VISION GROUP

NATIONAL PRIDE • GLOBAL EXCELLENCE

HOME SCHOOLING MATERIAL

PASS A' LEVEL

MATH AND CHEMISTRY

YOUR GUIDE AWAY FROM SCHOOL

ENTREPRENEURSHIP EDUCATION ANSWERS (AENT004)

1. (a) Mission statement of the project.
-Name and address of the project with statement.
"To provide clean and safe drinking water necessary for healthy living of the people in the country".
(b) An advert for promoting the product (newspaper advert).

KYABWIHURE MINERAL WATER CO. LTD
P.O. BOX 63,
KINONI, RWAMPARA.
TEL: 0774 031 483.
Producers of high quality natural mineral water
For reducing thirsty
Packed in bottles of 500m, litre and 5 litres.
Located at Plot 17 opposite St Matthew Catholic Church at Mile 16
On Mbarara – Kabale high way
" Water is life"

THE TEACHERS

KEDRETH ASIIMWE,
MBARARA HIGH SCHOOL

ALLAN AHABWE BUHAMIZO,
NTARE SCHOOL

(c) Programme for launching Kyabwihure Mineral Water Co.Ltd.

KYABWIHURE MINERAL WATER CO. LTD
P.O. BOX 63,
KINONI, RWAMPARA
TEL. 0774 031 483
Programme for the launching of due to take place on 23rd -11-2020 at the Coy Head office.

Time	Activity	Person in charge	Remarks
	Preparation of the venue	MC	
	Arrival and registration of the invited guests.	Receptionist	
	Anthems and prayer	MC	
	Opening remarks	Director	
	Touring of the business premises	Director	
	Official launch of the business	Chief guest	
	Entertainment	DJ	
	Refreshments	COOKS/ Ushers	
	Issuing of brochures	Sales Persons	
	Closure and departure	MC	

Prepared by:
Sign……
Name……
Title……

Approved by:
Sign……
Name……..
Title……

2 (a) The memo should have the following.
- Name and address of the business which must reflect the nature of the business or products dealt in
- Documentary identity i.e. Memo
- Business logo
- From
- To
- Date
- Reference number
- Subject line
- Body
- Carbon copy; i.e. cc
- Sign and Name
- Frame

(b) Guidelines to be followed by the production Manager for improving the quality of the products.
- Name and address of the business with statement (" guideline……").
- Constant and thorough research shall be carried out.
- High quality raw materials shall be used.
- Proper storage facilities with recommended storage conditions shall be used.
- Maximum supervision and monitoring of workers shall be conducted.
- Specialized and highly skilled personnel shall be employed in production process.
- Appropriate technology shall be used.
- Proper hygiene shall be maintained at all the time.
- Clear instructions shall be given to workers regarding the production process.
- Workers shall be trained to improve their skills and efficiency in handling work.
- Machines shall be serviced regularly to ensure that they are in good mechanical conditions.
- Products shall be properly packed so as to avoid contamination, damage, spoilage etc.
- Proper welfare of workers shall be ensured to motivate workers to produce quality products.

(c) A market survey guide should include the following:
- Name and address of the business reflecting the products (Plastic products).
- Brief introduction showing purpose of the research and the products dealt in.
- Details of the respondent that is Name, age, sex or gender, marital status, location and income bracket, etc.
- Questions about the product i.e. quality, quantity and packaging.
- Questions about price i.e. market price, expected price customers are willing to pay.
- Questions about place or distribution channel i.e. where customers prefer to get products from, how convenient the distribution channels of the business are.
- Questions about promotions: how customers got to know about the business product s that is, how best they would wish to get information about the business products.
- Question about the position of the business products – ranking of the product, that is, how they compare the products with those of the competitors.
- General comments or views about the business

(d) Stock card

LOGO
Name and address of the business
P O BOX 41
MBARARA
TEL. 0412 276 578
STOCK CARD

Item NAME…… Item number…….
Maximum stock level…… RE- Order level……

Date of receiving	Qty received	Date of issue	Qty issued	Stock balance	Issued to	Issued by	Authorized by:	Remarks

(d) A letter of credit to customers who were over-invoiced.
It should include the following:

