Atebion C1 Ionawr 2005

C1 Ionawr 2005

① $A = (2, 3)$ $B = (5, 9)$

a) Graddiant llinell $AB = \frac{y_2 - y_1}{x_2 - x_1}$

$= \frac{9-3}{5-2}$

$= \frac{6}{3}$

$= 2$

Felly graddiant llinell syn berpendicwlar i $AB = -\frac{1}{2}$

Hafaliad llinell yn mynd trwy B efo graddiant $-\frac{1}{2}$:

$y - y_1 = m(x - x_1)$

$y - 9 = -\frac{1}{2}(x - 5)$

$2y - 18 = -1(x - 5)$

$2y - 18 = -x + 5$

$2y + x - 18 - 5 = 0$

$2y + x - 23 = 0$

$x + 2y - 23 = 0$ ✓

b) $C = (?, 0)$

Amnewid $y = 0$ yn hafaliad y llinell BC:

$x + 2(0) - 23 = 0$

$x - 23 = 0$

$x = 23$

Felly $C = (23, 0)$.

(c) $D = (24, 1)$ $C = (23, 0)$

Graddiant llinell $CD = \frac{y_2 - y_1}{x_2 - x_1}$

$= \frac{1-0}{24-23}$

$= 1$

Llinell trwy A efo graddiant 1:

$y - y_1 = m(x - x_1)$

$y - 3 = 1(x - 2)$

$y - 3 = x - 2$

$y = x + 1$

E ywr pwynt ble mae'r llinellau $x + 2y - 23 = 0$ a $y = x + 1$ yn croes torri. Yn amnemid i mewn ir hafaliad cyntaf:

$x + 2(x+1) - 23 = 0$

$x + 2x + 2 - 23 = 0$

$3x - 21 = 0$

$3x = 21$

$x = 7$

Felly $y = x + 1$

$y = 8$

Mae'n dilyn mai $(7, 8)$ ywr pwynt E. ✓

(ch) $C = (23, 0)$ $E = (7, 8)$

Hyd $CE = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

$= \sqrt{(7-23)^2 + (8-0)^2}$

$= \sqrt{-16^2 + 8^2}$

$= \sqrt{256 + 64}$

$= \sqrt{320}$

$= \sqrt{16} \times \sqrt{20}$

$= 4 \times \sqrt{4} \times \sqrt{5}$

$= 4 \times 2 \times \sqrt{5}$

$= 8\sqrt{5}$

② $\dfrac{6+\sqrt{7}}{\sqrt{7}-2} = \dfrac{(6+\sqrt{7})(\sqrt{7}+2)}{(\sqrt{7}-2)(\sqrt{7}+2)}$

$= \dfrac{6\sqrt{7}+12+\sqrt{7}\times\sqrt{7}+2\sqrt{7}}{\sqrt{7}\times\sqrt{7}+2\sqrt{7}-2\sqrt{7}-4}$

$= \dfrac{8\sqrt{7}+12+7}{7-4}$

$= \dfrac{8\sqrt{7}+19}{3}$

$= \frac{1}{3}(8\sqrt{7}+19)$

③ $y = 2x^3 - 6x^2 + 12$

a) $\dfrac{dy}{dx} = 6x^2 - 12x$

Yn dalrys $\frac{dy}{dx} = 0$

$6x^2 - 12x = 0$

$6x(x-2) = 0$

Unai $x = 0$ neu $x - 2 = 0$

$x = 2$

Nawr $\dfrac{d^2y}{dx^2} = 12x - 12$

Os yw $x = 0$, yna mae $\frac{d^2y}{dx^2} = 12(0) - 12$

$= -12$

ac mae $y = 2(0^3) - 6(0^2) + 12$

$= 12$

Felly mae $(0, 12)$ yn bwynt macsimwm.

Os yw $x = 2$, yna mae $\frac{d^2y}{dx^2} = 12(2) - 12$

$= 12$

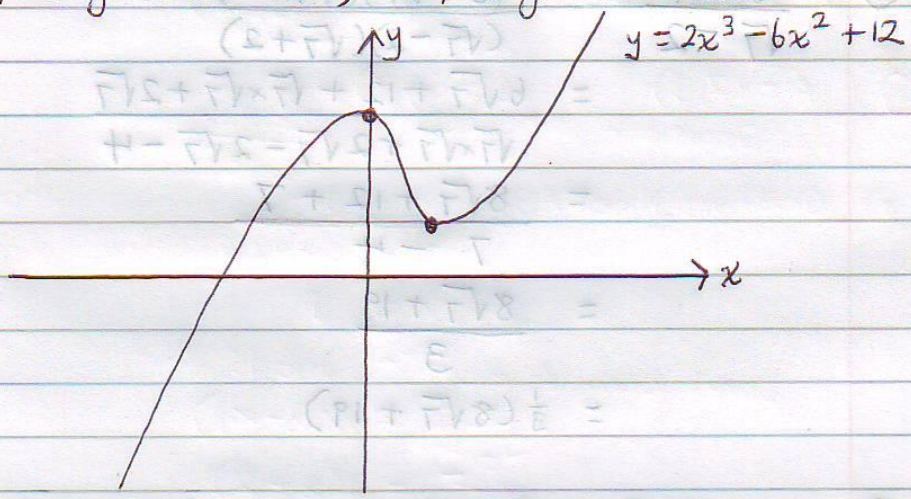
ac mae $y = 2(2^3) - 6(2^2) + 12$

$= 2\times 8 - 6\times 4 + 12$

$= 4$

Felly mae $(2, 4)$ yn bwynt minimwm.

(b) $(0, 12)$ yn macsimwm, $(2, 4)$ yn minimwm



(c) 1 gwreiddyn real sydd gan yr hafaliad

$$2x^3 - 6x^2 + 12 = 0$$

oherwydd dim ond unwaith mae'r graff yn croestorri'r echelin-x.

(4) $3x^3 + 2x^2 - 19x + 6$

a) $f(1) = 3(1^3) + 2(1^2) - 19(1) + 6$

$= 3 + 2 - 19 + 6$

$= -8$

$f(-1) = 3(-1^3) + 2(-1^2) - 19(-1) + 6$

$= -3 + 2 + 19 + 6$

$= 24$

$f(2) = 3(2^3) + 2(2^2) - 19(2) + 6$

$= 3 \times 8 + 2 \times 4 - 38 + 6$

$= 24 + 8 - 38 + 6$

$= 0$

Felly mae $(x-2)$ yn ffactor.

$$
\begin{array}{r}
3x^2+8x-3 \\
x-2\ \overline{)\ 3x^3+2x^2-19x+6} \\
3x^3-6x^2 \\
\hline
8x^2-19x+6 \\
8x^2-16x \\
\hline
-3x+6 \\
-3x+6 \\
\hline
\end{array}
$$

Felly $3x^3+2x^2-19x+6 = (x-2)(3x^2+8x-3)$

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

Ffactorau'r polynomial yw $x-2$, $3x-1$, $x+3$.

b) $f(-1) = 24$ (o ran (a))

Felly'r gweddill pan fydd $3x^3+2x^2-19x+6$ yn cael ei rannu â $x+1$ yw 24.

