MUHANGA DISTRICT

MARKING GUID OF CORE MATHEMATICS S6, TERM II,2026

1. The area bounded by the curves $y = x^2$and $y = 2x + 3$is:

A) 12

B) 18

C) 24

D) 30

Answer is A

2. The volume of the solid formed when the region under $y = \sqrt{x}$ from $x = 0$ to $x = 4$ is revolved about the x-axis is:

A) 8π

B) 16π

C) 32π

D) 64π

Answer is A

3. The work done by a force $F(x) = 3x^2$as a particle moves from $x = 1$to $x = 5$is:

A) 96 J

B) 124 J

C) 150 J

D) 180 J

Answer is B

4. Given the function $f(x) = \frac{e^x-2}{e^x+1}$, the value of $f(-3\, ln\, 2)$

A) $-\frac{3}{5}$

B) $-\frac{5}{3}$

C) $-\frac{5}{8}$

D) $\frac{5}{3}$

Sol

$sf(x) = \frac{e^x-2}{e^x+1}$

$f(-3\,ln\,2) = \frac{e^{-3\,ln\,2}-2}{e^{-3\,ln\,2}+1}$

$= \frac{e^{ln\,2^{-3}}-2}{e^{ln\,2^{-3}}+1}$

$= \frac{\frac{1}{8}-2}{\frac{1}{8}+1} = -\frac{15}{9} = -\frac{5}{3}$

Ansuwe is B

5. The length of the arc of the semicubical parabola $y^2 = x^3$ between the point (1, 1) and (4, 8) is

A) $\frac{1}{27}(22\sqrt{22} - 13\sqrt{13})$

B) $\frac{1}{27}(13\sqrt{13} - 22\sqrt{22})$

C) $\frac{1}{27}(8\sqrt{10} - 13\sqrt{13})$

D) $\frac{1}{27}(80\sqrt{10} - 13\sqrt{13})$

sol

For the top half of the curve, we have $y = x^{\frac{3}{2}}$

That means $\frac{dy}{dx} = \frac{3}{2}x^{\frac{1}{2}}$. 1mark

We calculate the arc of length by using the following technics: $L = \int_a^b \sqrt{1 + \left(\frac{dy}{dx}\right)^2}\,dx$ 0.5mark

Therefore

$$L = \int_1^4 \sqrt{1 + \left(\frac{dy}{dx}\right)^2}\,dx = \int_1^4 \sqrt{1 + \frac{9x}{4}}\,dx$$

$u = 1 + \frac{9x}{4} \to du = \frac{9}{4}dx$

$$x = 1 \to u = \frac{13}{4}$$

$x = 4 \to u = 10$

$$L = \frac{4}{9}\int_{\frac{13}{4}}^{10} \sqrt{u}\, du = \frac{4}{9} \times \frac{2}{3} u^{\frac{2}{3}} \Big|_{\frac{13}{4}}^{10}$$

$$= \frac{1}{27}\left(80\sqrt{10} - 13\sqrt{13}\right)$$

Answer is D

6. Determine whether the complex number $3+i\sqrt{2}$ satisfies $x^2-6x+11=0$ 4marks

sol

Replace x by $3+i\sqrt{2}$, we obtain:$(3+i\sqrt{2})^2-6(3+i\sqrt{2})+11$ 1marks $=9+6i\sqrt{2}-2-18-6i\sqrt{2}+11$ 1marks $=0$ 1marks Then, the complex number $3+i\sqrt{2}$ satisfies the equation $x2-6x+11=0$ 1marks

7.a.Determine the order and degree of $x\frac{dy}{dx} + \frac{3}{\frac{dy}{dx}} = y^2$2marks

b.State also if there are linear or non-linear. 1mark

a) $x\frac{dy}{dx} + \frac{3}{\frac{dy}{dx}} = y^2$

$$x\left(\frac{dy}{dx}\right)^2 + 3 = y^2\frac{dy}{dx} \qquad \text{1mark}$$

The order of the highest derivative is 1 (1mark)and its highest positive integral exponent is 2. 1mark

b) It is non-linear differential equation. 1mark
$\frac{dy}{dx}$occurs in second degree and also $y^2$and $\frac{dy}{dx}$are multiplied together.

