

C2 - Ionawr 2013 - Atebion 5 mesynn → 4 stribed

<u>①</u>	<u>x</u>	<u><math>\sqrt{10-x^3}</math></u>	<u><math>h = \frac{2-0}{4} = \frac{1}{2}</math></u>
0		3.16227766	
0.5		3.142451272	
1		3	
1.5		2.573907535	
2		1.414213562	

$$= \frac{0.5}{2} \left( 3.16227766 + 1.414213562 + 2(3.142451272 + 3 + 2.573907535) \right)$$

$$= \underline{\underline{5.5023}}$$

$$\textcircled{2}(a) 7\sin^2\theta - \sin\theta = 3\cos^2\theta. \quad \cos^2\theta = 1 - \sin^2\theta.$$

$$7\sin^2\theta - \sin\theta = 3(1 - \sin^2\theta)$$

$$7\sin^2\theta - \sin\theta = 3 - 3\sin^2\theta.$$

$$10\sin^2\theta - \sin\theta - 3 = 0$$

$$x = \sin\theta, \quad 10x^2 - x - 3 = 0$$

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

$$x = \frac{3}{5}, \quad x = -\frac{1}{2}.$$

$$\sin\theta = \frac{3}{5}$$

$$\sin\theta = -\frac{1}{2}.$$

$$\theta = \sin^{-1}\left(\frac{3}{5}\right) = \underline{\underline{36.9^\circ}}, \underline{\underline{143.1^\circ}}$$

$$\theta = \sin^{-1}\left(-\frac{1}{2}\right) = -30^\circ$$

$$\theta = \underline{\underline{210^\circ}}, \underline{\underline{330^\circ}}$$

$$\textcircled{2}(b) \quad 3x - 20 = \tan^{-1}(1.28)$$

$$3x - 20 = 52^\circ, 232, 412.$$

$$x = \underline{\underline{24^\circ, 84^\circ, 144^\circ}}$$

$$\textcircled{3}(a) \quad x^2 = (x+4)^2 + 10^2 - 2 \times 10 \times (x+4) \times \cos \alpha$$

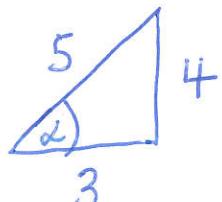
$$\cancel{x^2} = \cancel{x^2} + 8x + 16 + 100 - 20x \cos \alpha - 80 \cos \alpha$$

$$0 = 8x + 116 - 20x \times \frac{3}{5} - 80 \times \frac{3}{5}$$

$$0 = -20x + 68.$$

$$x = \frac{68}{-20} = \cancel{-17}$$

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



$$(b) \quad A = \frac{1}{2} ab \sin \alpha.$$

$$\sin \alpha = \frac{4}{5}.$$

$$= \frac{1}{2} \times 10 \times 2 \times \frac{4}{5}$$

$$= \underline{\underline{84 \text{ cm}^2}}$$

$$\textcircled{4} \text{ (a)} \quad a = 1, d = 4.$$

$$\begin{aligned}\text{(i) } n\text{th term} &= a + (n-1)d \\ &= 1 + 4(n-1) \\ &= 1 + 4n - 4 \\ &= \underline{\underline{4n-3}}\end{aligned}$$

$$\text{(ii) } S_n = 1 + 5 + \dots + (4n-7) + (4n-3). \textcircled{1}$$

$$S_n = (4n-3) + (4n-7) + \dots + 5 + 1. \textcircled{2}$$

$$\textcircled{1} + \textcircled{2} \quad 2S_n = (4n-2) + (4n-2) + \dots + (4n-2)$$