(5) $x^2-14x+55$

$= (x-7)^2-49+55$

$= (x-7)^2+6$

Felly $a=7$, $b=6$

Mae'n rhaid bod $x^2-14x+55$ yn bositif ar gyfer pob gwerth o x oherwydd gwerth lleiaf y ffwythiant yw 6 (rhaid cael $(x-7)^2 \geq 0$ ar gyfer pob gwerth o x).

⑥ $y = 4x^2 - 7x + 11$

$y = 5x + K$

Felly $4x^2 - 7x + 11 = 5x + K$

$4x^2 - 7x + 11 - 5x - K = 0$

$4x^2 - 12x + 11 - K = 0.$

Er mwyn ir hafaliad yma gael dau wreiddyn gwahanadwy,

Rhaid cael $b^2 - 4ac > 0$

$(-12)^2 - 4(4)(11-K) > 0$

$144 - 16(11-K) > 0$

$144 - 176 + 16K > 0$

$-32 + 16K > 0$

$16K > 32$

$K > 2$ ✓

⑦ $y = x^2 + 4x + 3$

$$\frac{dy}{dx} = \lim_{\delta x \to 0} \frac{f(x+\delta x) - f(x)}{\delta x}$$

$$= \lim_{\delta x \to 0} \frac{[(x+\delta x)^2 + 4(x+\delta x) + 3] - [x^2 + 4x + 3]}{\delta x}$$

$$= \lim_{\delta x \to 0} \frac{[(x+\delta x)(x+\delta x) + 4x + 4\delta x + 3] - x^2 - 4x - 3}{\delta x}$$

$$= \lim_{\delta x \to 0} \frac{[x^2 + x\delta x + x\delta x + (\delta x)^2 + 4x + 4\delta x + 3] - x^2 - 4x - 3}{\delta x}$$

$$= \lim_{\delta x \to 0} \frac{2x\delta x + (\delta x)^2 + 4\delta x}{\delta x}$$

$$= \lim_{\delta x \to 0} 2x + \delta x + 4$$

$$\frac{dy}{dx} = 2x + 4.$$

C1: Tangiad, Normal

Gaeaf 2005

⑧ $y = 3x^{\frac{3}{2}} - \frac{32}{x}$

(a) Os yw $x = 4$ yna $y = 3(4)^{\frac{3}{2}} - \frac{32}{4}$

$y = 3(\sqrt{4})^3 - 8$

$y = 3(2)^3 - 8$

$y = 24 - 8$

$y = 16$

$y = 3x^{\frac{3}{2}} - 32x^{-1}$

$\frac{dy}{dx} = 3(\frac{3}{2})x^{\frac{1}{2}} + 32x^{-2}$

$\frac{dy}{dx} = \frac{9}{2}x^{\frac{1}{2}} + 32x^{-2}$

$\frac{dy}{dx} = \frac{9\sqrt{x}}{2} + \frac{32}{x^2}$

Os yw $x = 4$ yna $\frac{dy}{dx} = \frac{9\sqrt{4}}{2} + \frac{32}{4^2}$

$\frac{dy}{dx} = \frac{9 \times 2}{2} + \frac{32}{16}$

$\frac{dy}{dx} = 9 + 2$

$\frac{dy}{dx} = 11$

Hafaliad y Tangiad: $y - y_1 = m(x - x_1)$

$y - 16 = 11(x - 4)$

$y - 16 = 11x - 44$

$y = 11x - 28$

(b) Graddiant y Tangiad = 11

Graddiant y Normal = $-\frac{1}{11}$ (negatif y cilydd)

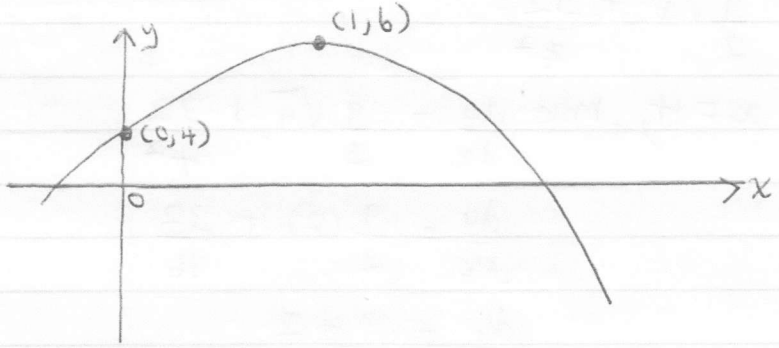
Hafaliad y Normal: $y - y_1 = m(x - x_1)$

$y - 16 = -\frac{1}{11}(x - 4)$

$11y - 176 = -x + 4$

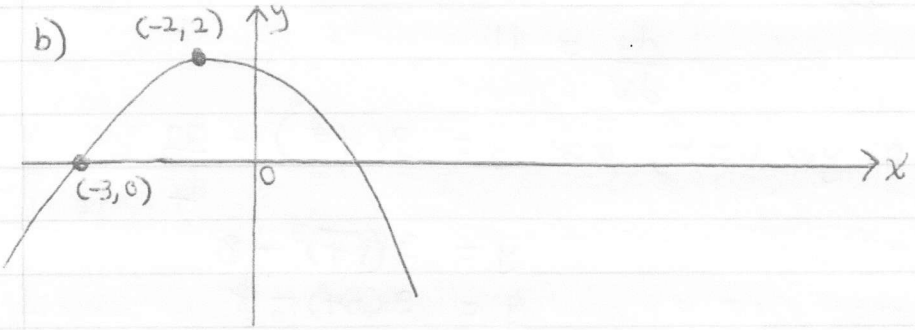
$11y + x - 180 = 0$

(9) a)



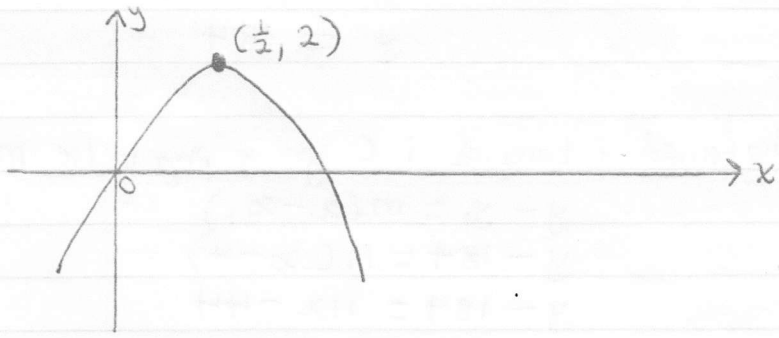
↑4

b)



