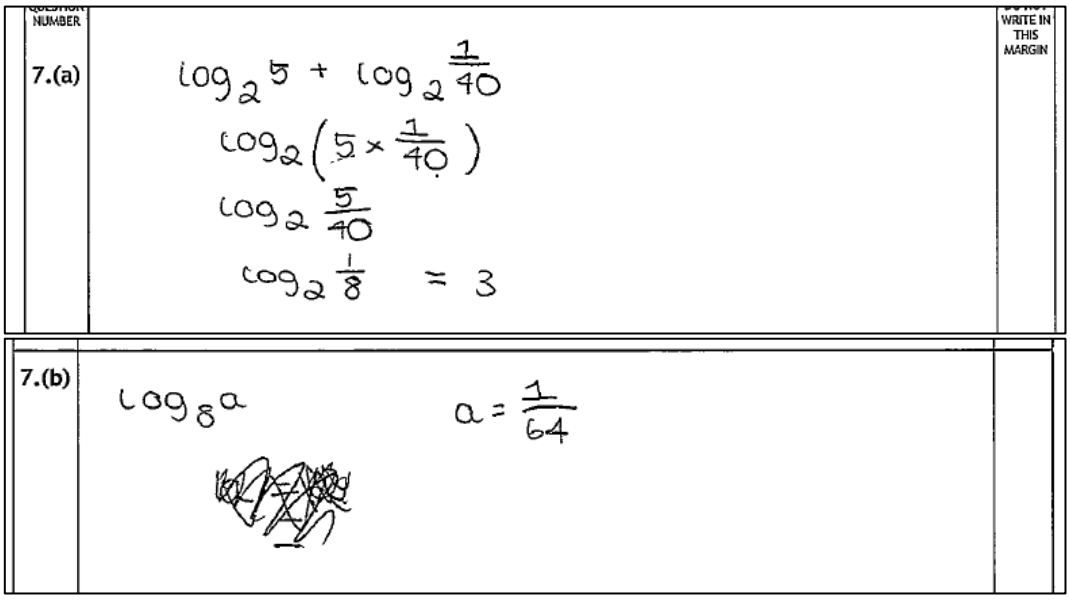


Question 7

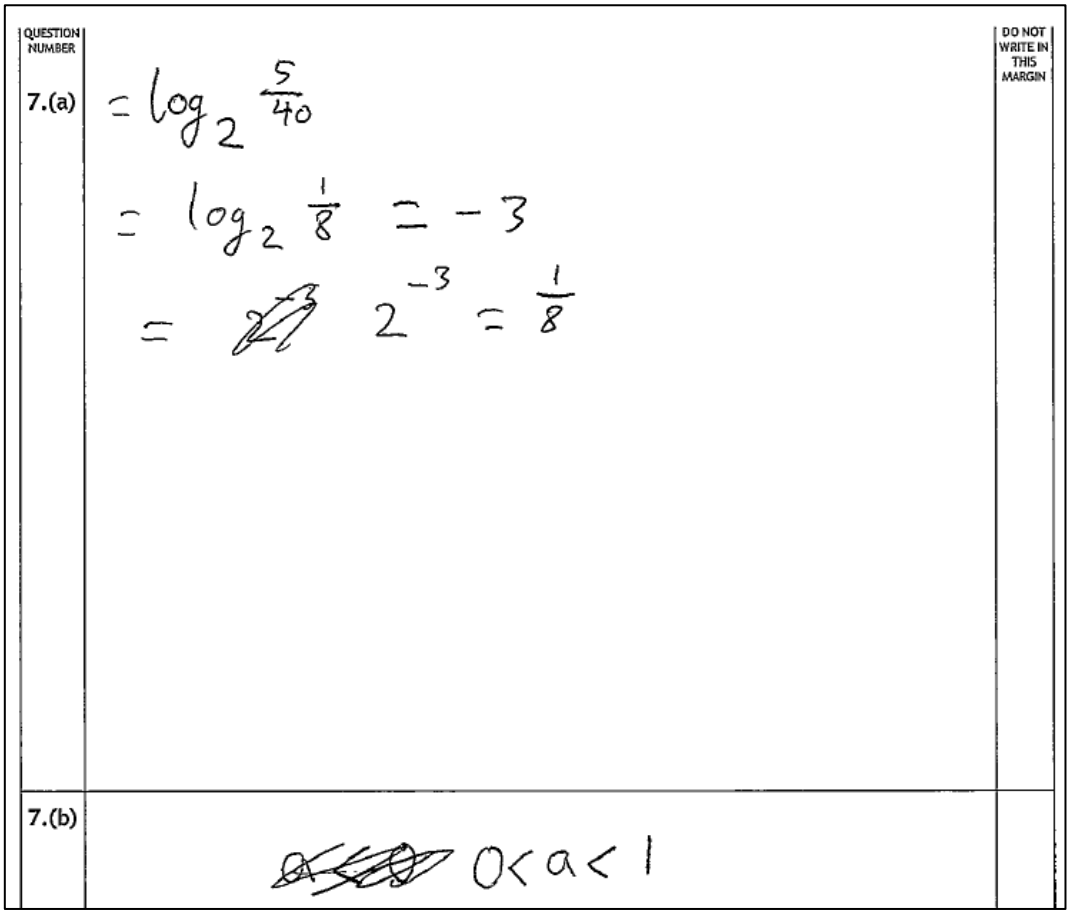
Candidate 18



Candidate 19

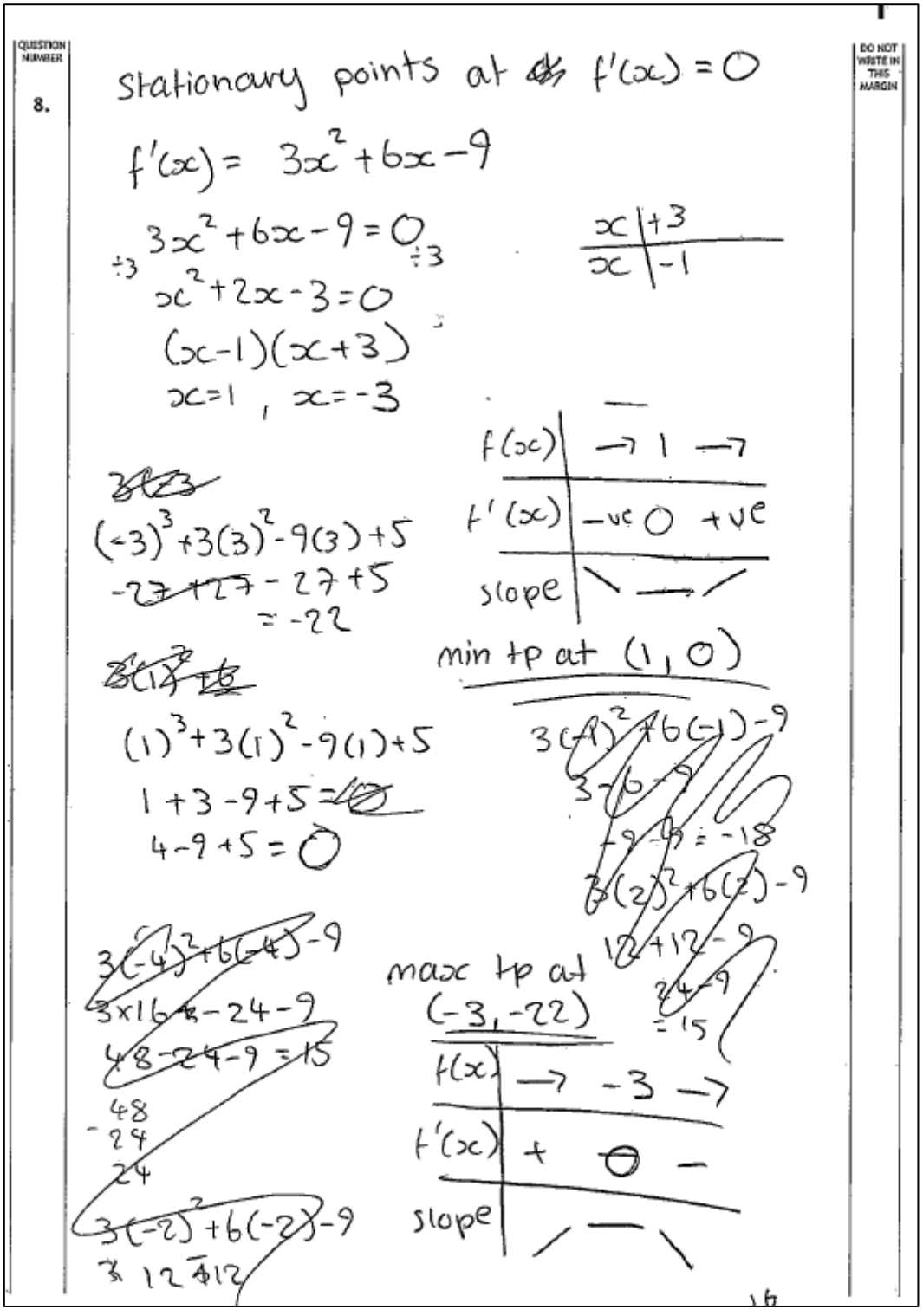


Candidate 20



Question 8

Candidate 21



Candidate 22

QUESTION NUMBER

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 $x = 1$

$x - 1 = 0$ | $x + 3 = 0$

$x = 1$ | $x = -3$

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