KYABWIHURE MINERAL WATER CO.LTD
PO BOX 63,
KINONI, RWAMPARA
Credit Note NO OO80
Date 30 Nov -2020

TO
BIG BOSS HOTEL
PO BOX 21
KABEREBERE, ISINGIRO
We have credited your account as follows

Description	Amount (Shs)
To correct an arithmetic error in invoice No 64 Erroneous total 6,000,000 Correct total 5000,000	1,000,000
Shs one million shillings only Total	1,000,000

We are sorry for the inconveniencies caused.
Sign……
Name……
Title……

3 (a). Notice inviting shareholders to a meeting.
Contents of the notice

Name and address
PO BOX 345
MBARARA
TEL. 0774 131 000
NOTICE

TO: ALL SHAREHOLDERS

SUBJECT: REVIVAL OF THE MEAT FACTORY
Notice is given to all shareholders of the Meat factory;
The meeting is intended to discuss the revival of the meat factory.
The meeting is to take place on 13th Nov. 2020 at the head office in the Board room.
Looking forward to your response.
Yours faithfully
Taban Kesi
Secretary General

CC. Managing director
CC. General Manager

(c). A Schedule for the routine maintenance of Machine

Name and address
P O BOX 345
MBARARA
TEL. 0774 131 000

SCHEDULE FOR ROUTINE MAITAINANCE OF MACHINES.

Date of service	Type of Machine	Description of service	Technical	Venue of service	Date of next service	Remarks

Prepared by:
Sign……
Name……..
Title……

Approved by:
Sign……..
Name……
Title……

Turn to next page

ENTREPRENEURSHIP EDUCATION ANSWERS (AENT004)

3. (b) Programme for recruiting the workers.

Name and address
PO BOX 345
MBARARA
TEL. 0774 131 000

Employee recruitment programme

Step	Time flame	Activity	Person in charge	Comment
1		Identifying vacant post	Human resource	
2		Establishing the required skills and qualifications	H R M	
3		Determining the remuneration or benefits for employment	H R	
4		Preparing and placing the job advert	H R M	
5		Receiving applications from interested candidates		
6		Sorting applications and short-listing applicants for interviews	H R M	
7		Establishing the interviews panel and formulating interview questions.	H R M	
8		Inviting short- listed candidates for interviews	H R M	
9		Interviewing the short -listed candidates	H R M	
10		Analysing interview results and contacting referees	H R M	
11		Giving feedback results to the applicants	H R M	
12		Issuing of appointments to successful candidates	H R M	
13		Receiving of acceptance letters	H R M	
14		Organising an indication and orientation	H R M	
15		Placement of new employees	H R M	

Prepared by:
Sign……..
Name……
Title……

Approved by:
Sign……..
Name……

3. (d) Organisation plan for - - - - - Meat Packers.

MEAT PACKERS
P.O. BOX 345,
MBARARA.
TEL. 0774 131 000

ORGANISATIONAL PLAN
(i). Organisational structure flow of leadership from top to bottom.
(ii) Human resource needs and responsibilities; i.e., general manager, accountant, production manager, human resource manager, marketing manager and staff.
(iii). Job duties and responsibilities; i.e., casual labour to do manual work, role of the general manager, department manager heading each department.
(iv). Skills and knowledge or qualifications of each employee.
(v). Basic pay for each category of employees.
(vi). Fringe benefits to be given to each employee; i.e., allowances in addition to salary paid.
(vii). Monitoring and evaluation of workers.
(viii). Summary of administrative expenses; i.e., communication, transport and amount specified.

- Adopting to good purchasing practices; i.e., discounts, negotiating for major credit periods
- Selling off fixed assets
- Reducing credit sales
- Carrying sales promotions
- Ploughing back profit/capitalisation of profit.
- Selling shares
- Minimising cash drawings
- Practising proper budgetary controls
- Soliciting for donations.