← 3

c)



2

(10)

1
1 1
1 2 1
1 3 3 1
1 4 6 4 1

a) $(a+b)^4 = a^4 + 4a^3b + 6a^2b^2 + 4ab^3 + b^4$

b) $(a+2x)^4 = a^4 + 4a^3(2x) + 6a^2(2x)^2 + 4a(2x)^3 + (2x)^4$
$= a^4 + 8a^3x + 24a^2x^2 + 32ax^3 + 16x^4$

Cyfernod term x^2 12 gwaith cyfernod term x^3

Felly $24a^2 = 12(32a)$

$2a^2 = 32a$ $(\div 12)$

$a^2 = 16a$ $(\div 2)$

$a = 16a$ $(\div a)$

NEU

$a^2 - 16a = 0$

$a(a-16) = 0$

Unai $a = 0$ neu $a - 16 = 0$

$a = 16$

Atebion C2 Ionawr 2005

C2 Ionawr 2005

① $\int_0^1 \sqrt{1+x^3}\,dx$

Gwerth x	Gwerth $\sqrt{1+x^3}$	
0	1	y_0
0,25	1.007782219	y_1
0,5	1.060660172	y_2
0.75	1.192424002	y_3
1	1.414213562	y_4

Rheol y Trapesium:

$\int_a^b y\,dx \approx \frac{1}{2}h\{(y_0+y_n)+2(y_1+y_2+\cdots+y_{n-1})\}$, lle mae $h=\frac{b-a}{n}$.

Felly $\int_0^1 \sqrt{1+x^3}\,dx \approx \frac{1}{2}(0.25)\{y_0+y_4+2(y_1+y_2+y_3)\}$

$= 0.125(1+1.414213562+2(1.007782219$
$+1.060660172+1.192424002))$
$= 0.125(8.935946348)$
$= 1.116993294$
$= 1.12$ i dau le degol.

② $3^{2x}-3^{x+2}+14=0$

$u^2-9u+14=0$

$(u-2)(u-7)=0$

$3^x=u$

$(3^x)^2=u^2$ | $3^2(3^x)$

$3^{2x}=u^2$ | $=3^{x+2}$

Unai $u-2=0$ neu $u-7=0$

$u=2$ neu $u=7$

$3^x=2$ neu $3^x=7$

$x\log 3=\log 2$ $x\log 3=\log 7$

$x=\frac{\log 2}{\log 3}$ $x=\frac{\log 7}{\log 3}$

$x=0.631$ $x=1.771$

i 3 lle degol i 3 lle degol.

C2: Hafaliadau Trigonometreg

$\sin^2 x + \cos^2 x = 1$

$\tan x = \frac{\sin x}{\cos x}$

Gaeaf 2005

(3) (a) $2\sin^2 x + \cos x - 1 = 0$

$2(1 - \cos^2 x) + \cos x - 1 = 0$

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

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

$2\cos^2 x - \cos x - 1 = 0$ (Lluosi efo -1)

$(2\cos x + 1)(\cos x - 1) = 0$

Unai $2\cos x + 1 = 0$

$2\cos x = -1$

$\cos x = -\frac{1}{2}$

$x = \cos^{-1}(-\frac{1}{2})$

$x = 120°, 240°$

neu $\cos x - 1 = 0$

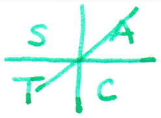
$\cos x = 1$

$x = \cos^{-1}(1)$

$x = 0°, 360°$

Ateb: $x = 0°, 120°, 240°, 360°$

(b) $\tan 3x = 1$



$3x = \tan^{-1}(1)$

$3x = 45°, 225°, 405°, 585°, \ldots$

$x = 15°, 75°, 135°, 195°, \ldots$

Ateb: $x = 15°, 75°, 135°$.

C2: Rheol sin, Rheol Cosin, Arwynebedd Triongl

Rheol Sin: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

NEU $\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$

S	A
T	C

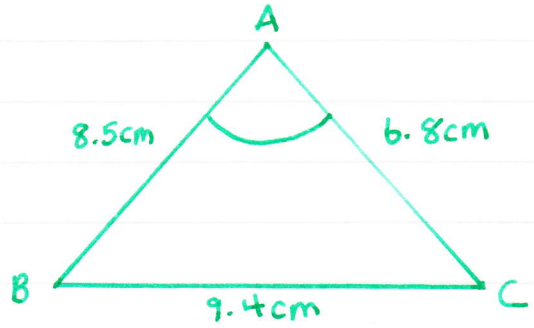
Rheol Cosin: $a^2 = b^2 + c^2 - 2bc\cos A$

NEU $\cos A = \frac{b^2 + c^2 - a^2}{2bc}$

Arwynebedd Triongl = $\frac{1}{2}ab\sin C$

Gaeaf 2005

(4)



(a) $\cos A = \frac{b^2 + c^2 - a^2}{2bc}$

$\cos A = \frac{6.8^2 + 8.5^2 - 9.4^2}{2 \times 6.8 \times 8.5}$

$\cos A = 0.2606401384$

$A = \cos^{-1}(0.2606401384)$

$A = 74.89195093$

$A = 74.9^\circ$ i un lle degol

(b) Arwynebedd triongl = $\frac{1}{2}ab\sin C$

$= \frac{1}{2}bc\sin A$

$= 0.5 \times 6.8 \times 8.5 \times \sin(74.89195093)$

$= 27.9\ cm^2$ i un lle degol.

⑤ $a + (a+4d) = 0$. —①

$a + 12d = 20$ —②

a) ② $\Rightarrow a = 20 - 12d$ —③

Yn amnewid ③ i mewn i ①:

$20 - 12d + 20 - 12d + 4d = 0$

$40 - 20d = 0$

$-40 + 20d = 0$

$20d = 40$

$d = 2$

Felly $a = 20 - 12(2)$

$a = 20 - 24$

$a = -4$

b) $S_{20} = \frac{20}{2}(-8 + 19(2))$ $\qquad S_n = \frac{n}{2}(2a + (n-1)d)$

$= 10(-8 + 38)$

$= 10(30)$

$= 300.$

⑥ C_1 $(x+1)^2 + (y+2)^2 = 25$

C_2 $x^2 + y^2 - 10x - 5y + 25 = 0$.

a) Radiws $C_1 = 5$

Cyfesurynnau canol $C_1 = (-1, -2)$

b) C_2: $(x-5)^2 - 25 + (y - 2\frac{1}{2})^2 - 6.25 + 25 = 0$

$(x-5)^2 + (y - 2\frac{1}{2})^2 = 6.25$

Radiws $\sqrt{6.25} = 2.5$

Cyfesurynnau canol $(5, 2.5)$

c) I ddangos bod C_1 ag C_2 yn cyffwrdd â'i gilydd, rhaid dangos bod y pellter rhwng canol y ddau gylch yn hafal i swm y ddau radiws.