$y = 1 + 3 - 9 + 5$ | $y = -27 + 27$

$y = 0$

nature

x	0	1	2
$\frac{dy}{dx}$			
shape			

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

$= 15$

$3(0)^2 + 6(0) - 9$

$= -9$

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

$= 15$

DO NOT WRITE IN THIS MARGIN

Question 9

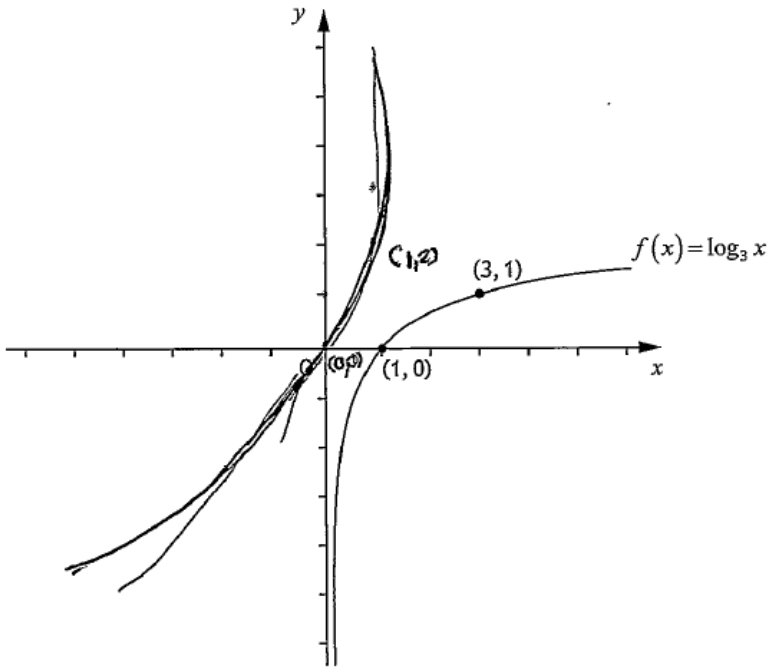
Candidate 23

QUESTION NUMBER

9.