8. Find the average value of the function $f(x) = 1 + x^2$ on the interval $[-1,2]$

Sol

$$f(x) = 1 + x^2$$

$$f_{ave} = \frac{1}{b-a}\int_a^b f(x)dx \quad \text{1mark}$$

$$= \frac{1}{2+1}\int_{-1}^{2}(1+x^2)dx \quad \text{1mark}$$

$$= 2 \quad \text{1mark}$$

9. $f(x) = a^x$ passes through point $(\sqrt{3}, 8)$. Find the value of a 2marks

S0l

$(\sqrt{3}) = 8$ 0.5marks

$a^{\sqrt{3}} = 8 \Leftrightarrow a^{(\sqrt{3})\frac{1}{\sqrt{3}}} = 2^{(3)\frac{1}{\sqrt{3}}}$ 1marks

$\Leftrightarrow a = 2^{\frac{3}{\sqrt{3}}} = 2^{\sqrt{3}}$ 0.5m

10. Use the Maclaurin's expansion to calculate

a) $\lim_{x\to 0}\frac{1-\cos 4x + x\sin 3x}{x^2}$ 3marks

b) $\lim_{x\to 0}\frac{\ln(1+x)-x}{\sin^2 x}$ 2marks

sol

a) $\lim_{x\to 0}\frac{1-\cos 4x + x\sin 3x}{x^2}$

As $x \to 0, \cos 4x \simeq 1 - \frac{(4x)^2}{2} \simeq 1 - 8x^2$ 0.5marks

$and\ \sin 3x \simeq 3x$ 0.5marks

Then

$\lim_{x\to 0} \frac{1-\cos 4x + x \sin 3x}{x^2}$ 0.5marks

$= \lim_{x\to 0} \frac{1-1+8x^2+3x^2}{x^2}$ 1marks

$= 11$ 0.5marks

b) $\lim_{x\to 0} \frac{\ln(1+x)-x}{\sin^2 x}$

We know that if $x \to 0$:

$\ln(1+x) \simeq x - \frac{x^2}{2}$ 0.5marks

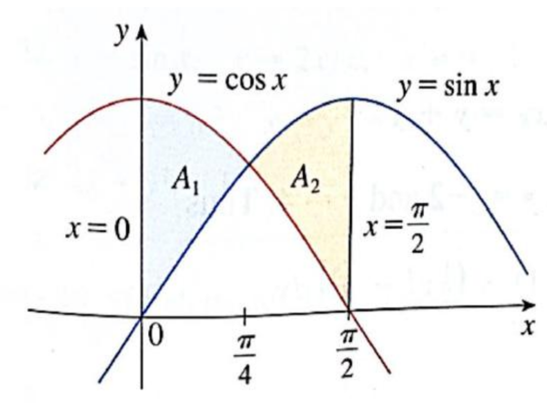
$and\ \sin^2 x \simeq x^2$ 0.5marks

Then $\lim_{x\to 0} \frac{\ln(1+x)-x}{\sin^2 x} = \lim_{x\to 0} \frac{x-\frac{x^2}{2}-x}{x^2}$ 0.5marks

$= -\frac{1}{2}$ 0.5marks

11. Find the area of the region bounded by the curves $y = \sin x$ and $y = \cos x$ where $0 \le x \le \frac{\pi}{2}$ 4mark

Sol.