$$2S_n = n(4n-2)$$

$$S_n = \frac{n}{2}(4n-2)$$

$$\underline{\underline{S_n = n(2n-1)}}$$

$$\text{(b) } S_{10} = 55$$

$$\frac{n}{2}(2a + (n-1)d) = 55$$

$$5(2a + 9d) = 55$$

$$\underline{\underline{2a + 9d = 11}} \quad \textcircled{1}$$

$$(a+3d) + (a+6d) + (a+8d) = 27$$

$$\underline{\underline{3a + 17d = 27}} \quad \textcircled{2}$$

$$\textcircled{1} \times 3 \quad 6a + 27d = 33 \quad \textcircled{3}$$

$$\textcircled{2} \times 2 \quad 6a + 34d = 54 \quad \textcircled{4}$$

$$\textcircled{4} - \textcircled{3} \quad 7d = 21$$

$$\underline{d = 3}$$

$$\text{In } \textcircled{1}, \quad 2a + 9 \times 3 = 11$$

$$2a + 27 = 11$$

$$2a = -16$$

$$\underline{a = -8}$$

$$\textcircled{5}(a) \quad n^{\text{th}} \text{ term} = ar^{n-1}$$

$$p^{\text{th}} \text{ term} = \underline{ar^{p-1} = 16} \quad \textcircled{1}$$

$$(p+1)^{\text{th}} \text{ term} = ar^{p+1-1} = 24$$

$$\underline{ar^p = 24} \quad \textcircled{2}$$

$$\textcircled{2} \div \textcircled{1} \quad r^{p-(p-1)} = \frac{24}{16}$$

$$r = \frac{3}{2} = \underline{1.5}$$

~~What is~~ ~~the~~

$p+1$	$\rightarrow$	24
$p+2$	$\rightarrow$	36
$p+3$	$\rightarrow$	54
$p+4$	$\rightarrow$	<u>81</u>

$$\textcircled{5} \text{ (b)} \quad S_3 = \frac{a(1-r^3)}{1-r} = 22.8. \quad \textcircled{1}$$

$$S_\infty = \frac{a}{1-r} = 18.75. \quad \textcircled{2}$$

$$\textcircled{1} \div \textcircled{2} \quad 1-r^3 = \frac{22.8}{18.75}$$

$$1-r^3 = 1.216.$$

$$-r^3 = 0.216 \\ r = \sqrt[3]{-0.216}$$

$$\underline{\underline{r = -3/5}}$$

$$\text{From } \textcircled{2} \quad a = 18.75(1-r)$$

$$a = 18.75(1 - -\frac{3}{5})$$

$$a = \underline{\underline{30}}$$

$$\begin{aligned} \textcircled{6} \text{ (a)} \quad \int 5x^{-4} - 7x^{2/3} dx &= \frac{5x^{-3}}{-3} - \frac{7x^{5/3}}{5/3} + C \\ &= -\frac{5}{3x^3} - \frac{21x^{5/3}}{5} + C. \end{aligned}$$

$$\textcircled{6} \text{ (b) (i)} \quad y = 9 - x^2$$

$$0 = 9 - x^2$$

$$x^2 = 9$$

$$x = 3, -3 \quad \therefore P(3, 0)$$

$$\text{(ii)} \quad \frac{dy}{dx} = -2x \neq \textcircled{4} \rightarrow \text{gradient y tangential}$$

$$x = 3, \quad m_{\text{tangential}} = -2 \times 3 = \underline{\underline{-6}}$$

$$y = -6x + b$$

try  $(3, 0)$ ,

$$0 = -6(3) + b$$

$$0 = -18 + b$$

$$\underline{18 = b}$$

$$\text{(iii)} \quad \begin{array}{c} \text{Awynesedd} \\ \text{wedi tywyllu} \end{array} = \begin{array}{c} \text{Awynesedd o} \\ \text{dan llinell} \\ \text{syth} \end{array} - \begin{array}{c} \text{Awynesedd o} \\ \text{dən gronlin} \end{array}$$

$$\begin{array}{c} \text{Awynesedd o} \\ \text{dan llinell} \\ \text{syth} \end{array} = \frac{18 \times 3}{2} = \underline{\underline{27 \text{ uned}^2}}$$

$$\begin{array}{c} \text{Awynesedd o} \\ \text{dən gronlin} \end{array} = \int_0^3 9 - x^2 dx = \left[ 9x - \frac{x^3}{3} \right]_0^3$$

$$= \left[ 9(3) - \frac{3^3}{3} \right] - [0] = 18 \text{ uned}^2$$

Anwynebedd wedi =  $27 - 18 = \underline{\underline{9 \text{ uned}}}$   
fgywyd y tu

⑦ (a)  $p = \log_a x, q = \log_a y.$

$$x = a^p, y = a^q$$

$$\frac{x}{y} = \frac{a^p}{a^q} = a^{p-q}$$

$$\log_a \left( \frac{x}{y} \right) = p - q.$$

$$\log_a \left( \frac{x}{y} \right) = \log_a x - \log_a y.$$

(b)  $6^{2x+5} = 7.$

$$(2x+5) \log 6 = \log 7.$$

$$2x+5 = \frac{\log 7}{\log 6}.$$

$$2x = \frac{\log 7}{\log 6} - 5.$$

$$2x = -3.913966867$$

$$\underline{\underline{x = -1.957 \text{ (3 llawnegol)}}}$$

$$\textcircled{8} \text{ (a)} \quad x^2 + y^2 + 6x - 10y + 14 = 0$$

$$\text{(i)} \quad x^2 + 6x + y^2 - 10y + 14 = 0.$$

$$(x+3)^2 - 9 + (y-5)^2 - 25 + 14 = 0$$

$$(x+3)^2 + (y-5)^2 = 20.$$

$$\text{Centroid } (-3, 5) \quad r = \sqrt{20} = \underline{\underline{2\sqrt{5}}}$$