An additional diagram, if required, can be found on *page 13*.

DO NOT WRITE IN THIS MARGIN



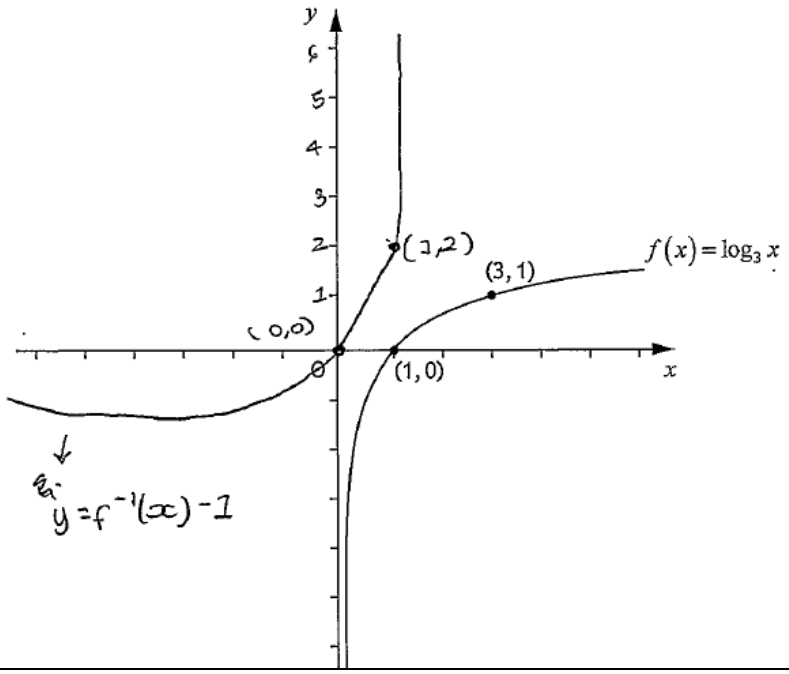
Candidate 24

QUESTION NUMBER

9.

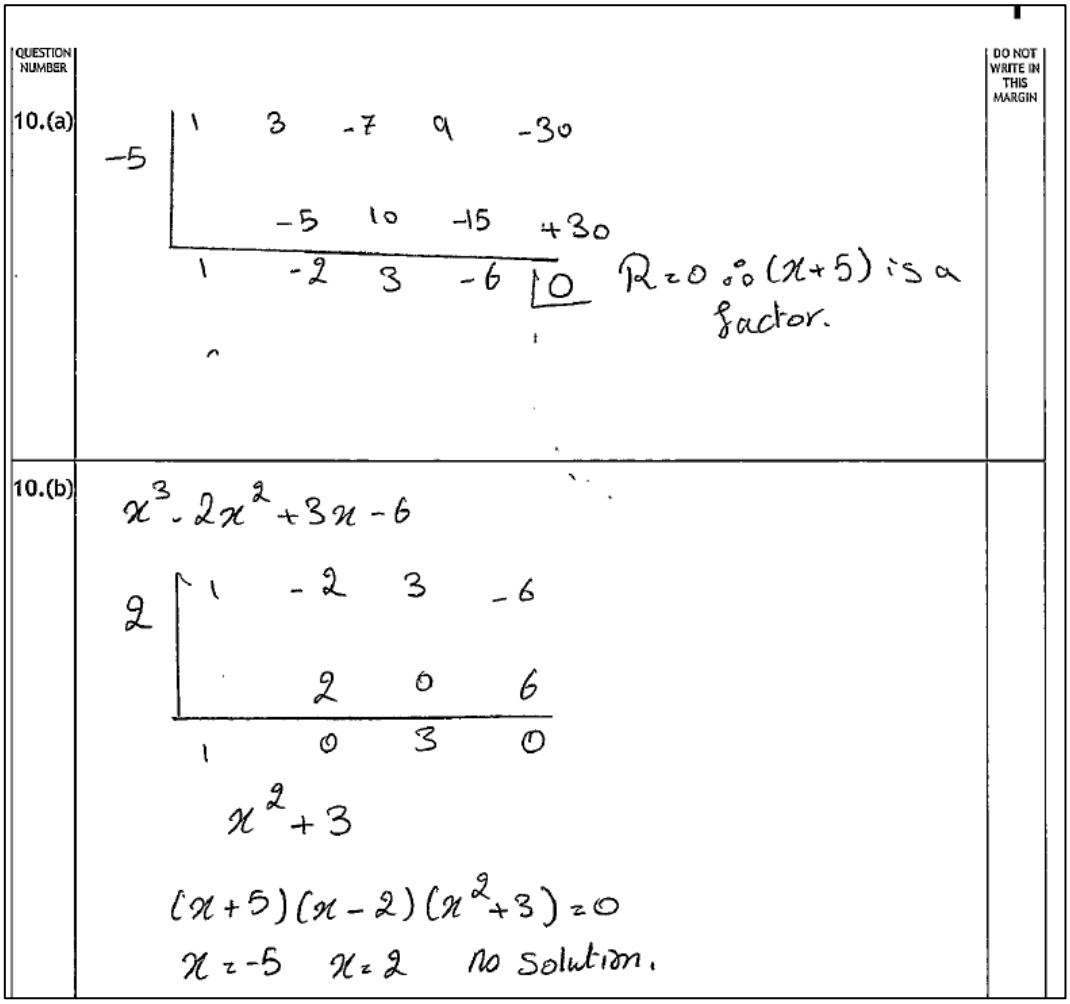
An additional diagram, if required, can be found on *page 13*.