$A = \int_0^{\frac{\pi}{2}} |\cos x - \sin x|\, dx = A_1 + A_2$ 1mark

$$= \int_0^{\frac{\pi}{4}} (\cos x - \sin x)\, dx + \int_{\frac{\pi}{4}}^{\frac{\pi}{2}} (\sin x - \cos x)\, dx$$ 1mar

$$= \left(\frac{1}{\sqrt{2}} + \frac{1}{\sqrt{2}} - 0 - 1\right) + \left(0 - 1 + \frac{1}{\sqrt{2}} + \frac{1}{\sqrt{2}}\right)$$ 1mark

$= 2\sqrt{2} - 1$ squire unit. 1mark

12. Find the differential equation corresponding to $y^2 = a\left(b - x^2\right)$ by eliminating a and b .**(4 marks**

Sol

$y^2 = a\left(b - x^2\right)$

$\Leftrightarrow y^2 = ab - ax^2$ **1 mark**

Differentiate both sides:

$2y\frac{dy}{dx} = -2ax \Rightarrow y\frac{dy}{dx} = -ax$ **1 mark**

Again, differentiate both sides:

$y\frac{d^2y}{dx^2} + \left(\frac{dy}{dx}\right)^2 = -a$ **1 mark**

$\Rightarrow \frac{dy}{dx} = x\left[y\frac{d^2y}{dx^2} + \left(\frac{dy}{dx}\right)^2\right]$ **1 mark** which is the required differential equation.

13. Solve $\int \frac{e^x+1}{e^x-1} dx$ 4marks

Sol;

$$I = \int \frac{e^x + 1}{e^x - 1} dx = \int \frac{(e^x - 1) + 2}{e^x - 1} dx$$ 1marks

$= \int dx + 2\int \frac{dx}{e^x - 1}$ 1marks

$$= \int dx + 2\int \frac{e^{-x}}{1 - e^{-x}} dx$$ 1marks

$= x + 2\,ln|1 - e^{-x}| + c$ 1marks

14.Given the function $: R \to R: x \to \log_x \sqrt{1 - x^2}$. Find the domain. 2marks

Sol

$f(x) = log_x \sqrt{1 - x^2}$

Condition: $1 - x^2 > 0, x \neq 1, x > 0$ 1marks

x	$-\infty$		-1		1		$+\infty$
$1-x^2$	$-$	$-$	0	$+$	0	$-$	$-$

$Domf: x \in (0,1)$ 1marks

15.Find the value of c if $\lim\limits_{x\to\infty}\left(\frac{x+c}{x-c}\right)^x = 3$ 4marks

Solution

$$\lim_{x\to\infty}\left(\frac{x+c}{x-c}\right)^x = 3$$

$\leftrightarrow \lim\limits_{x\to\infty}\left(1 + \frac{2c}{x-c}\right)^x = 3$ 1mark

$x - c = 2ct \leftrightarrow x = 2ct + c$

$x \to \infty, t \to \infty$

$\lim\limits_{t\to\infty}\left(1 + \frac{1}{t}\right)^{2ct+c} = 3$ 1mark

$\leftrightarrow \lim\limits_{t\to\infty}\left[\left(1 + \frac{1}{t}\right)^t\right]^{2c}\left(1 + \frac{1}{t}\right)^c = 3$ 0.5marks

$\leftrightarrow e^{2c} \times 1 = 3$ 0.5marks

$\leftrightarrow 2c = ln\,3$

$\to c = \frac{ln\,3}{2}$ 1mark

SECTION B;

16.

a) Calculate the integral $\int_0^{2\pi} |sinx| dx$ **(5marks)**

b) Using integral rules, Compute the circumference of a circle centred at the origin. **(10 marks)**

Sol

a) $\int_0^{2\pi} |\sin x| dx$

$|\sin x| = \begin{cases} \sin x & if \ \sin x \geq 0 \\ -\sin x & if \ \sin x < 0 \end{cases}$ **1 mark**

$\Rightarrow \int_0^{2\pi} |\sin x| dx = \int_0^{\pi} \sin x dx - \int_{\pi}^{2\pi} \sin x dx$ **1 mark**