5. Financial ratios

A (i). Gross profit margin = $\frac{GP \times 100}{\text{Net sales}}$
$= \frac{60,000,000 \times 100}{240,000,000}$
= 25%

(ii) Net profit to sales = $\frac{\text{Net Profit} \times 100}{\text{Net sales}}$
$= \frac{35,000,000 \times 100}{35,000,000 \times 100}$
=14.6%

(iii). Net profit to owners' equity
= $\frac{\text{Net profit} \times 100}{\text{Owners' equity}}$

But owners' equity
= Capital + Net profit – Drawing
= 89,000,000 + 35,000,000 – 10,000,000
= Shs 114,000,000
= $\frac{35,000,000 \times 100}{114,000,000}$
= 30.7%

(iv).Acid test ratio = $\frac{\text{Current assets - stock}}{\text{Current liabilities}}$

But total current assets = closing stock + debtors + bank balance + cash at hand
=47,000,000+38,000,000+25,000,000+18.000.000
=Shs 128,000,000
Total current liabilities = Bank overdraft + creditors
= 34,000,000 +40,000,000
= shs74,000,000
Therefore, Acid test
$= \frac{128,000,000-47,000,000}{47,000,000}$
=1.72:1

(v). Stock turn over = $\frac{\text{Cost of sales}}{\text{Average stock}}$

But average stock
$= \frac{\text{opening stock + closing stock}}{2}$
$= \frac{23,000,000 + 47,000,000}{2}$
= Shs 35,000,000
Stock turn over = $\frac{180,000,000}{35,000,000}$
= 5 times.

(vi) Fixed assets turn over
= $\frac{\text{Net sales}}{\text{Total fixed assets}}$
But total fixed assets
= 82,000,000+ 50,000,000
= Shs 132,000,000
= $\frac{240,000,000}{132,000,000}$
=1.8:1

(vii) Gearing ratio = $\frac{\text{Long term liabilities}}{\text{Owner's equity}}$
$= \frac{72,000,000}{114,000,000}$
= 0.62:1

(b). Interpretation of the specified ratios.
(i) Debt to owners' equity or gearing ratio
63% of the long term debt is covered by owners' equity.
(ii). Net profit to sales
For every Shs 100 of net sales received Shs14.58 is net profit.

6. (i). Payee for Tushemereirwe. Does not pay payee because his salary is below the tax threshold of shs 235,000.
Payee for Abeine = $\frac{10}{100}$ ×(300,000-235000)
= shs 65,000

(ii). Payee for Turyahikayo
= 10,000 + $\frac{20}{100}$ ×(400,000-335,000)
=shs 23,000

(iii). Payee for Okumu
= 25,000 + $\frac{30}{100}$ ×(800,000-410,000)
= shs 142,000

4. **ABEINE ENTERPRISES LTD CASH FLOW STATEMENT FOR THE MONTH OF JULY TO OCTOBER 2019**

Cash in flows	July Shs	August Shs	September Shs	October Shs
Balance b/f	26,000,000	37,700,000	26,600,000	47,500,000
Receipt from creditors	24,000,000	40,000,000	40,000,000	40.000.000
Loan		20,000,000		20,000,000
Cash sales	60,000,000	60,000,000	60,000,000	60,000,000
Total cash inflows	110,000,000	157,000,000	126600,000	167,500,000
Cash outflows				
Sales men commission	6000,000	6,000,000	6,000,000	6,000,000
Cash purchases	40,500,000	40,500,000	40,500,000	40,500,000
Delivery van		35,000,000		
Wage bill	12,500,000	12,500,000	12,500,000	13,700,000
Loan interest payment			1,000,000	
Expansion of business buildings	6,200,000	30,000,000		
General Expenses	7,100,000	7,100,000	7,100,000	7,100,000
Income tax payment			12,000,000	
	72,300,000	131,100,000	79,100,000	68,350,000
Net cash	37,700,000	26,600,000	47,500,000	99,150,000

4 (b). Ways of managing cash short falls include:
- Delaying some cash payments.
- Reducing expenses i.e. dividends.
- Improving cash collections.
- Giving debtors short credit period
- Getting cheaper sources of financing/ funds.
- Raising prices of some items for some time

ENTREPRENEURSHIP QUESTIONS (AENT005)

SECTION A

1 a (i) Define the term quality as used in production
(ii) Give three techniques used by entrepreneurs to ensure quality in production

(b) Give four utilities used by business enterprises

(c) (i) Define the term innovation
(ii) List three sources of innovation in business

d (i) Define the term" personal branding" as used in business
(ii) Mention three principles of personal branding

e) Give four key prayers in capital markets

SECTION B

2. (a) Explain the uses of a business plan.