Swm y ddau radiws $= 5 + 2.5$
$= 7.5$

Pellter rhwng canol y ddau gylch
$= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$
$= \sqrt{(5 - -1)^2 + (2.5 - -2)^2}$
$= \sqrt{6^2 + 4.5^2}$
$= \sqrt{56.25}$
$= 7.5$ ✓

⑦ a) $\int 3\sqrt{x} - \frac{6}{x^3}\,dx = \int 3x^{\frac{1}{2}} - 6x^{-3}\,dx$

$= \frac{3x^{\frac{3}{2}}}{\frac{3}{2}} - \frac{6x^{-2}}{-2} + K$

$= 2x^{\frac{3}{2}} + 3x^{-2} + K$

b) $y = 16 - x^2$
$y = 2x + 13$

(i) Felly $16 - x^2 = 2x + 13$
$0 = x^2 + 2x + 13 - 16$
$0 = x^2 + 2x - 3$
$0 = (x + 3)(x - 1)$

Unai $x + 3 = 0$ neu $x - 1 = 0$
$x = -3$ $x = 1$

$y = 2(-3) + 13$ $y = 2(1) + 13$
$y = -6 + 13$ $y = 2 + 13$
$y = 7$ $y = 15$
$A = (-3, 7)$ $B = (1, 15)$

(ii) Angen $\int_{-3}^{1} 16-x^2\,dx - \int_{-3}^{1} 2x+13\,dx$

$= \left[16x - \frac{x^3}{3}\right]_{-3}^{1} - \left[\frac{2x^2}{2} + 13x\right]_{-3}^{1}$

$= \left[\left(16(1) - \frac{(1)^3}{3}\right) - \left(16(-3) - \frac{(-3)^3}{3}\right)\right]$

$- \left[\left(1^2 + 13(1)\right) - \left((-3)^2 + 13(-3)\right)\right]$

$= \left[\left(16 - \frac{1}{3}\right) - \left(-48 + 9\right)\right] - \left[\left(1+13\right) - \left(9 - 39\right)\right]$

$= \left[\frac{47}{3} - -39\right] - \left[14 - -30\right]$

$= \frac{164}{3} - 44$

$= \frac{32}{3}$

(8) a) Term cyntaf a

Ail derm ar

Trydydd term ar^2

ac yn y blaen.

Swm yr n term cyntaf mewn cyfres geometrig yw

$S_n = a + ar + ar^2 + \cdots + ar^{n-1}$.

Yn lluosi bob ochr ag r,

$rS_n = ar + ar^2 + ar^3 + \cdots + ar^n$

Yn tynnu'r ail hafaliad o'r hafaliad cyntaf:

$S_n - rS_n = a - ar^n$

(mae'r termau yn y canol yn cansio mewn parau)

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

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

b) $S_\infty = 4$. $\quad a + ar = 3$ — (2)

Felly $\frac{a}{1-r} = 4$

$a = 4(1-r)$ — (1)

Yn amnewid o (1) i (2)

$4(1-r) + 4(1-r)r = 3$

$4 - 4r + 4(r - r^2) = 3$

$4 - 4r + 4r - 4r^2 = 3$

$4 - 4r^2 = 3$

$4 = 3 + 4r^2$

$4 - 3 = 4r^2$

$1 = 4r^2$

$4r^2 = 1$

$r^2 = \frac{1}{4}$

$r = \pm\sqrt{\frac{1}{4}}$

$r = \pm\frac{1}{2}$

O wybod bod r yn bositif, rhaid cael $\underline{\underline{r = \frac{1}{2}}}$

(9) a) Hyd arc $= r\theta$

$3 = 4\theta$

$4\theta = 3$

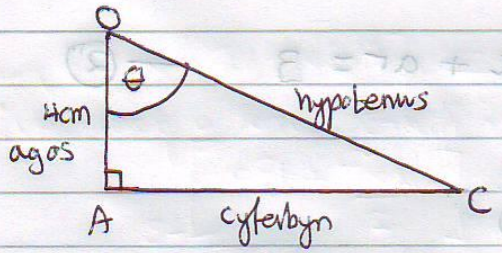
$\theta = \frac{3}{4}$ radian

b) Arwynebedd y sector $OAB = \frac{1}{2} r^2\theta$

$= \frac{1}{2}(4^2)(\frac{3}{4})$

$= 6\,cm^2$

Mae tangiad a radiws yn cyfarfod ar ongl sgwâr felly mae'r triongl OAC yn driongl ongl sgwâr.



$\text{Tan}\theta = \frac{\text{cyferbyn}}{\text{agos}}$

$\text{Tan}\frac{3}{4} = \frac{AC}{4}$

$4 \times \text{Tan}\frac{3}{4} = AC$

$AC = 3.72638584\text{ cm}$

Felly Arwynebedd y Triongl $OAC = \frac{1}{2} \times \text{sail} \times \text{uchder}$

$= \frac{1}{2} \times 3.72638584 \times 4$

$= 7.45277168\text{ cm}^2$

Arwynebedd y rhanbarth wedi'i dywyllu

= Arwynebedd y Triongl − Arwynebedd y sector

$= 7.45277168 - 6$

$= 1.45277168$

$= \underline{1.45\text{cm}^2}$ i ddau le degol.

(10) (a) Gadewch i $y = \log_a x$

Yna $a^y = x$

Felly $(a^y)^k = x^k$

$a^{yk} = x^k$ (rheolau indecsau)