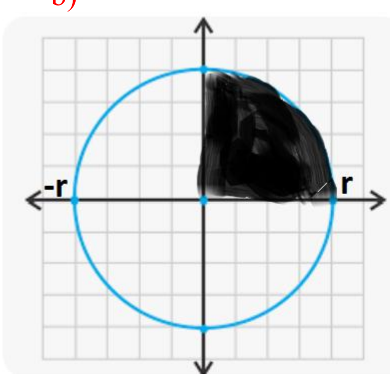
$\Leftrightarrow \int_0^{2\pi} |\sin x| dx = -\cos x\Big|_0^{\pi} + \cos x\Big|_{\pi}^{2\pi}$ **1 mark**

$\Leftrightarrow \int_0^{2\pi} |\sin x| dx = -\cos \pi - (-\cos 0) + [\cos 2\pi - \cos \pi]$ **1 mark**

$\Leftrightarrow \int_0^{2\pi} |\sin x| dx = 1+1+1+1$ **0.5 marks**

$\Rightarrow \int_0^{2\pi} |\sin x| dx = 4\, U.A$ **0.5 marks**

b)



Consider the arc of the circonference when $y > 0$ and $r > 0$.

$x^2 + y^2 = r^2$ **0.5 marks**

$y = \pm\sqrt{r^2 - x^2}$ **0.5 marks**

$y' = \dfrac{-x}{\sqrt{r^2 - x^2}}$ **0.5 marks**

$Arc = \int_a^b \sqrt{1 + (y')^2}\,dx$ **0.5 marks**

$\Leftrightarrow Arc = \int_0^r \sqrt{1 + \left(\dfrac{-x}{\sqrt{r^2 - x^2}}\right)^2}\,dx$ **0.5 marks**

$\Leftrightarrow Arc = \int_0^r \sqrt{1 + \dfrac{x^2}{r^2 - x^2}}\,dx$ **0.5 marks**

$\Leftrightarrow Arc = \int_0^r \sqrt{\dfrac{r^2 - x^2 + x^2}{r^2 - x^2}}\,dx$ **0.5 marks**

$\Leftrightarrow Arc = r\int_0^r \dfrac{dx}{\sqrt{r^2 - x^2}}$ **0.5 marks**

$\Leftrightarrow Arc = r \arcsin \dfrac{x}{r}\Big|_0^r$ **0.5 marks**

$\Rightarrow Arc = r \arcsin 1 - 0 = \dfrac{r\pi}{2}\ Units\ of\ length$ **0.5 marks**

Hence the total length is

$C = 4Arc = 4 \times \dfrac{r\pi}{2}\ Units\ of\ length = 2r\pi\ Units\ of\ length$ **1 mark**

17 a) Show that $y = Ae^{-2x} + Be^{x}$ is a general solution of the differential equation : $y'' + y' - 2y = 0$ and find the particular solution that satisfies the condition $y = y' = 1$ when $x = 0$ **(8 marks)**

b) Calculate the area of the surface bounded by the curve:

$x = 6(\theta - sin\theta)\ and\ y = 6(1 - cos\theta)\ ,\ \ where\ 0 \le t \le 2\pi$ **(7 marks)**

$y = Ae^{-2x} + Be^{x}$

$\Leftrightarrow y' = -2Ae^{-2x} + Be^{x}$ ……………**1 marks**

$\Leftrightarrow y'' = 4Ae^{-2x} + Be^{x}$ …………..**1marks**

$y'' + y' - 2y = 0$ …………………………...**1marks**

$\Leftrightarrow 4Ae^{-2x} + Be^{x} + \left(-2Ae^{-2x} + Be^{x}\right) - 2\left(Ae^{-2x} + Be^{x}\right) = 0$ ……………**1marks**

$\Leftrightarrow 4Ae^{-2x} + Be^{x} - 2Ae^{-2x} + Be^{x} - 2Ae^{-2x} - 2Be^{x} = 0$
$\Leftrightarrow 4Ae^{-2x} - 4Ae^{-2x} + 2Be^{x} - 2Be^{x} = 0$ ……………..**1 marks**