DO NOT WRITE IN THIS MARGIN

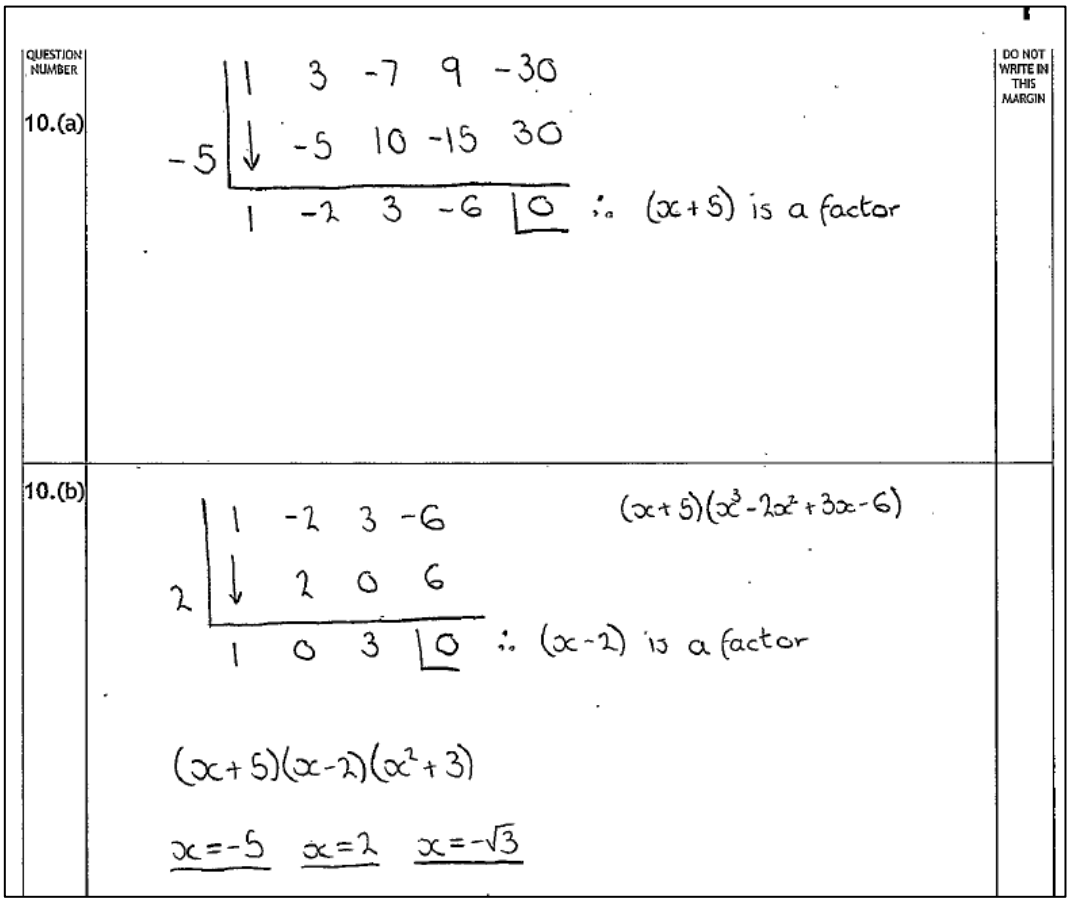


Question 10

Candidate 25



Candidate 26



QUESTION NUMBER

DO NOT WRITE IN THIS MARGIN

10.(a)

$$\begin{array}{r|rrrr} & 1 & 3 & -7 & 9 & -30 \\ -5 & \downarrow & -5 & 10 & -15 & 30 \\ \hline & 1 & -2 & 3 & -6 & 0 \end{array}$$

$\therefore (x+5)$ is a factor

10.(b)

$$\begin{array}{r|rrrr} & 1 & -2 & 3 & -6 \\ 2 & \downarrow & 2 & 0 & 6 \\ \hline & 1 & 0 & 3 & 0 \end{array}$$