(b) Explain the factors considered when preparing a marketing plan.

3. (a) Examine the monitoring tools used by entrepreneurs in their business.

(b) Explain the need for proper business monitoring

4. (a) Justify the need for charging taxes by government.

(b) Explain the techniques used by government to increase taxable capacity.

5. (a) Explain the insurance policies that large business may take up.

(b) Under what conditions may an insurance policy be terminated?

6. (a) Examine the limitations of women active participation in business.

(b) How can the government encourage women participation in business?

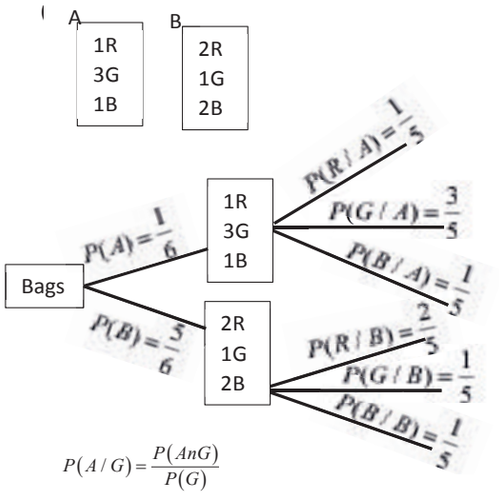
7. (a) Explain the differences between social enterprises and business enterprises.

(b) What are the elements of a social enterprise plan?

MATHEMATICS ANSWERS (AMATHS005)

(ii). $P(E/R)=\frac{P(EnR)}{P(R)}=\frac{P(R/E)\times P(E)}{P(R)}$

$=\frac{0.6\times0.4}{0.37}=\frac{0.24}{0.37}=0.6486$



$P(A/G)=\frac{P(AnG)}{P(G)}$

$P(G)=P(GnA)+P(GnB)$

$P(G)=P(G/A)\times P(A)+P(G/B)\times P(B)$

$=\frac{1}{6}\times\frac{3}{5}+\frac{5}{6}\times\frac{1}{5}=\frac{3}{30}+\frac{5}{30}=\frac{8}{30}$

$P(AnG)=\frac{1}{30}$

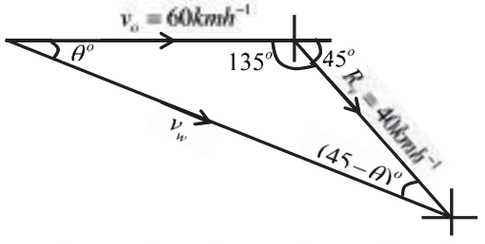
$P(A/G)=\frac{1}{30}\div\frac{8}{30}=\frac{1}{30}\times\frac{30}{8}=\frac{1}{8}$

Therefore given that a green ball is picked, the probability that it is from A is $\frac{1}{8}$

13. speed of the observer, $v_o=60kmh^{-1}$

speed of wind relative to the observer $R_v=40kmh^{-1}$

Let the true speed of wind be v_w



$\frac{V_0}{\sin(45-\theta)}=\frac{R_v}{\sin\theta}=\frac{V_w}{\sin135}$, $\frac{60}{\sin(45-\theta)}=\frac{40}{\sin\theta}=\frac{V_w}{\sin135}$

$\frac{60}{\sin(45-\theta)}=\frac{40}{\sin\theta}$, $\frac{3}{\sin(45-\theta)}=\frac{2}{\sin\theta}$

$3\sin\theta=2\sin45\cos\theta-2\cos45\sin\theta$

$3\tan\theta=2\frac{\sqrt{2}}{2}-2\frac{\sqrt{2}}{2}\tan\theta$

$3\tan\theta=\sqrt{2}-\sqrt{2}\tan\theta$

$\tan\theta=\frac{\sqrt{2}}{3+\sqrt{2}}=17.76^0$

$\frac{40}{\sin17.76}\times\sin135=V_w=92.7044kmh^{-1}$

b). (i) Velocity of P relative to Q

$\underset{\sim}{V}_P=-12\underset{\sim}{j}ms^{-1}=\begin{pmatrix}0\\-12\end{pmatrix}kmh^{-1}, \underset{\sim}{V}_Q=16\underset{\sim}{i}kmh^{-1}=\begin{pmatrix}16\\0\end{pmatrix}kmh^{-1}$