$\begin{cases} 1 = A + B \\ 1 = -2A + B \end{cases}$ ………………………1 **marks**

$A = 0 \quad and \quad B = 1$ …………………**1marks**

$y = e^{x}$ ………………………**1 marks**

B) $x = 6(\theta - \sin\theta)$ *and* $y = 6(1 - \cos\theta)$

$0 \le \theta \le 2\pi$

$A = \int_{a}^{b} f(x)dx = \int_{a}^{b} ydx$

$\frac{dx}{d\theta} = \frac{d}{d\theta}(6\theta - 6\sin\theta) = 6(1 - \cos\theta)d\theta$ ………………**1 marks**

$A = \int_{0}^{2\pi} 36(-\cos\theta)(-\cos\theta)d\theta$ ………………**1 marks**

$\Leftrightarrow A = \int_{0}^{2\pi} 36(-\cos\theta)^{2}d\theta$ …………………**1 marks**

$\Leftrightarrow A = 36\int_{0}^{2\pi}\left(1 - 2\cos\theta + \cos^{2}\theta\right)d\theta$ ………………..**1marks**

$\Leftrightarrow A = 36\int_{0}^{2\pi}\left(1 - 2\cos\theta + \frac{1 + \cos 2\theta}{2}\right)d\theta$ ……………….. **1marks**

$\Leftrightarrow A = 36\int_{0}^{2\pi}\left(\frac{3}{2} - 2\cos\theta + \frac{\cos 2\theta}{2}\right)d\theta$ ……………………..**1marks**

$$\Leftrightarrow A=36\left[\frac{3}{2}\theta-2\sin\theta+\frac{1}{4}\sin 2\theta\right]_0^{2\pi}$$ ……………………………**0.5 marks**

$$\Rightarrow A=108\pi \text{ units of area}$$ ………………………………………sss**0.5 marks**

18. Consider the polynomial $P(x)=a_3x^3+a_2x^2+a_1x+a_0$, with a_0,a_1,a_2,a_3 coefficients of the polynomial. Given that:

$$P(1+2i)=0,\quad P(2)=0,\quad P(0)=20$$

Determine the coefficients of $P(x)$. **(15 marks)**

Sol $P(0)=20\Rightarrow a_0=20$ ……………………………… **2 marks**

$$P(1+2i)=0\Rightarrow a_3(1+6i-12-8i)+a_2(1+4i-4)+a_1(1+2i)+20=0$$

$$(-11-2i)a_3+(-3+4i)a_2+(1+2i)a_1+20=0$$ …………………………….(2) **1 mark**

$$P(1-2i)=0\Rightarrow a_3(1-6i-12+8i)+a_2(1-4i-4)+a_1(1-2i)+20=0$$

$$(-11+2i)a_3+(-3-4i)a_2+(1-2i)a_1+20=0$$ …………………………(3) **1 mark**

(Conjugates zero theorem of polynomials)

$$P(2)=0\Rightarrow 8a_3+4a_2+2a_1+20=0$$

…………………………………………..…………...(4) **1 mark**

From (1),(2),(3) and (4) above, we get:

$$\begin{cases}(-11-2i)a_3+(-3+4i)a_2+(1+2i)a_1=-20\\(-11+2i)a_3+(-3-4i)a_2+(1-2i)a_1=-20\\8a_3+4a_2+2a_1=-20\end{cases}\quad(\xi)$$ **2 marks**

Solving the system of linear equation in (ξ) (Crammer's method "Sarrus expansion"), we get:

$\Delta = -200i$ $\Delta_1 = 3600i$ $\Delta_2 = -1600i$ **4 marks** $\Delta_3 = 400i$

$\therefore a_0 = 20, \quad a_1 = -18, \quad a_2 = 8, \quad a_3 = -2$ **3 marks**

$P(x) = -2x^3 + 8x^2 - 18x + 20$ **1 mark**

19. $f(x) = xe^{-x}$

a) Find the domain of $f(x)$ **(1 mark)**
b) Determine the party of $f(x)$ **(2 marks)**
c) Find the intersection points of $f(x)$ **(1 mark)**
d) Determine the limit on bounding points and asymptotes of $f(x)$ **(4 marks)**
e) Find the variation tables of $f(x)$ **(6 marks)**
f) Sketch the graph of $f(x)$ **(1 mark)**