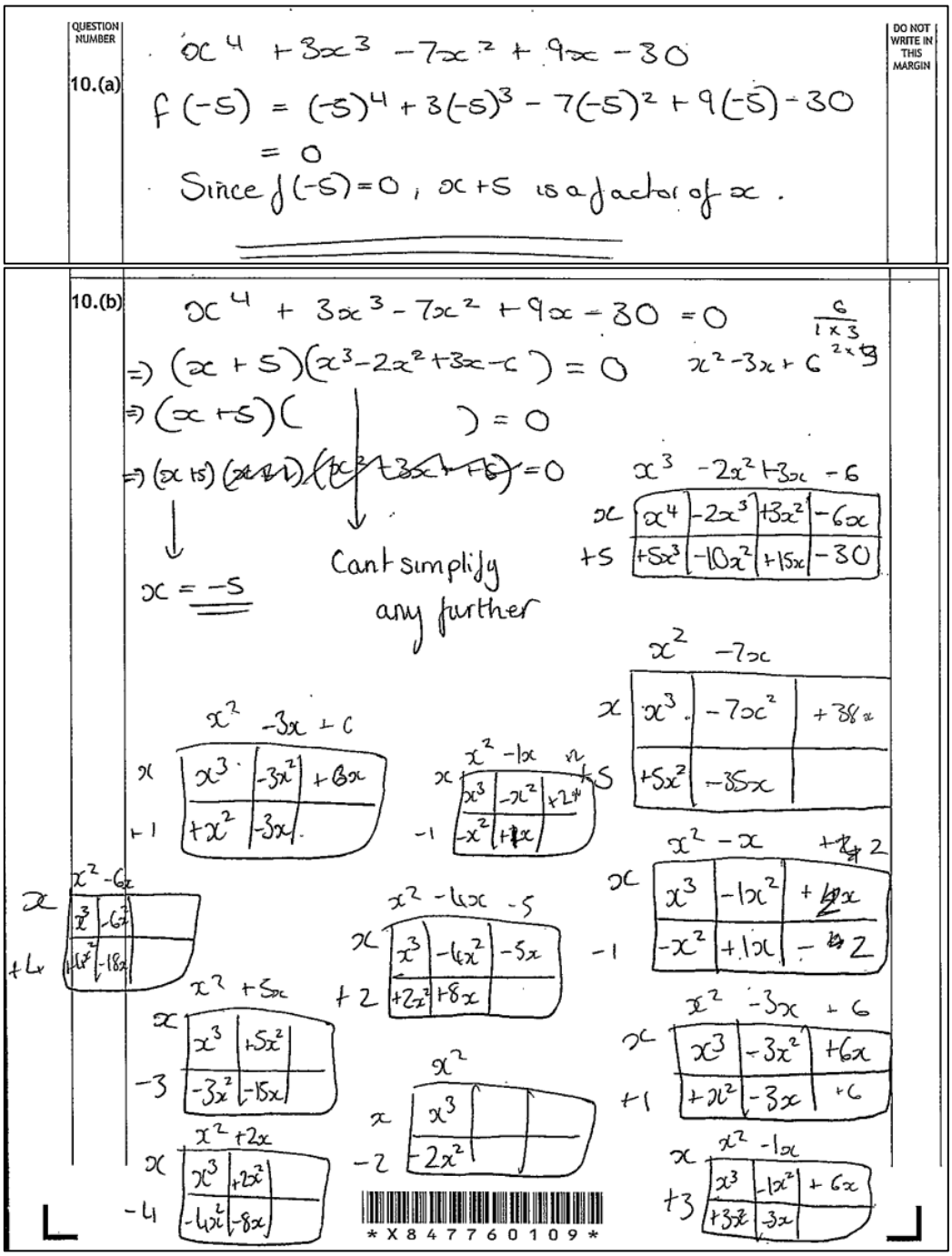
$(x+5)(x^3-2x^2+3x-6)$

$\therefore (x-2)$ is a factor

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

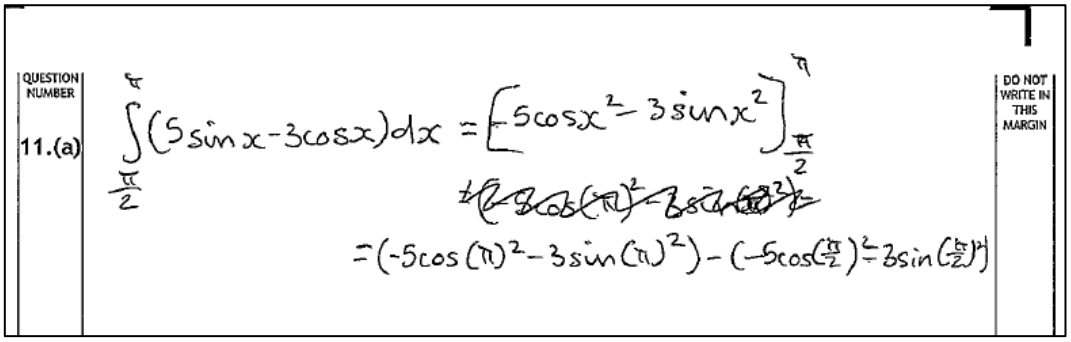
$x=-5 \quad x=2 \quad x=-\sqrt{3}$

Candidate 27

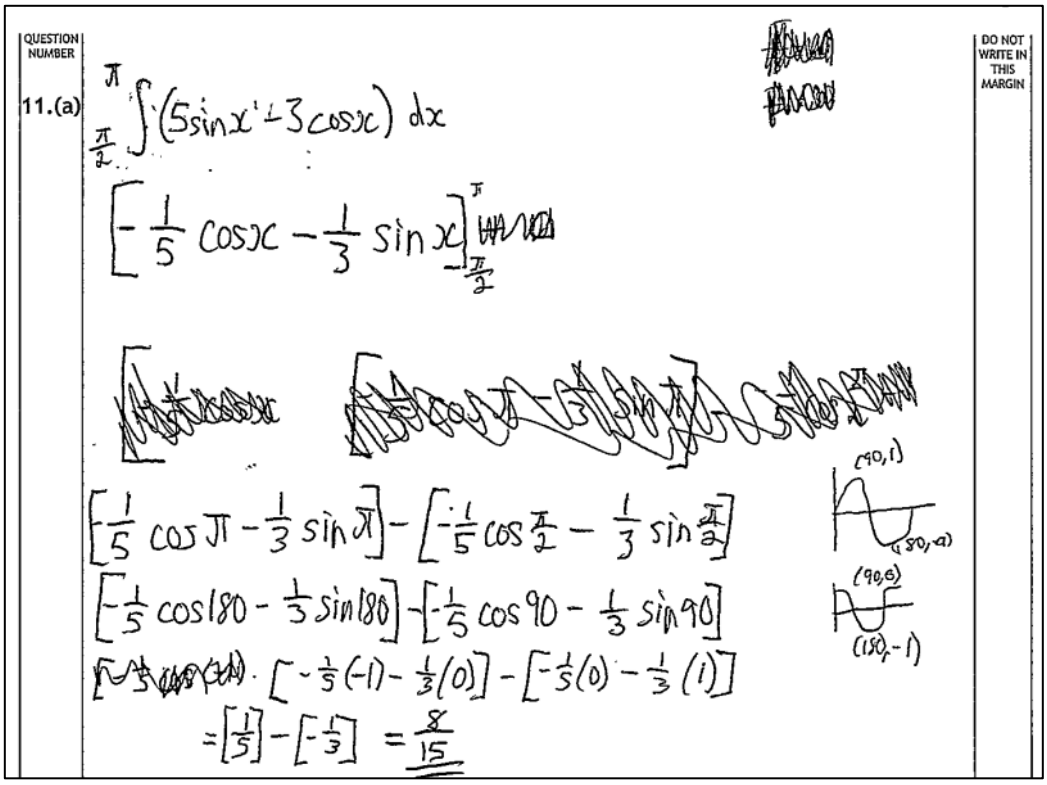


Question 11

Candidate 28



Candidate 29



Candidate 30

QUESTION NUMBER

DO NOT WRITE IN THIS MARGIN

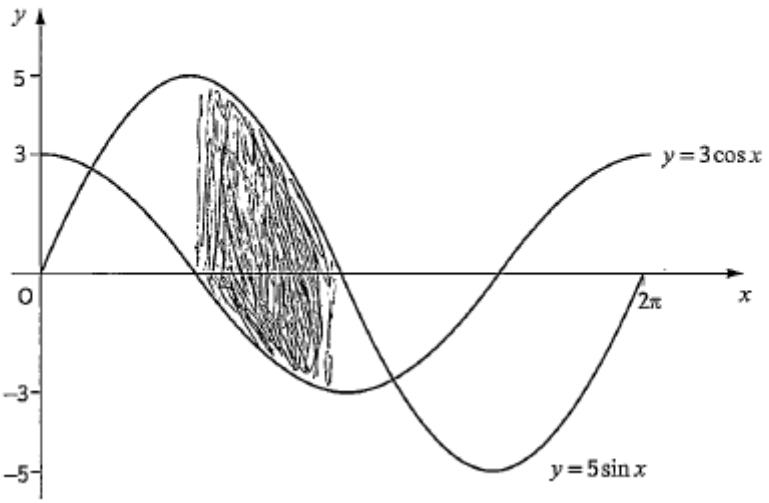
11.(a)

$$\int_{\frac{\pi}{2}}^{\pi} (5\sin x - 3\cos x)\,dx$$

$$= \left[-5\cos x + 3\sin x\right]_{\frac{\pi}{2}}^{\pi}$$

$$= \left[-5\cos\pi - 3\sin\pi\right] - \left[-5\cos\tfrac{\pi}{2} - 3\sin\tfrac{\pi}{2}\right]$$