$yk = \log_a x^k$

$ky = \log_a x^k$

Felly $k \log_a x = \log_a x^k$

neu $\log_a x^k = k \log_a x$

b) $\log_{10}(x^2+48) = \log_{10} x + 2\log_{10} 4$

$\log_{10}(x^2+48) = \log_{10} x + \log_{10} 4^2$

$\log_{10}(x^2+48) = \log_{10} x + \log_{10} 16$

$\log_{10}(x^2+48) = \log_{10}(x \times 16)$

$\log_{10}(x^2+48) = \log_{10}(16x)$

$x^2+48 = 16x$

$x^2-16x+48 = 0$

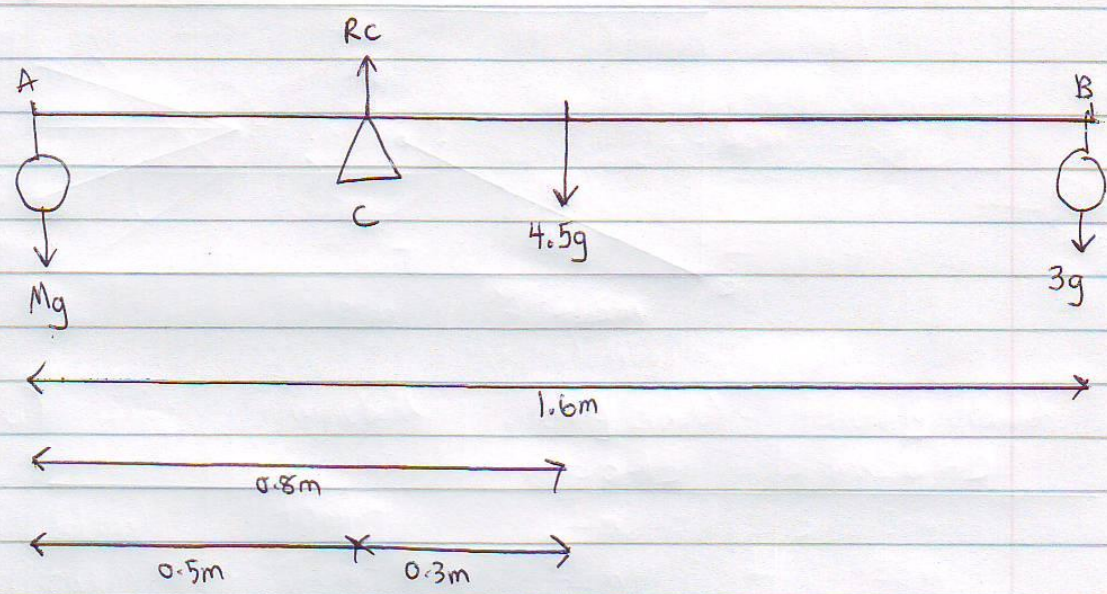
$(x-4)(x-12) = 0$

Unai $x-4=0$ atau $x-12=0$

$\underline{x=4}$ atau $\underline{x=12}$

Atebion M1 Ionawr 2005

1)



Grymoedd i fyny = Grymoedd i lawr

$R_c = Mg + 4.5g + 3g$

$R_c = Mg + 7.5g$

Cymryd momentau o amgylch C

Momentau clocwedd = Momentau gwrthglocwedd

$4.5g \times 0.3 + 3g \times 1.1 = Mg \times 0.5$

$45.57 = 4.9M$

$M = 9.3\,Kg$

Felly $R_c = 9.3 \times 9.8 + 7.5 \times 9.8$

$R_c = 164.64\,N$

2) $v = u + at$

$v^2 = u^2 + 2as$

$s = ut + \frac{1}{2}at^2$

$s = \left(\frac{u+v}{2}\right)t$

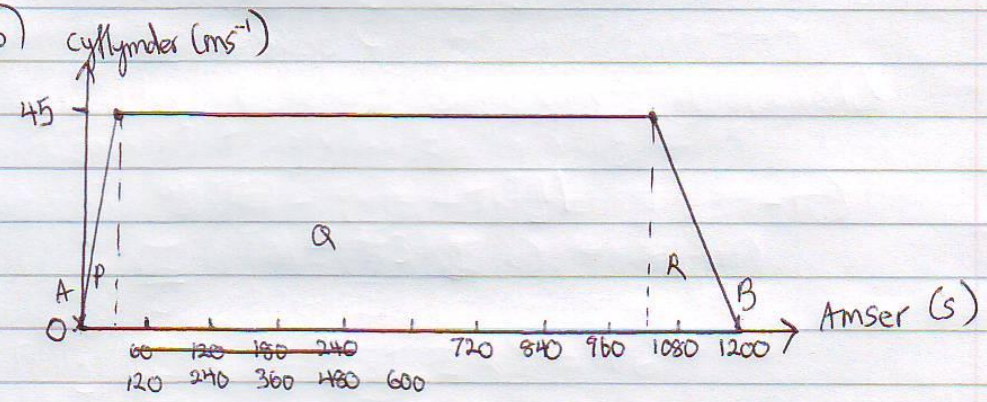
a) (i) $s = ?$
$u = 0\,ms^{-1}$
$v = 45\,ms^{-1}$
$a = ?$
$t = 60s$

$v = u + at$
$45 = 0 + a \times 60$
$45 = 60a$
$a = \frac{45}{60}$
$a = 0.75\,ms^{-2}$

(ii) $s = ?$
$u = 45ms^{-1}$
$v = 0\,ms^{-1}$
$a = -0.25ms^{-2}$
$t = ?$

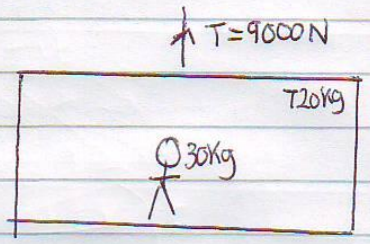
$v = u + at$
$0 = 45 + -0.25 \times t$
$0 = 45 + -0.25t$
$0.25t = 45$
$t = 180s$

(b)



(c) Pellter a deithwyd = Arwynebedd o dan y graff
$= P + Q + R$
$= (\frac{1}{2} \times 60 \times 45) + (16 \times 60 \times 45) + (\frac{1}{2} \times 180 \times 45)$
$= 48600\,m$
$= 48.6km$

3) (a)



F = ma ar y system

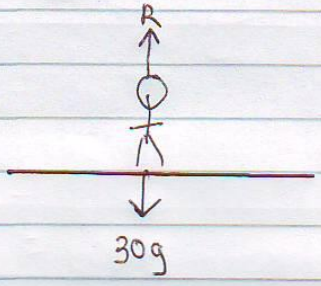
T − Pwysau'r system = ma

9000 − 750 × 9.8 = 750a

1650 = 750a

a = 2.2 ms^{-2}

(b)



F = ma ar y plentyn

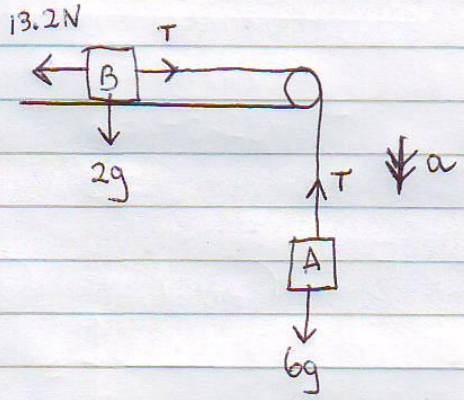
R − Pwysau'r plentyn = ma

R − 30 × 98 = 30 × 2.2

R = 30 × 9.8 + 30 × 2.2

R = 360N

4)



F = ma ar B

T − 13.2 = 2a

T = 13.2 + 2a

F = ma ar A

6g − T = 6a

−6g + T = −6a

T = 6g − 6a

Felly 13.2 + 2a = 6g − 6a

13.2 + 8a = 6g

8a = 6g − 13.2

$a = \frac{6g - 13.2}{8}$

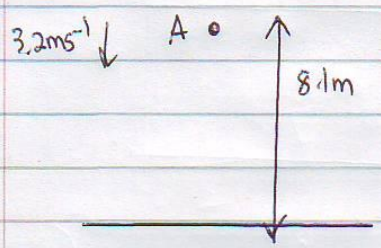
a = 5.7 ms^{-2}

T = 13.2 + 2a

T = 13.2 + 2 × 5.7

T = 24.6 N

5



a) $s = 8.1m$
$u = 3.2ms^{-1}$
$v = ?$
$a = 9.8ms^{-2}$
$t = ?$

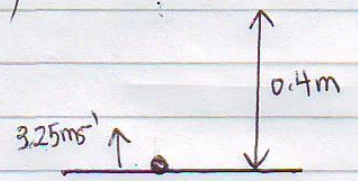
$v^2 = u^2 + 2as$
$v^2 = 3.2^2 + 2 \times 9.8 \times 8.1$
$v^2 = 169$
$v = 13\ ms^{-1}$

Gan ddefnyddio $v = -eu$ i ddarganfod cyflymder y bêl yn syth ar ôl taro'r ddaear.

