



Subject/Topic:

Date:

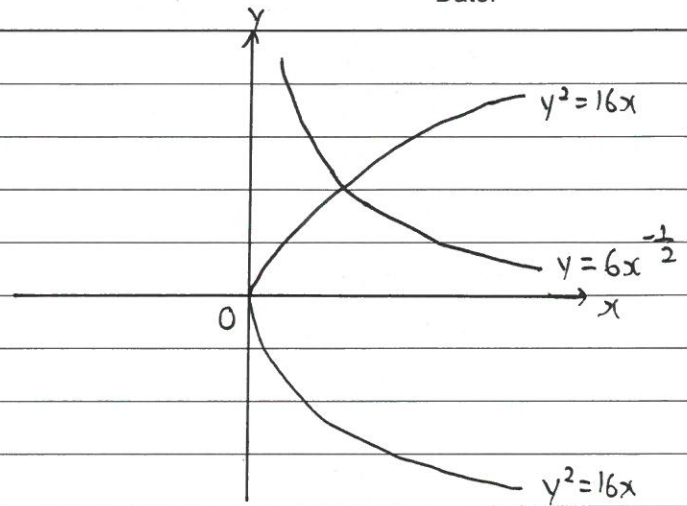
4a Of course if $3+2\sqrt{5}$ is a root
its conjugate $3-2\sqrt{5}$ is also a root

5(i)

$$\begin{aligned} \text{Sum of roots} &= 3+2\sqrt{5} + 3-2\sqrt{5} \\ &= 6 \end{aligned}$$

$$\begin{aligned} \text{Product of roots} &= (3+2\sqrt{5})(3-2\sqrt{5}) \\ &= 9-20 \\ &= -11 \end{aligned}$$

Equation is $x^2-6x-11=0$
with $a=-6$ and $b=-11$



(ii) Intersection occurs when

$$\begin{aligned} \text{b Breadth} &= \frac{24+\sqrt{98}}{6+\sqrt{12}} \\ &= \frac{24+\sqrt{16}\sqrt{3}}{6+\sqrt{12}\sqrt{3}} \\ &= \frac{24+4\sqrt{3}}{6+2\sqrt{3}} \\ &= \frac{2(12+2\sqrt{3})}{2(3+\sqrt{3})} \\ &= \frac{12+2\sqrt{3}}{3+\sqrt{3}} \\ &= \frac{(12+2\sqrt{3})(3-\sqrt{3})}{(3+\sqrt{3})(3-\sqrt{3})} \\ &= \frac{36-12\sqrt{3}+6\sqrt{3}-6}{9-3} \\ &= \frac{30-6\sqrt{3}}{6} \\ &= 5-\sqrt{3} \end{aligned}$$

$$\begin{aligned} (6x^{-1/2})^2 &= 16x \\ 36x^{-1} &= 16x \\ \frac{36}{16} &= x^2 \\ x^2 &= \frac{36}{16} \\ &= \frac{9}{4} \\ x &= +\frac{3}{2} \quad (\text{curves are not defined at } x=-\frac{3}{2}) \\ y &= 6x^{-1/2} \\ &= 6\left(\frac{3}{2}\right)^{-1/2} \\ &= 6\left(\frac{2}{3}\right)^{1/2} \\ &= \frac{6\sqrt{2}}{\sqrt{3}} \\ &= \frac{2\sqrt{2}\sqrt{3}\sqrt{3}}{\sqrt{3}} \\ &= 2\sqrt{2}\sqrt{3} \\ &= 2\sqrt{6} \end{aligned}$$

5(ii)

Coordinates are $(\frac{3}{2}, 2\sqrt{6})$

Tuition classes for English, Math (including E Maths & A Maths), Science (including combined science [phy/chem/bio]), Physics, Chemistry, Biology, Social Studies/Geography/History and Principles of Accounts (POA). Secondary 1 to Secondary 4.