11.(b) An additional diagram, if required, can be found on *page 14*.



Candidate 31

QUESTION NUMBER

11.(a)

$$\int_{\frac{\pi}{2}}^{\pi} (5\sin x - 3\cos x)\,dx$$

$$\left[-5\cos x - 3\sin x\right]_{\pi/2}^{\pi}$$

$$\left[-5\cos(\pi) - 3\sin(\pi)\right] - \left[-5\cos\left(\tfrac{\pi}{2}\right) - 3\sin\left(\tfrac{\pi}{2}\right)\right]$$

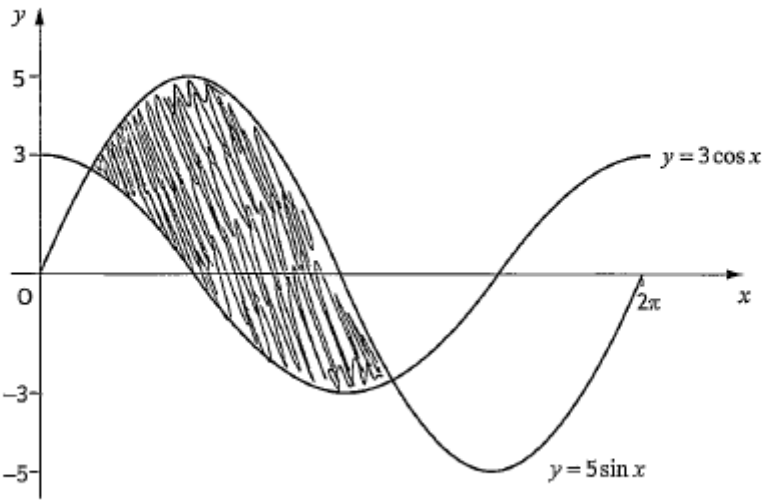
$$[-5(-1) - 3(0)] - [-5(0) - 3(1)]$$

$$[+5] - [-3] = [5] - [-3]$$

$= 8$ units^2

DO NOT WRITE IN THIS MARGIN

11.(b) An additional diagram, if required, can be found on *page 14*.