$f(x) = xe^{-x}$

a) Dom $f(x) = \Re$ **1 mark**
b) Parity: $f(-x) = -xe^{x} \neq f(x)$ **0.5 marks**
$-f(-x) = xe^{x} \neq f(x)$: **0.5 marks**
Neither even nor odd **1 mark**
c) Intersecting points:
$C \cap 0X \equiv \{(0,0)\}$ **0.5 marks**
$C \cap 0Y \equiv \{(0,0)\}$ **0.5 marks**
d) Limits on bounding points and asymptotes:
$VA \equiv x = a\Big|_{a \text{ point on boundary}} : \lim_{x\to a} f(x) = \infty$: not admitted. **1 mark**
$HA \equiv y = b\big|_{b\in\Re} : \lim_{x\to\infty} f(x) = b \Rightarrow \lim_{x\to\infty} xe^{-x} = \lim_{x\to\infty} \frac{x}{e^x} = \frac{\infty}{\infty}$: **1 mark** Indeterminate case

By Hospital rule,

$\lim_{x\to\infty} \frac{x}{e^x} = \lim_{x\to\infty} \frac{1}{e^x} = 0$ **0.5 marks**

$HA \equiv y = 0$ **0.5 marks**

No slant asymptote admitted. **1 mark**

e) Variation table :

Step 1:Study of f':

i) $f'(x) = \left(xe^{-x}\right)' = e^{-x} - xe^{-x} = e^{-x}(1-x)$ **0.5 marks**

ii) $f'(x) = 0 \Rightarrow x = 1$:critical point of the function(at $x = 1$,the tangent line is horizontal)**0.5 marks**

iii)T.V of f for f' and extrema points**0.5 marks**

x	$-\infty$ 1 $+\infty$
$f'(x)$	++++++++++++++++++++0--------------------------------
$f(x)$	↗ Max: $\left(1, \frac{1}{e}\right)$ ↘

1 mark

Step 2:Study of f'':

i) $f''(x) = \left[(1-x)e^{-x}\right]' = (x-2)e^{-x}$ **0.5 marks**

ii) $f''(x) = 0 \Rightarrow x = 2$, inflection point is $\left(2, \frac{2}{e^2}\right)$**0.5 marks**

iii)T.V of f for f'' and nature of concavity:**0.5 marks**

x	$-\infty$ 2 $+\infty$
$f''(x)$	--------------------------------0++++++++++++++++++++++++
$f(x)$	∩ ∪

1 mark

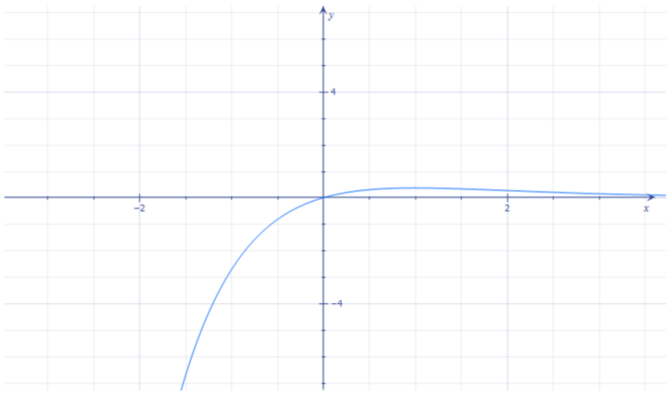
Step 3: Table of variation of f

x	$-\infty$ 1 2 $+\infty$
$f'(x)$	+++++++++++++++++++0--------------------------------------
$f''(x)$	--------------------------------------0+++++++++++++++++++++
$f(x)$	↗ ∩ ↘ ∪

1 mark

e) Graph

x	-4	-3	-2	-1	0	1	2	3	4
$f(x)$	$-4e^4$	$-3e^3$	$-2e^2$	$-e$	0	e^{-1}	$2e^{-2}$	$3e^{-3}$	$4e^{-4}$