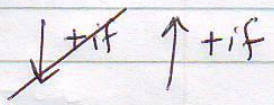
$v = -eu$
$v = -\frac{1}{4} \times 13$
$v = -3.25ms^{-1}$

Felly buanedd y bêl yn syth ar ôl taro'r ddaear yw $3.25ms^{-1}$.

cb)



$s = 0.4m$
$u = 3.25ms^{-1}$
$v = ?$
$a = -9.8ms^{-2}$
$t = ?$



$s = ut + \frac{1}{2}at^2$
$0.4 = 3.25t + \frac{1}{2} \times -9.8 \times t^2$
$0.4 = 3.25t - 4.9t^2$
$4.9t^2 - 3.25t + 0.4 = 0$
$t = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
$a = 4.9,\ b = -3.25,\ c = 0.4$

$t = \frac{3.25 \pm \sqrt{(-3.25)^2 - 4 \times 4.9 \times 0.4}}{2 \times 4.9}$

Unai $t = \frac{1}{2}s$
neu $t = \frac{8}{49}s$

$s = 0.4\text{m}$

$u = 3.25\text{ms}^{-1}$

$v = ?$

$a = -9.8\text{ms}^{-2}$

$t = ?$

$v^2 = u^2 + 2as$

$v^2 = 3.25^2 + 2 \times -9.8 \times 0.4$

$v^2 = 2.7225$

$v = 1.65\text{ms}^{-1}$

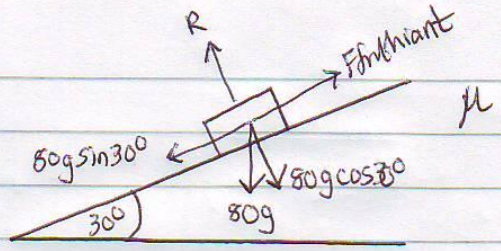
$v = u + at$

$1.65 = 3.25 + -9.8t$

$-1.6 = -9.8t$

$t = \frac{8}{49}\text{s}$

6/



(a) $\mu = 0.4$ $\quad \mu R = F_{frithiant}$

$R = 80g \cos 30^\circ$

$R = 80 \times 9.8 \times \cos 30^\circ$

$R = 678.9639166\ N$

Felly $F_{frithiant} = \mu R$

$= 0.4 \times 678.9639166$

$= 271.5855666\ N$

$F = ma$ ar y gwrthrych, yn baralel i plân

$80g \sin 30^\circ - F_{frithiant} = 80a$

$80 \times 9.8 \times \sin 30^\circ - 271.5855666 = 80a$

$120.4144334 = 80a$

$a = 1.51\ ms^{-2}$ i 2 le degol.

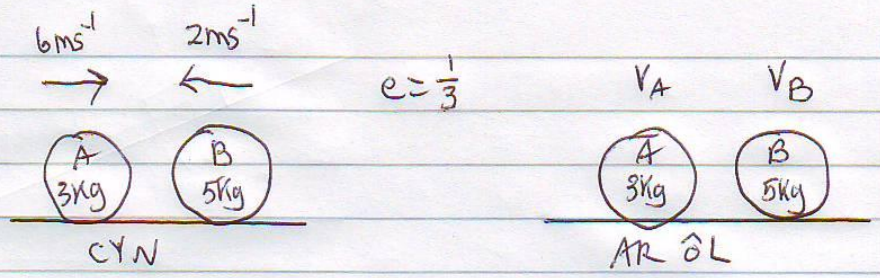
(b) $\mu = 0.6$

$F_{frithiant} = 0.6 \times 678.9639166$

$= 407.37835N$

Gan fod $80g \sin 30^\circ = 392\ N$,
Ni fydd y gwrthrych yn symud pan ydd heir ohernydd gall y grym ffrithiannol fod yn fwy na chydran y pwysau sy'n gweithredu i lawr y plân

7/



(a) Egwyddor Cadwraeth Momentwm

$$M_A u_A + M_B u_B = M_A v_A + M_B v_B$$
$$3 \times 6 + 5 \times -2 = 3v_A + 5v_B$$
$$8 = 3v_A + 5v_B \quad \text{——(1)}$$

Deddf Adferiad Newton

$$v_B - v_A = -e(u_B - u_A)$$
$$v_B - v_A = -\tfrac{1}{3}(-2 - 6)$$
$$v_B - v_A = \tfrac{8}{3}$$
$$v_B = v_A + \tfrac{8}{3} \quad \text{——(2)}$$

Amnewid o (2) i (1)

$$8 = 3v_A + 5(v_A + \tfrac{8}{3})$$
$$8 = 3v_A + 5v_A + \tfrac{40}{3}$$
$$8 = 8v_A + \tfrac{40}{3}$$
$$-\tfrac{16}{3} = 8v_A$$
$$v_A = -\tfrac{2}{3}\ ms^{-1}$$

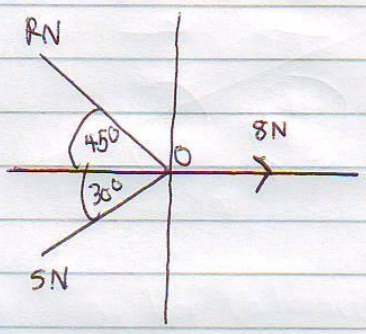
Felly $v_B = v_A + \tfrac{8}{3}$

$$v_B = -\tfrac{2}{3} + \tfrac{8}{3}$$
$$v_B = 2\ ms^{-1}$$

b) Ergyd a roddir gan A ar B $= M_B(v_B - u_A)$

$$= 5(2 - -2)$$
$$= 20\ Ns$$

8/



Yn cydrannu llorweddol

Grymoedd i'r chwith = Grymoedd i'r dde

$R\cos 45^\circ + S\cos 30^\circ = 8$

$\frac{\sqrt{2}}{2}R + \frac{\sqrt{3}}{2}S = 8$ — (1)

