C2 - Ionawr 2014 - Atebion

5 mesurynn → 4 stribed

$h = \frac{4-2}{4} = \frac{2}{4} = \underline{\underline{0.5}}$

①

x	$\sqrt{1+6/x}$
2	2
2.5	1.843908891
3	1.732050808
3.5	1.647508942
4	1.58113883

$$= \frac{0.5}{2}\left(2 + 1.58113883 + 2\left(1.843908891 + 1.732050808 + 1.647508942\right)\right)$$

$$= \underline{\underline{3.507}} \text{ (3 lle degol)}$$

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② (a) $8\cos^2\theta - 7\sin^2\theta = 4\cos\theta - 3$

$\sin^2\theta = 1 - \cos^2\theta$.

$$8\cos^2\theta - 7(1-\cos^2\theta) = 4\cos\theta - 3$$

$$8\cos^2\theta - 7 + 7\cos^2\theta = 4\cos\theta - 3$$

$$15\cos^2\theta - 4\cos\theta - 4 = 0.$$

$\underline{x = \cos\theta}$

$$15x^2 - 4x - 4 = 0$$

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

$5x + 2 = 0$, $3x - 2 = 0$

$5x = -2$, $3x = 2$

$x = -2/5$, $x = 2/3$

$\cos\theta = 2/3$

$\cos\theta = -2/5$

$\theta = \cos^{-1}(-2/5) = \underline{113.6^\circ}, \underline{246.4^\circ}$

$\theta = \cos^{-1}(2/3) = \underline{48.2^\circ}, \underline{311.8^\circ}$

② (b) $\tan X = -2.246$

$X = \tan^{-1}(-2.246) = -66^\circ$

$X = 180^\circ - 66^\circ = \underline{114^\circ}$

$X + Y + Z = 180^\circ \rightarrow 114 + Y + Z = 180^\circ$

$\boxed{Y + Z = 66^\circ}$ ①

$\tan(Y - Z) = 0.364$

$Y - Z = \tan^{-1}(0.364)$

$\boxed{Y - Z = \underline{20^\circ}}$ ②

① + ② $2Y = 86^\circ$

$\underline{Y = 43^\circ}$

In ② $43 - Z = 20$

$Z = 43 - 20$

$\underline{Z = 23^\circ}$

③ (a) $(a+2d)+(a+7d)=0$

$2a+9d=0$ ①

$(a+4d)+(a+6d)+(a+9d)=22$

$3a+19d=22$ ②

① × 3 $\quad 6a+27d=0$ ③

② × 2 $\quad 6a+38d=44$ ④

④ − ③ $\quad 11d=44$

$\underline{d=4}$

In ①, $2a+9\times4=0$

$2a+36=0$

$2a=-36$

$\underline{a=-18}$

③ (b) $a=9,\ d=2$

$S_{2n}=\frac{2n}{2}\left(2\times9+(2n-1)\times2\right)$

$S_{2n}=n\left(18+4n-2\right)$

$S_{2n}=16n+4n^2$

$S_n=\frac{n}{2}\left(2\times9+(n-1)\times2\right)$

$S_n=9n+n^2-n$

$S_n=8n+n^2$

$$3S_n = S_{2n}$$

$$3(8n+n^2) = 16n+4n^2$$

$$24n+3n^2 = 16n+4n^2$$

$$0 = -8n+n^2$$

$$0 = n(n-8)$$

$n=0$ <u>ou</u> $n=8$.

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4. (a) $S_n = a + ar + \ldots\ldots + ar^{n-1}$

$$rS_n = ar + ar^2 + \ldots\ldots + ar^{n-1} + ar^n$$

$$S_n - rS_n = a - ar^n$$

$$S_n(1-r) = a(1-r^n)$$

$$S_n = \frac{a(1-r^n)}{1-r}$$

(b) (i) $ar^3 = -108$ ①

$ar^6 = 4$ ②

② ÷ ① $\quad r^3 = \frac{-4}{108} \rightarrow r^3 = \frac{-1}{27} \rightarrow r = \frac{-1}{3}$

(ii) $S_\infty = \frac{a}{1-r}$ $\quad$ In ②, $a = \frac{4}{r^6} = \frac{4}{(-1/3)^6} = 2916$

$$S_\infty = \frac{2916}{1--1/3} = \underline{\underline{2187}}$$

5 (a) (i) $5^2 = x^2 + 3^2 - 2 \times x \times 3 \times \cos ADB$

$25 = x^2 + 9 - 6x \cos ADB$

$16 - x^2 = -6x \cos ADB$

$$\boxed{\cos ADB = \frac{x^2 - 16}{6x}}$$

$6^2 = x^2 + 1^2 - 2 \times x \times 1 \times \cos ADC$

$36 = x^2 + 1 - 2x \cos A\hat{D}C$

$35 - x^2 = -2x \cos A\hat{D}C$

$$\boxed{\cos A\hat{D}C = \frac{x^2 - 35}{2x}}$$

$A\hat{D}B + A\hat{D}C = 180°$

$\therefore \cos A\hat{D}B + \cos A\hat{D}C = 0$

$$\frac{x^2 - 16}{6x} + \frac{x^2 - 35}{2x} = 0 \quad (\times 3)$$

$$\frac{x^2 - 16 + 3x^2 - 105}{6x} = 0$$

$4x^2 - 121 = 0$

$4x^2 = 121$

$x^2 = 30.25$

$x = 5.5$

5 (b) $A = \frac{1}{2} ab \sin C$

$= \frac{1}{2} \times 3 \times 5.5 \times \sin 64.42$

$= \underline{7.44 \text{ cm}^2}$

$A\hat{D}B = \cos^{-1}\left(\frac{5.5^2 - 16}{6 \times 5.5}\right)$

$A\hat{D}B = 64.42^\circ$

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6. (a) $\int 5x^{-3} - 2x^{1/3} - 4 \, dx = \frac{5x^{-2}}{-2} - \frac{2x^{4/3}}{4/3} + C$