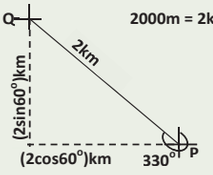
${}_P\underset{\sim}{V}_Q=\underset{\sim}{V}_P-\underset{\sim}{V}_Q=\begin{pmatrix}0\\-12\end{pmatrix}-\begin{pmatrix}16\\0\end{pmatrix}=\begin{pmatrix}-16\\-12\end{pmatrix}kmh^{-1}$

${}_P\underset{\sim}{V}_Q=(-16\underset{\sim}{i}-12\underset{\sim}{j})kmh^{-1}$

(ii) when ships are closest

At closest distance relative position and relative velocity are perpendicular

${}_P\underset{\sim}{R}_Q(t).{}_P\underset{\sim}{V}_Q=0$



$\underset{\sim}{r}_p=0\underset{\sim}{i}+0\underset{\sim}{j}=\begin{pmatrix}0\\0\end{pmatrix}km$

$\underset{\sim}{r}_Q=-2\cos60^o\,\underset{\sim}{i}+2\sin60^o\,\underset{\sim}{j}=\begin{pmatrix}-2\cos60^o\\2\sin60^o\end{pmatrix}km=\begin{pmatrix}-1\\\sqrt{3}\end{pmatrix}km$

Position of P at any time, t

$\underset{\sim}{r}_P(t)=\underset{\sim}{r}_p+\underset{\sim}{v}_pt=\begin{pmatrix}0\\0\end{pmatrix}+\begin{pmatrix}0\\-12\end{pmatrix}t=\begin{pmatrix}0\\-12t\end{pmatrix}km$

Position of Q at any time, t

$\underset{\sim}{r}_Q(t)=\underset{\sim}{r}_Q+\underset{\sim}{v}_Qt=\begin{pmatrix}-1\\\sqrt{3}\end{pmatrix}+\begin{pmatrix}16\\0\end{pmatrix}t=\begin{pmatrix}-1+16t\\\sqrt{3}\end{pmatrix}km$

Relative position at any time, ${}_P\underset{\sim}{R}_Q(t)$

${}_P\underset{\sim}{R}_Q(t)=\underset{\sim}{r}_p(t)-\underset{\sim}{r}_Q(t)=\begin{pmatrix}0\\-12t\end{pmatrix}-\begin{pmatrix}-1+16t\\\sqrt{3}\end{pmatrix}$

${}_P\underset{\sim}{R}_Q(t)=\begin{pmatrix}1-16t\\-12t-\sqrt{3}\end{pmatrix}km$

${}_P\underset{\sim}{R}_Q(t).{}_P\underset{\sim}{V}_Q=0$

$\begin{pmatrix}1-16t\\-12t-\sqrt{3}\end{pmatrix}.\begin{pmatrix}-16\\-12\end{pmatrix}=0$

$-16+256t+144t+12\sqrt{3}=0$

$400t=16-12\sqrt{3}$

$t=\frac{16-12\sqrt{3}}{400}$

Time cannot be negative. This is due to an unforeseen error In the magnitude of parameters in the question but the working is okay.