1 mark

20. Find the particular solution of the differential equation:

$7x(x-y)dy = 2(x^2+6xy-5y^2)dx$ given that $x=1$ when $y=0$ 15marks

Sol$7x(x-y)dy = 2(x^2+6xy-5y^2)dx$

the differential equation is homogeneous

$\frac{dy}{dx} = \frac{2(x^2+6xy-5y^2)}{7x(x-y)}$ 1mark

let $y = ux \rightarrow \frac{dy}{dx} = x\frac{du}{dx} + u$ 1mark

$x\frac{du}{dx} + u = \frac{2(x^2+6x(ux)-5(ux)^2)}{7x(x-ux)}$ 1mark

$$= \frac{2x^2(1+6u-5u^2)}{7x^2(1-u)} = \frac{2(1+6u-5u^2)}{7(1-u)}$$ 1mark

$x\frac{du}{dx} = \frac{2(1+6u-5u^2)}{7(1-u)} - u$ 0.5mark $= \frac{2(1+6u-5u^2)-7(1-u)u}{7(1-u)}$ 0.5mark

$$= \frac{2+12u-10u^2-7u+7u^2}{7(1-u)} = \frac{-3u^2+5u+2}{7(1-u)}$$ 0.5mark

$\frac{7(1-u)}{-3u^2+5u+2}du = \frac{dx}{x}$ 0.5mark

$\int \frac{7(1-u)}{-3u^2+5u+2} du = \int \frac{dx}{x}$ 0.5mark

$\frac{7(1-u)}{-3u^2+5u+2} = \frac{7(1-u)}{-(u-2)(3u+1)} = \frac{-7(1-u)}{(u-2)(3u+1)}$ 0.5mark

$= \frac{a}{u-2} + \frac{b}{3u+1} = \frac{a(3u+1)+b(u-2)}{(u-2)(3u+1)}$ 0.5mark

$-7(1-u) = a(3u+1) + b(u-2)$ 0.5mark

Let $u = 2$, then $-7(1-2) = a(6+1)$ 0.5mark

,

$7a = 7 \quad \rightarrow a = 1$ 0.5mark

Let $u = -\frac{1}{3}$, then $-7\left(1+\frac{1}{3}\right) = b(-\frac{1}{3} - 2)$, 0.5mark

$-\frac{7}{3}b = \frac{-28}{3}, \quad \rightarrow b = 4$ 0.5mark

$\frac{7(1-u)}{-3u^2+5u+2} = \frac{1}{u-2} + \frac{4}{3u+1}$ 0.5mark

$\int \frac{7(1-u)}{-3u^2+5u+2} du = \int \frac{dx}{x}$ 0.5mark

$\int \frac{7(1-u)}{-3u^2+5u+2} du = \int \frac{1}{u-2} + \frac{4}{3u+1} du$ 0.5mark

$= \ln(u-2) + \frac{4}{3}\ln(3u+1)$ 1mark

$ln\left((u-2)(3u+1)^{\frac{4}{3}}\right) = \ln(Ax)$0.5mark

$(u-2)(3u+1)^{\frac{4}{3}} = Ax$ 0.5mark

$or\ y = ux \rightarrow u = \frac{y}{x}$

$\left(\frac{y}{x} - 2\right)\left(3\frac{y}{x} + 1\right)^{\frac{4}{3}} = Ax$ 0.5mark

$\leftrightarrow \quad \left(\frac{y-2x}{x}\right)\left(\frac{3y+x}{x}\right)^{\frac{4}{3}} = Ax$0.5mark

When $x = 1$ $y = 0$, $\quad \left(\frac{0-2}{1}\right)\left(\frac{0+1}{1}\right)^{\frac{4}{3}} = A \rightarrow A = -2$, 1mark

Thus, the particular solution is

$\left(\frac{y-2x}{x}\right)\left(\frac{3y+x}{x}\right)^{\frac{4}{3}} = -2x$ 0.5mark