$$\text{(ii)} \quad P(-6, 2).$$

$$\text{Perimeter of } \triangle APQ = \sqrt{(5-2)^2 + (-3+6)^2} \\ = \sqrt{3^2 + 3^2} = \sqrt{18}$$

$$\sqrt{18} < \sqrt{20} \quad \therefore P \text{ is inside } C.$$

$$\text{(b)} \quad y = 2x + 1 \quad \text{coastal belt tangent to } Q.$$

Anneurid i C.

Radius =

$$x^2 + (2x+1)^2 + 6x - 10(2x+1) + 14 = 0$$

$$x^2 + 4x^2 + 4x + 1 + 6x - 20x - 10 + 14 = 0$$

$$5x^2 - 10x + 5 = 0$$

$$x^2 - 2x + 1 = 0$$

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

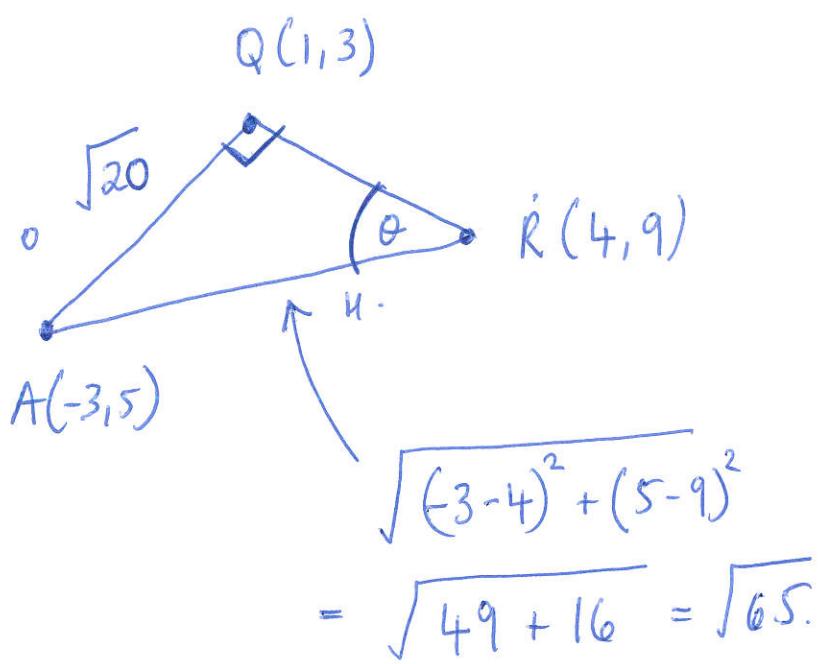
$$\underline{\underline{x=1}}$$

$$y = 2(1) + 1 = 3$$

$Q(1, 3)$ .

\*. Un gweiddyn yr orffig wedi'u ailadrodd  $\rightarrow$  tangiad i'r cylch.

(ii)  $R(4, 9)$ ,  $Q(1, 3)$ ,  $A(-3, 5)$ .



$$\begin{aligned} & \sqrt{(4-1)^2 + (9-3)^2} \\ &= \sqrt{49 + 16} = \sqrt{65}. \end{aligned}$$

$$\sin \theta = \frac{\sqrt{20}}{\sqrt{65}} \rightarrow \theta = \sin^{-1}\left(\frac{\sqrt{20}}{\sqrt{65}}\right)$$

$$\underline{\underline{\theta = 33.69^\circ}}$$

(9) (a) Area Sector =  $\frac{1}{2} r^2 \theta$ .

$$43.56 = \frac{1}{2} \times 11^2 \times \theta.$$

$$\underline{\theta = 0.72 \text{ radians}}$$

(b)  $l_{BC} + 13 = l_{CD}$ .

$$l_{BC} = r\phi \quad r\phi + 13 = r(\pi - \phi)$$

$$l_{CD} = r(\pi - \phi) \quad 11\phi + 13 = 11\pi - 11\phi \\ 22\phi = 11\pi - 13$$

$$\phi = \frac{11\pi - 13}{22}$$

$$\underline{\phi = 0.98 \text{ radians}}$$