14. Let $f(x)=x^2-5x+2$

$f(4)=4^2+5\times4+2$

$f(4)=-2$

$f(5)=5^2-5\times5+2$

$f(5)=2$

$f(4)\times f(5)=-2\times2=-4$

Since $f(4)\times f(5)<0$ the root exists in the interval x = 4 and x = 5

$f(4)=-2$

$f(5)=2$

Let the better approximation be x_o, $f(x_0)=0$

x	4	x_o	5
$f(x)$	-2	0	2

From linear interpolation

$\frac{5-4}{2-(^-2)}=\frac{x_o-4}{0-(^-2)}$

$\frac{1}{4}=\frac{x_o-4}{2}$

$x_o=4.5$

b)

Therefore the better approximation to the root of the equation is 4.5

$n=0, x_n=x_o=4.5, x_{n+1}=x_1$

for

$x_{n+1}=\frac{x_n^2+2}{5}, x_1=\frac{x_o^2+2}{5}$

$x_1=\frac{4.5^2+2}{5}=4.45$

$n=1, x_n=x_1=4.45, x_{n+1}=x_2$

$x_2=\frac{x_1^2+2}{5}=\frac{4.45^2+2}{5}=4.3605$

For $x_{n+1}=\left(5-\frac{2}{x_n}\right)$

$x_1=\left(5-\frac{2}{x_o}\right)=\left(5-\frac{2}{4.5}\right)=4.55556$

$x_2=\left(5-\frac{2}{x_1}\right)=\left(5-\frac{2}{4.55556}\right)=4.560975$

c) $error, e=|x_{n+1}-x_n|$

for $x_{n+1}=\frac{x_n^2+2}{5}$

$|e_1|=|x_1-x_o|=|4.45-4.5|=0.05$

$|e_2|=|x_2-x_1|=|4.3605-4.45|=0.0895$

Since $|e_2|>|e_1|$ $x_{n+1}=\frac{x_n^2+2}{5}$ is divergent and therefore not a suitable formula for approximating the root of the equation x^2-5x+2

For $x_{n+1}=\left(5-\frac{2}{x_n}\right)$

$|e_1|=|e_1-e_o|=|4.55556-4.5|=0.05556$

$|e_2|=|e_2-e_1|=|4.560975-4.55556|=0.00542$

Since $|e_2|<|e_1|$ $x_{n+1}=\left(5-\frac{2}{x_n}\right)$ is convergent and therefore a suitable formula for approximating the root of the equation x^2-5x+2

For 3dp

$error=\frac{1}{2}\times10^{-3}=0.0005$

$x_3=\left(5-\frac{2}{x_2}\right)=\left(5-\frac{2}{4.560975}\right)=4.56150$

$|e_3|=|x_3-x_2|=|4.56150-4.560975|=0.00052$

$x_4=\left(5-\frac{2}{x_3}\right)=\left(5-\frac{2}{4.56150}\right)=4.56155$

$|e_4|=|x_4-x_3|=|4.56155-4.56150|=0.00005$

Since $0.00005<0.0005$, the root of the equation x^2-5x+2

Is 4.562(3dp)

15.

$$f(x)=\begin{cases}\frac{2}{13}(x+1), & 0<x<a\\ \frac{2}{13}(5-x) & a<x<b\\ 0 & elsewhere\end{cases}$$

$\frac{2}{13}(x+1)$ is equal to $\frac{2}{13}(5-x)$ at $x=a$

$\frac{2}{13}(a+1)=\frac{2}{13}(5-a)$

$a+1=5-a$

$a=2$

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PASS A'LEVEL

MATHEMATICS ANSWERS (AMATHS005)

From the property of pdfs

$\int_{allx} f(x) = 1$

$\int_0^a \frac{2}{13}(x+1)dx + \int_a^b \frac{2}{13}(5-x)dx = 1$

$\int_0^2 \frac{2}{13}(x+1)dx + \int_2^b \frac{2}{13}(5-x)dx = 1$

$\frac{2}{13}\left[\frac{x^2}{2}+x\right]_0^2 + \frac{2}{13}\left[5x-\frac{x^2}{2}\right]_2^b = 1$

$\left(\frac{2^2}{2}+2-0\right)+\left(\left(5b-\frac{b^2}{2}\right)-\left(5\times 2-\frac{2^2}{2}\right)\right)=\frac{13}{2}$