Yn cydrannu fertigol

Grymoedd i fyny = Grymoedd i lawr

$R\sin 45^\circ = S\sin 30^\circ$

$\frac{\sqrt{2}}{2}R = \frac{1}{2}S$

$\sqrt{2}R = S$ — (2)

Amnewid o (2) i (1) $\frac{\sqrt{2}}{2}R + \frac{\sqrt{3}}{2}(\sqrt{2}R) = 8$

$\sqrt{2}R + \sqrt{3}(\sqrt{2}R) = 16$

$\sqrt{2}R + \sqrt{6}R = 16$

$R(\sqrt{2}+\sqrt{6}) = 16$

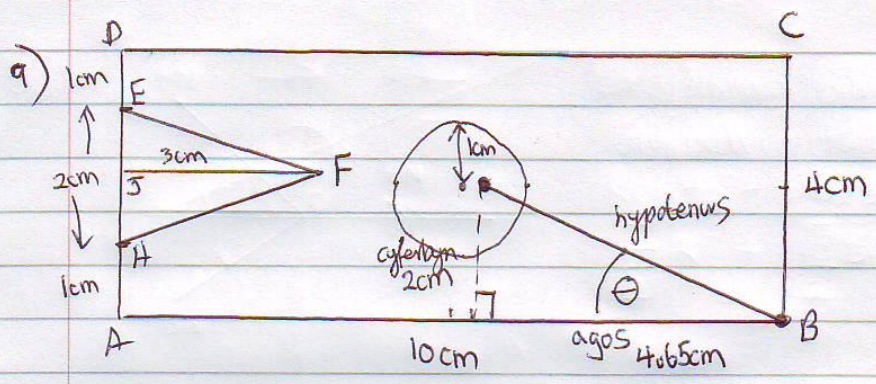
$R = \frac{16}{\sqrt{2}+\sqrt{6}}$

$R = 4.14N$ i 2 le degol

Felly $\sqrt{2}R = S$

$\sqrt{2} \times \frac{16}{\sqrt{2}+\sqrt{6}} = S$

$S = 5.86\,N$ i 2 le degol

9) 

(a) (i)

Siâp	Arwynebedd	Pellter y craidd mas o AB	Pellter y craidd mas o AD
Petryal	$40\,cm^2$	2cm	5cm
Cylch	$\pi\,cm^2$	2cm	5cm
Triongl	$3cm^2$	2cm	1cm
Lamina	$37-\pi\,cm^2$	$\bar{x}$	$\bar{y}$

Cymryd momentau o amgylch y llinell AB

~~$2\times40+2\times\pi$~~

$$2\times40-2\times\pi-2\times3=\bar{x}(37-\pi)$$
$$74-2\pi=\bar{x}(37-\pi)$$
$$\frac{74-2\pi}{37-\pi}=\bar{x}$$
$$\bar{x}=2cm$$

Cymryd momentau o amgylch y llinell AD

$$5\times40-5\times\pi-1\times3=\bar{y}(37-\pi)$$
$$197-5\pi=\bar{y}(37-\pi)$$
$$\frac{197-5\pi}{37-\pi}=\bar{y}$$
$$\bar{y}=5.35\,cm$$

(b) $\text{Tan}\,\theta=\frac{\text{cyferbyn}}{\text{agos}}$

$\text{Tan}\,\theta=\frac{2}{4.65}$

$\theta=\text{Tan}^{-1}\left(\frac{2}{4.65}\right)$

$\theta=23.3^\circ$ i un lle degol.

Atebion S1 Ionawr 2005

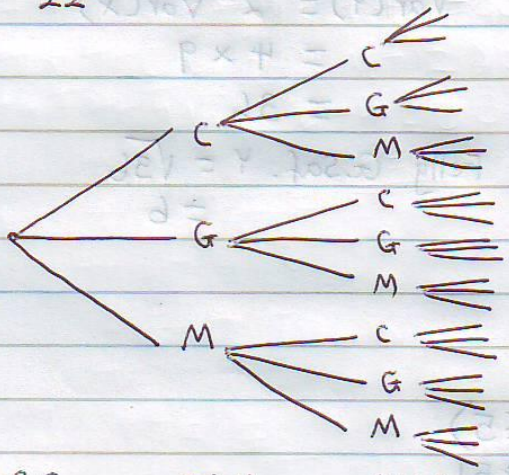
S1 Gaeaf 2005

① a) Coch a Coch a Coch

$$= \frac{5}{12} \times \frac{4}{11} \times \frac{3}{10}$$

$$= \frac{1}{22}$$

b)



GGG neu GGM neu GMG neu GMM neu MGM neu MGG neu MMG neu MMM

$$= \frac{4}{12} \times \frac{3}{11} \times \frac{2}{10} + \frac{4}{12} \times \frac{3}{11} \times \frac{3}{10} + \frac{4}{12} \times \frac{3}{11} \times \frac{3}{10} + \frac{4}{12} \times \frac{3}{11} \times \frac{2}{10}$$

$$+ \frac{3}{12} \times \frac{4}{11} \times \frac{2}{10} + \frac{3}{12} \times \frac{4}{11} \times \frac{3}{10} + \frac{3}{12} \times \frac{2}{11} \times \frac{4}{10} + \frac{3}{12} \times \frac{2}{11} \times \frac{1}{10}$$

$$= \frac{24}{1320} + \frac{36}{1320} + \frac{36}{1320} + \frac{24}{1320} + \frac{24}{1320} + \frac{36}{1320} + \frac{24}{1320} + \frac{6}{1320}$$

$$= \frac{210}{1320}$$

$$= \frac{7}{44}$$

c) CGM neu CMG neu GCM neu GMC neu MCG neu MGC

$$= 6 \times \left(\frac{5}{12} \times \frac{4}{11} \times \frac{3}{10} \right)$$

$$= 6 \times \frac{60}{1320}$$

$$= \frac{3}{11}$$

② $X \sim B(48, 0.25)$

Cymedr $np = 48 \times 0.25$
$= 12$

Amrywiant $npq = 48 \times 0.25 \times 0.75$
$= 9$

Gwyriad Safonol $\sqrt{npq} = 3$

$Y = 2X - 1$

$E(Y) = 2E(X) - 1$
$= 2 \times 12 - 1$
$= 23$

$Var(Y) = 2^2 Var(X)$
$= 4 \times 9$
$= 36$

Felly G.Saf. $Y = \sqrt{36}$
$= 6$

③ $X \sim Po(4)$

a) $P(X < 6) = P(X \leq 5)$
$= 0.7851$

b) $P(X = 3) = P(X \leq 3) - P(X \leq 2)$
$= 0.4335 - 0.2381$
$= 0.1954$

④ $P(A) = 0.2$, $P(B) = 0.6$ $P(A|B) = 0.3$

a) Felly $\frac{P(A \cap B)}{P(B)} = 0.3$

$P(A \cap B) = 0.3 P(B)$
$P(A \cap B) = 0.3 \times 0.6$
$P(A \cap B) = 0.18$

b) $P(B|A) = \frac{P(B \cap A)}{P(A)}$
$= \frac{0.18}{0.2}$
$= 0.9$

c) $P(A \cup B) = P(A) + P(B) - P(A \cap B)$
$= 0.2 + 0.6 - 0.18$
$= 0.62$

ç) $P(A' \cap B') = 1 - P(A \cup B)$
$= 1 - 0.62$
$= 0.38$

⑤ $n = 550$, $p = 0.7\%$
$p = 0.007$

$X \sim Po(np)$
$X \sim Po(3.85)$

a) $P(X = 4) = \frac{3.85^4 e^{-3.85}}{4!}$
$= 0.1927879567$
$= 0.1928$; 4 ile değil