Subject/Topic: A Maths P1

Date:

$$\begin{aligned}
6(i) \quad \log_3 x + \log_9 x &= \log_3 x + \frac{\log_3 x}{\log_3 9} \\
&= \log_3 x + \frac{1}{2} \log_3 x \\
&= \frac{3}{2} \log_3 x \\
&= \frac{3}{2} \cdot \frac{\log_{10} x}{\log_{10} 3} \\
&= \frac{3 \log x}{2 \log 3}
\end{aligned}$$

$$(ii) \quad \frac{dV}{dt} = 18\pi \text{ cm}^3/\text{s}$$

$$\begin{aligned}
\frac{dV}{dx} &= \frac{1}{3}\pi \left[x^2 \cdot \frac{d}{dx}(36-x) + (36-x) \cdot \frac{d}{dx}(x^2) \right] \\
&= \frac{1}{3}\pi \left[x^2(-1) + (36-x)(2x) \right] \\
&= \frac{1}{3}\pi (-x^2 + 72x - 2x^2) \\
&= \frac{1}{3}\pi (72x - 3x^2) \\
&= \pi (24x - x^2)
\end{aligned}$$

$$\begin{aligned}
(ii) \quad \log_3 x + \log_9 x &= 4 \\
\frac{3 \log x}{2 \log 3} &= 4 \\
3 \log x &= 8 \log 3 \\
\log x &= \frac{8}{3} \log 3 \\
&= \log 3^{8/3} \\
x &= 3^{8/3} \\
&= 18.72075441 \\
&\approx 18.7
\end{aligned}$$

$$\begin{aligned}
\text{When } x=9, \quad \frac{dV}{dx} &= \pi [24(9) - 9^2] \\
&= 135\pi \text{ cm}^2
\end{aligned}$$

$$\begin{aligned}
\frac{dV}{dt} &= \frac{dV}{dx} \cdot \frac{dx}{dt} \\
18\pi &= 135\pi \cdot \frac{dx}{dt} \\
\frac{dx}{dt} &= \frac{2}{15} \text{ cm/s} \\
&\approx 0.133 \text{ cm/s}
\end{aligned}$$

7(i) When depth = 9 cm, x



$$\begin{aligned}
8(i) \quad 8 \sin^2 x + 2 \cos^2 x &= 8 \sin^2 x + 8 \cos^2 x - 6 \cos^2 x \\
&= 8 (\sin^2 x + \cos^2 x) - 6 \left(\frac{\cos 2x + 1}{2} \right) \\
&= 8(1) - 3 \cos 2x - 3 \\
&= 5 - 3 \cos 2x
\end{aligned}$$

= π rad

When depth below centre reaches 9 cm,

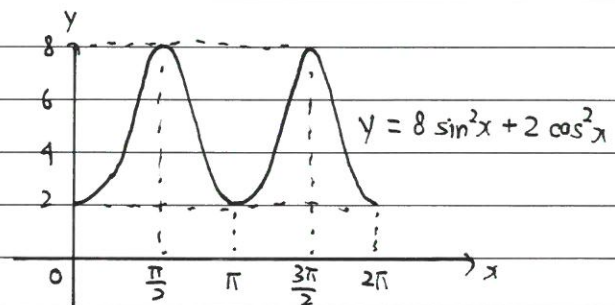
$$(ii) \quad \text{Per} = \frac{2\pi}{3/2} \quad \text{Amp} = 3 \text{ (not } -3)$$

$$x = 9$$

$$\begin{aligned}
V &= \frac{1}{3}\pi (9)^2 (36-9) \\
&= 729\pi \text{ cm}^3
\end{aligned}$$

$$\begin{aligned}
\text{Time taken} &= \frac{729\pi}{18\pi} \\
&= 40.5 \text{ s}
\end{aligned}$$

(iii)



Tuition classes for English, Math (including E Maths & A Maths), Science (including combined science [phy/chem/bio]), Physics, Chemistry, Biology, Social Studies/Geography/History and Principles of Accounts (POA). Secondary 1 to Secondary 4.