$4+\left(\frac{10b-b^2}{2}-8\right)=\frac{13}{2}$

$10b-b^2-8=13$

$b^2-10b+21=0$

$b = {}^{-}(-10) \pm \sqrt{\frac{(-10)^2-4\times 1\times 21}{2\times 1}}$

$b=7$ or $b=3$ substitute 3 and 7 in $\frac{2}{13}(5-x)$

$f(7)=\frac{-4}{13}, f(3)=\frac{4}{13}$

We consider $b=3$ because 7 gives a negative probability which defies the property of probabilities

$$\therefore f(x)=\begin{cases}\frac{2}{13}(x+1), & 0<x<2\\ \frac{2}{13}(5-x) & 2<x<3\\ 0 & elsewhere\end{cases}$$

For $0<x, f(x)=0, F(x)=0$

For $0<x<2, f(x)=\frac{2}{13}(x+1)$

Let t be a dummy variable

$F(x)=\int_0^x \frac{2}{13}(t+1)dt = \frac{2}{13}\left[\frac{t^2}{2}+t\right]_0^x = \frac{2}{13}\left(\frac{x^2}{2}+x\right)$

For

$2<x<7, f(x)=\frac{2}{13}(5-x)$

$F(x)=F(2)+\int_2^x \frac{2}{13}(5-t)dt = \frac{2}{13}\left(\frac{2^2}{2}+2\right)+\frac{2}{13}\left[5t-\frac{t^2}{2}\right]_2^x$

$F(x)=\frac{8}{13}+\frac{2}{13}\left(\left(5x-\frac{x^2}{2}\right)-\left(5\times 2-\frac{2^2}{2}\right)\right)$

$F(x)=\frac{8}{13}+\frac{1}{13}(10x-x^2-16)=\frac{10x-x^2}{13}-\frac{16}{13}+\frac{8}{13}$

$F(x)=\frac{1}{13}(10x-x^2-8)$

For

$\therefore a=2, b=3$

$x>7, f(x)=0$

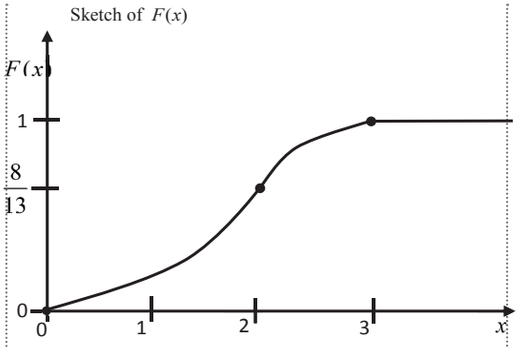
$F(x)=F(3)=\frac{1}{13}(10\times 3-3^2-8)=\frac{13}{13}=1$

$$\therefore F(x)=\begin{cases}0, x<0\\ \frac{2}{13}\left(\frac{x^2}{2}+x\right); 0<x<2\\ \frac{1}{13}(10x-x^2-8); 2<x<3\\ 1; x>3\end{cases}$$

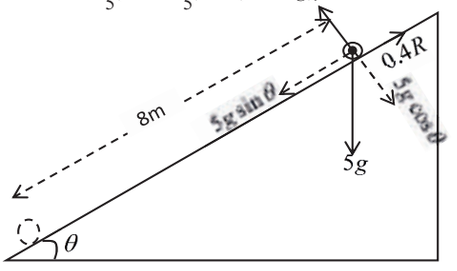
$F(0)=0\ F(2)=\frac{8}{13}\ F(3)=1$

$(0,0),\ \left(2,\frac{8}{13}\right),\ (3,1)$

Sketch of $F(x)$



12. $\sin\theta=\frac{4}{5}, \cos\theta=\frac{3}{5}, mass, m=5kg, \mu=0.4$



$R=5g\cos\theta$

$R=5g\times\frac{3}{5}=3gN$

$5g\sin\theta-0.4R=5a$

$5g\times\frac{4}{5}-0.4\times 3g=5a$

$4g-1.2g=5a$

$\frac{2.8g}{5}=a=5.488ms^{-2}$

$u=0ms^{-1}$

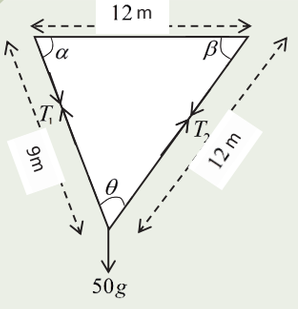
$V^2=u^2+2as$

$V^2=2\times 5.488\times 8$

$V^2=87.808$

$V=9.3706ms^{-1}$

b)