Candidate 32

QUESTION NUMBER

11.(a) $\int_{\frac{\pi}{2}}^{\pi} (5\sin x - 3\cos x)\,dx$

$\int_{\frac{\pi}{2}}^{\pi} (5\cos x + 3\sin x)\,dx$

$[5\cos\pi + 3\sin\pi] - [5\cos(\frac{\pi}{2}) + 3\sin(\frac{\pi}{2})]$

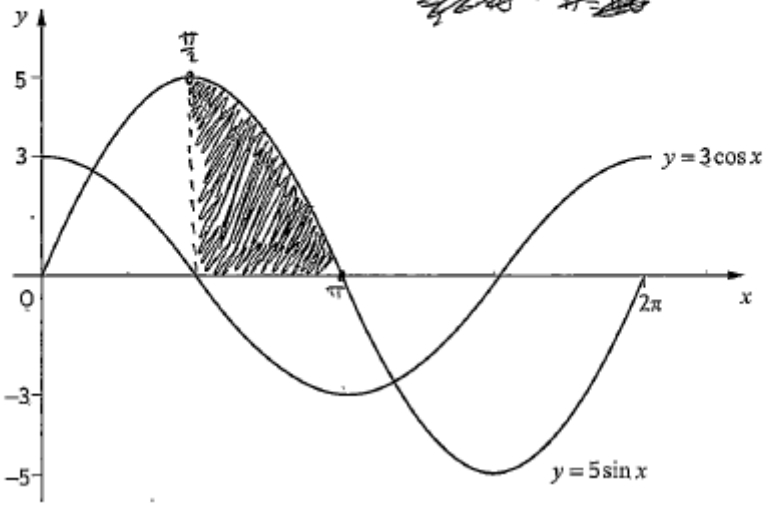
$[5(-1) + 3(0)] - [5(0) + 3(1)]$

$-5 - 3$

$= -8$

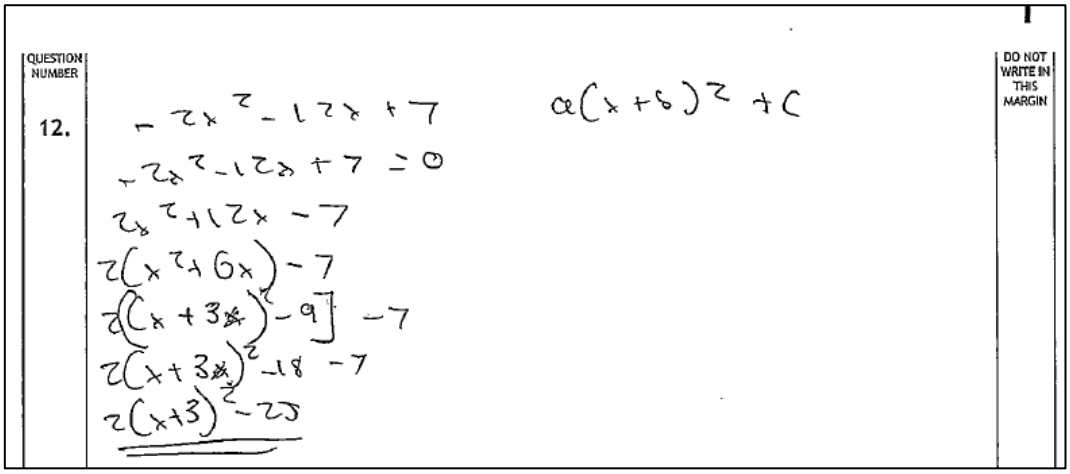
DO NOT WRITE IN THIS MARGIN

11.(b) An additional diagram, if required, can be found on *page 14*.