$= \frac{-5}{2x^2} - \frac{6x^{4/3}}{4} + C$

(b) $\int_2^6 3x^2 - \frac{x^3}{4} \, dx = \left[\frac{3x^3}{3} - \frac{x^4}{16}\right]_2^6$

$= \left(\frac{3(6)^3}{3} - \frac{6^4}{16}\right) - \left(\frac{3(2)^3}{3} - \frac{2^4}{16}\right)$

$= 135 - 7 = \underline{\underline{128}}$

(7) (a) $p = \log_a x \rightarrow x = a^p$

$\therefore x^n = a^{pn}$.

$\therefore \log_a x^n = pn = np$

$\log_a x^n = n \log_a x$.

(b) $7^{5-4x} = 11$.

$(5-4x)\log 7 = \log 11$

$5 - 4x = \dfrac{\log 11}{\log 7}$.

$-4x = \dfrac{\log 11}{\log 7} - 5$.

$-4x = -3.7677$

$\underline{\underline{x = 0.942}}$ (3 lle degol)

(c) $\log_8 x = -1/3$

$x = 8^{-1/3} = \dfrac{1}{8^{1/3}} = \underline{\underline{\dfrac{1}{2}}}$.

(8) (a) (i) $x^2 + y^2 - 4x + 8y - 5 = 0$

$$x^2 - 4x + y^2 + 8y - 5 = 0$$

$$(x-2)^2 - 4 + (y+4)^2 - 16 - 5 = 0$$

$$(x-2)^2 + (y+4)^2 = 25$$

Canol A $(2, -4)$

(ii) P $(6, -7)$ ar C

m rhwng canolbwynt a P : $\dfrac{-7 - -4}{6-2} = \dfrac{-3}{4}$

radius

$\therefore$ m tangiad $= \dfrac{4}{3}$

yn P, $y - -7 = \dfrac{4}{3}(x-6)$

$$3y + 21 = 4x - 24$$

$$3y - 4x + 45 = 0$$

(b) $y = x + 3$ Amnewid i C,

$$x^2 + (x+3)^2 - 4x + 8(x+3) - 5 = 0$$

$$x^2 + x^2 + 6x + 9 - 4x + 8x + 24 - 5 = 0$$

$$2x^2 + 10x + 28 = 0$$

~~tangiad~~ ~~$3y = 4x - 45$~~

~~$y = \frac{4}{3}x - 15$~~

~~$x + 3 = \frac{4}{3}x - 15$~~

~~$18 = \frac{1}{3}x \rightarrow x =$~~

$b^2 - 4ac = 10^2 - 4 \times 2 \times 28$

$= 100 - 224 < 0$

dim gwreiddiau ~~real~~

(9) ~~Segment $= \frac{1}{2} r^2 (\theta - \sin\theta)$~~

~~$23.1 = \frac{1}{2} \times 7^2 (\theta - \sin\theta)$~~

~~$-1.4 = \theta - \sin\theta$.~~

Arw Tywyllu = Arwynebedd Sector mawr − Arwynebedd Sector bach.

$$23.1 = \frac{1}{2} r^2 \theta - \frac{1}{2} r^2 \theta$$

$$23.1 = \frac{1}{2} \times 7^2 \theta - \frac{1}{2} \times 4^2 \theta$$

$$23.1 = \theta \left(\frac{49}{2} - \frac{16}{2} \right)$$

$$\theta = \frac{23.1}{16.5} = \underline{\underline{1.4}} \text{ radian.}$$

$AB = 7\theta$.

$BD = 7 - 4 = 3$

$CD = 4\theta$.

$AC = 7 - 4 = 3$

$$\text{Perimeter} = AB + BD + CD + AC$$

$$= 7\theta + 3 + 4\theta + 3.$$

$$= 11\theta + 6$$

$$= 11 \times 1.4 + 6 =$$

$$= \underline{\underline{21.4 \text{ cm}}}$$

10. (a) $t_{n+1} = 1 - 1/t_n$ $\qquad t_1 = 4.$

$t_2 = 1 - 1/4 = \underline{\underline{3/4}}$

$t_3 = 1 - 1/(3/4) = \underline{\underline{-1/3}}$

$t_4 = 1 - 1/(-1/3) = \underline{\underline{4}}$

(b) $4, 3/4, -1/3, 4, \ldots$

Mae'r dilyniant yn ailadrodd bob 3 ydd term.

$\underline{\underline{t_{50} = 3/4.}}$