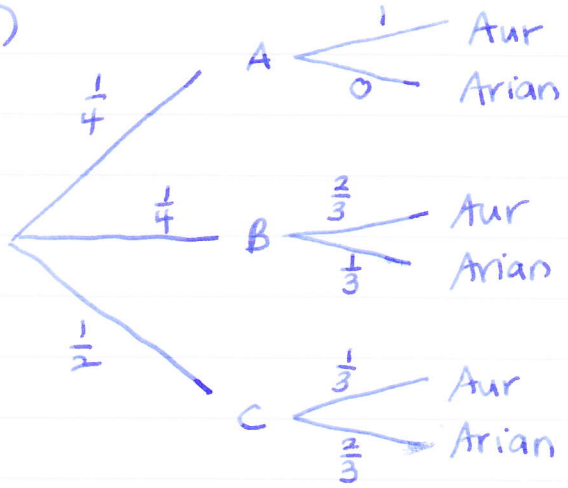
b) $P(X > 2) = 1 - P(X \leq 2)$
$= 1 - P(X=2) - P(X=1) - P(X=0)$
$= 1 - \frac{3.85^2 e^{-3.85}}{2!} - \frac{3.85^1 e^{-3.85}}{1!} - \frac{3.85^0 e^{-3.85}}{0!}$
$= 1 - 0.1577094467 - 0.0819269852 9$
$- 0.0212797364 4$
$= 0.7390838316$
$= 0.7391$; 4 ile değil

⑥ a) Drôr A $\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$ (PP)

Drôr B $\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$ (CC)

Drôr C $\frac{1}{2} \times \frac{1}{2} + \frac{1}{2} \times \frac{1}{2} = \frac{1}{2}$ (PC neu CP)

b)



(i) P(Medal aur) = A, Aur neu B, Aur neu C, Aur

$= \frac{1}{4} \times 1 + \frac{1}{4} \times \frac{2}{3} + \frac{1}{2} \times \frac{1}{3}$

$= \frac{7}{12}$

(ii) $P(A \mid \text{Medal aur}) = \frac{P(A \cap \text{Medal aur})}{P(\text{Medal aur})}$

$= \frac{\frac{1}{4} \times 1}{\frac{7}{12}}$

$= \frac{3}{7}$.

⑦ $X \sim \text{Bin}(20, 0.6)$

a) $P(X = 2) = \binom{20}{12} 0.6^{12} 0.4^{20-12}$

$= \binom{20}{12} 0.6^{12} 0.4^{8}$

$= 0.179705878$

$= 0.1797$ i 4 lle degol.

b) $P(9 \leq X \leq 15) = P(X=9) + P(X=10) + \cdots + P(X=15)$

$= \binom{20}{9} 0.6^9 0.4^{11} + \binom{20}{10} 0.6^{10} 0.4^{10} + \binom{20}{11} 0.6^{11} 0.4^9$

$+ \binom{20}{12} 0.6^{12} 0.4^8 + \binom{20}{13} 0.6^{13} 0.4^7$

$+ \binom{20}{14} 0.6^{14} 0.4^6 + \binom{20}{15} 0.6^{15} 0.4^5$

$= 0.3478749077$

$+ 0.3455880534$

$+ 0.1990587187$

$= 0.8925216798$

$= 0.8925$ i 4 lle degol

(8) a) Mae $0.1 + a + b + 0.3 + 0.2 = 1$

$a + b + 0.6 = 1$

$a + b = 0.4$ ✓

b) (i) $E(X) = 1 \times 0.1 + 2 \times a + 3 \times b + 4 \times 0.3 + 5 \times 0.2$

$E(X) = 0.1 + 2a + 3b + 1.2 + 1$

$E(X) = 2.3 + 2a + 3b$

$3.4 = 2.3 + 2a + 3b$

$1.1 = 2a + 3b$ — (1)

(ii) Mae $a + b = 0.4$ yn awgrymu $a = 0.4 - b$ — (2)

Yn amnewid o (2) i (1)

$1.1 = 2(0.4 - b) + 3b$

$1.1 = 0.8 - 2b + 3b$

$1.1 = 0.8 + b$

$0.3 = b$

Felly $a = 0.1$

c) $E\left(\frac{1}{1+X}\right) = \left(\frac{1}{1+1}\right)\times 0.1 + \left(\frac{1}{1+2}\right)\times 0.1$
$+ \left(\frac{1}{1+3}\right)\times 0.3 + \left(\frac{1}{1+4}\right)\times 0.3$
$+ \left(\frac{1}{1+5}\right)\times 0.2$
$= \frac{1}{2}\times 0.1 + \frac{1}{3}\times 0.1 + \frac{1}{4}\times 0.3 + \frac{1}{5}\times 0.3 + \frac{1}{6}\times 0.2$
$= \frac{151}{600}$
$(= 0.2516)$

⑨ a) $E(X) = \int x f(x)dx$
$= \int_1^4 x\left(\frac{1}{21}x^2\right)dx$
$= \int_1^4 \frac{1}{21}x^3\,dx$
$= \left[\frac{1}{21}\frac{x^4}{4}\right]_1^4$
$= \left[\frac{x^4}{84}\right]_1^4$
$= \frac{4^4}{84} - \frac{1^4}{84}$
$= \frac{85}{28}$

b) $F(x) = \int_1^x f(x)dx$
$= \int_1^x \frac{1}{21}x^2dx$
$= \left[\frac{1}{21}\frac{x^3}{3}\right]_1^x$
$= \frac{x^3}{63} - \frac{1}{63}$

c) ~~P(X~~ $P(2 \le X \le 3) = F(3) - F(2)$
$= \left(\frac{3^3}{63} - \frac{1}{63}\right) - \left(\frac{2^3}{63} - \frac{1}{63}\right)$
$= \frac{19}{63}$

ch) Canolinf X:
$F(x) = 0.5$
$\frac{x^3}{63} - \frac{1}{63} = 0.5$
$x^3 - 1 = 31.5$
$x^3 = 32.5$
$x = \sqrt[3]{32.5}$
$x = 3.19$
i 2 le degol