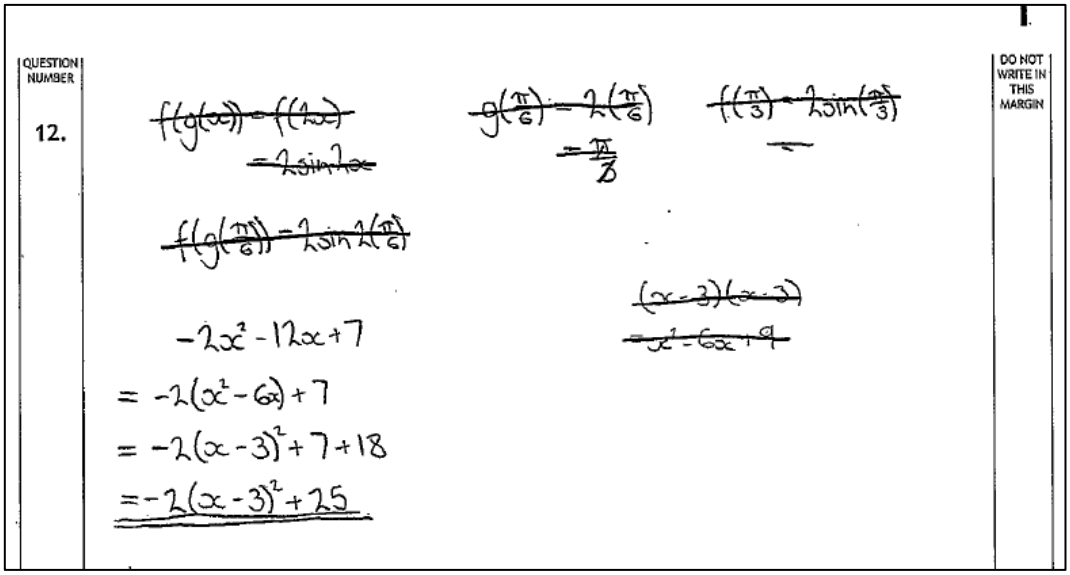


Question 12

Candidate 33



Candidate 34



Question 13

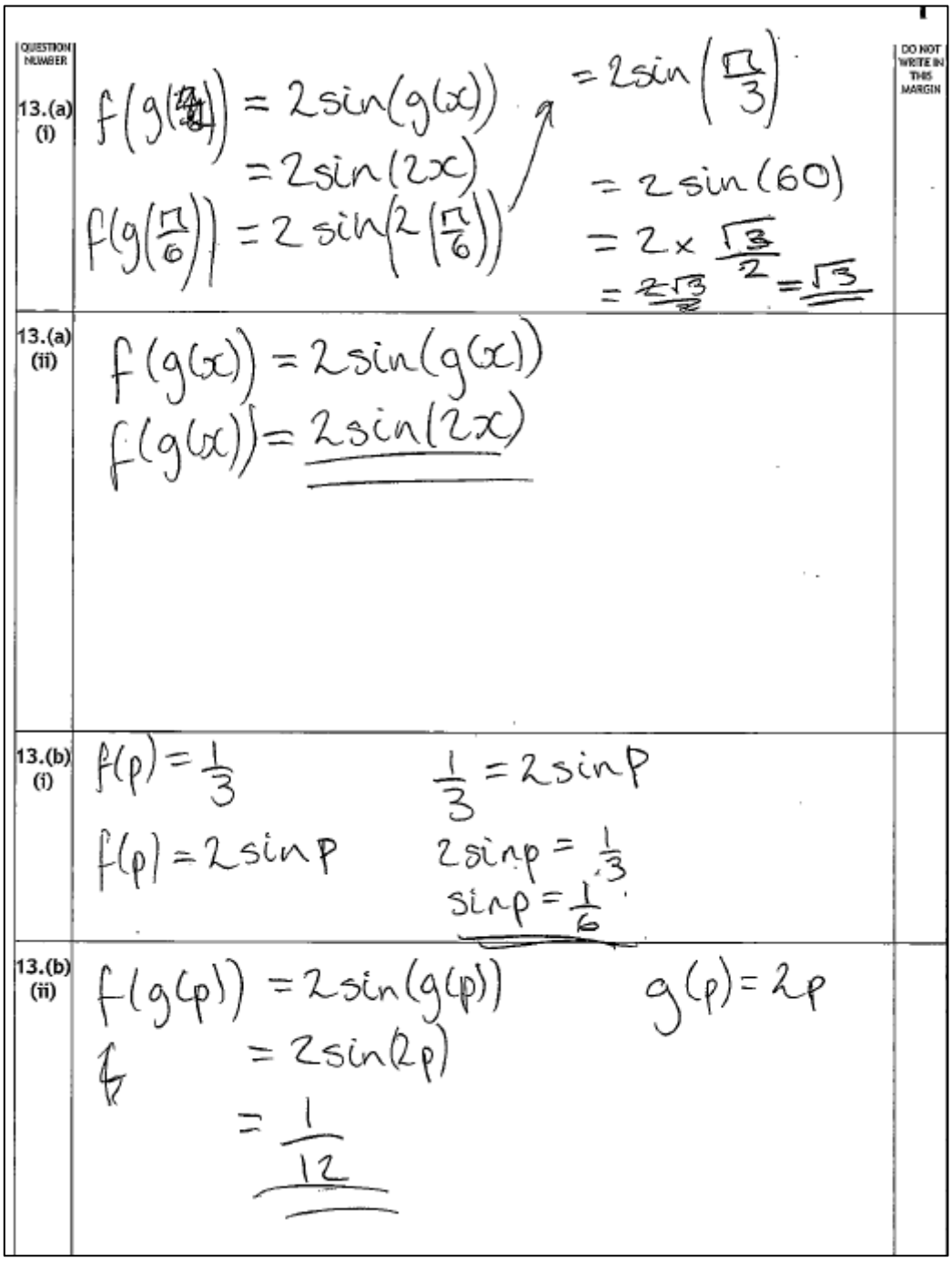
Candidate 35

QUESTION NUMBER		DO NOT WRITE IN THIS MARGIN
13.(a) (i)	$f(x) = 2\sin x$ $g(x) = 2x$ $f(g(x)) = 2\sin 2x$ $f(g(\frac{\pi}{6})) = 2\sin 2(\frac{\pi}{6}) = 2\sin\frac{\pi}{3}$	

Candidate 36

QUESTION NUMBER		DO NOT WRITE IN THIS MARGIN
13.(a) (i)	$g(\frac{\pi}{6}) = 2(\frac{\pi}{6}) = \frac{2\pi}{6}$ $f(g) = 2\sin(\frac{2\pi}{6}) = 2\sin(\frac{\pi}{3}) = 1$	
13.(a) (ii)	$2\sin(\frac{2\pi}{6})$ $2\sin(\frac{\pi}{3})$	
13.(b) (i)	$f(p) = \frac{1}{3}$ $2\sin(p) = \frac{1}{3}$ $\sin p = \frac{1}{6}$	
13.(b) (ii)	$f(g(p)$ $f(g(\frac{1}{6})$ $f(2(\frac{1}{6})$ $f(\frac{2}{3})$ $= 2\sin(\frac{1}{3})$ $= \frac{1}{6}$	

Candidate 37



Candidate 38

QUESTION NUMBER | DO NOT WRITE IN THIS MARGIN

13.(a) (i)

$f(g(x)) = 2\sin x$

~~$f(g(\frac{\pi}{6}))$~~

$f(2(\frac{\pi}{6})) = 2\sin 2\times\frac{\pi}{6}$

$\Rightarrow 2\times\sin(\frac{\pi}{3})$

$\Rightarrow 2\times\frac{1}{2}$

$\Rightarrow 1$

13.(a) (ii)

$f(g(x)) = 2\sin x$

$f(2x) = 2\sin(2x)$

$\Rightarrow 2\sin 2x$

$\Rightarrow 4\sin x\cos x$

13.(b) (i)

$f(p) = \frac{1}{3}$ $\sin p = \frac{1}{6}$

13.(b) (ii)

~~$f(g(p)) = 2\sin x$~~

~~$f(2x$~~

$4\sin x\cos x$

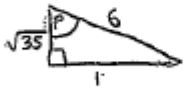
$\Rightarrow 4\times\sin p\times\cos p$

$\Rightarrow 4\times\frac{1}{6}\times\frac{\sqrt{35}}{6}$

$\Rightarrow \frac{4\sqrt{35}}{36}$

$\Rightarrow \frac{\sqrt{35}}{9}$

$\sin p = \frac{1}{6}$ $\cos p = \frac{\sqrt{35}}{6}$



$a^2 = c^2 - b^2$

$a^2 = 6^2 - 1^2$

$a^2 = 36 - 1$

$a = \sqrt{35}$