$15^2=9^2+12^2-24\times 9\cos\theta$

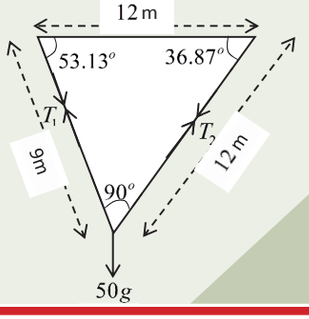
$15^2=9^2+12^2-24\times 9\cos\theta$

$\cos\theta=0$

$\theta=\cos^{-1}0, \theta=90^o$

$\sin\frac{12}{15}', \beta=36.87$

$\alpha=\sin^{-1}\frac{4}{5}=53.13^0$



$T_1\sin 53.13 + T_2\sin 36.87 = 50g$

$T_1\times\frac{4}{5}+T_2\times\frac{3}{5}=50g$

$4T_1+3T_2=250g----(i)$

$T_1\cos 3.13 = T_2\cos 36.87$

$T_1\times\frac{9}{15}=T_2\times\frac{12}{15}$

$3T_1=4T_2$

$T_1=\frac{4T_2}{3}----(ii)$

$sub,(ii)-(i)$

$4\times\frac{4}{3}T_2+3T_2=250g$

$16T_2+9T_2=750g$

$25T_2=750g$

$T_2=\frac{250g}{25}=30gN=294N$

$T_1=\frac{4}{3}\times T_2=\frac{4}{3}\times 294=392N$

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MATHEMATICS (AMATHS006)

SECTION A

1. Solve the equation $2\cos\theta - cosec\theta = 0$ for $0^0 \le \theta < 270°$
2. Find the equation of the tangent to the curve $x^3y - b^2 = 0$ at the point $M(\frac{b}{t},\ bt^2)$.
3. Find the square root of 5 + 12i
4. Given that $\alpha+\beta=-3$ and $\alpha\beta=\frac{2}{5}$ form aquadratic equation whose roots are $\frac{\alpha^2}{\beta}$ and $\frac{\beta^2}{\alpha}$.
5. $\int_0^{\frac{\pi}{2}} x\sin 2x dx$
6. Show that the curve y^2-x-6y+5=0 represent a parabola. Find its vertex and the directrix, hence sketch it.
7. Determine the angle between the line $\frac{x+1}{-4}=\frac{y-3}{2}=\frac{z+4}{8}$ and the plane 3x + 3y – 4z = -1.
8. Given that y = In $\{e^{2x}\left(\frac{x+3}{x-3}\right)^{\frac{-2}{3}}\}$ Find $\frac{dy}{dx}$

SECTION B

9 (a) Show that 1+i is a root of the equation z^4+3z^2-6z+10 =0. Hence find other roots.
(b) Given that the complex number z and its conjugate $\bar{z}$ satisfy the equation $z\bar{z}$-2z+2$\bar{z}$ = 5-4i find the possible values of z.
10 (a) Solve the simultaneous equations,

x^2-4xy+y^2 = 1

x^2+y^2- $\frac{17x}{4}=0$

(b) Find the range of values of x for which $\frac{2x+1}{x+2}>\frac{1}{2}$

MATHEMATICS QUESTIONS (AMATHS006)

11(a) $\int x ln(x^2 - 25)dx$

(b) Evaluate $\int_0^2 \frac{dx}{x^2\sqrt{16-x^2}}$.

12(a) Express $\cos(\theta + 45°) - \cos(\theta + 60°)$ in the form $R \sin A \sin B$, where R is a constant. Hence solve the equation $\cos(\theta + 45°) - \cos(\theta + 60°) = 0.4$

(b) Differentiate $\sin^2 2x$ from first principles

13. Sketch the curve $\frac{x^2+3}{(x+5)(x-5)}$ stating clearly the asymptotes

14. (a)The points P,Q and R have position vectors $\boldsymbol{p = 5i + 3j + k}$ $\boldsymbol{q = 2i - j + 3k}$ and $\boldsymbol{r = 7i - 3j + 10k}$ respectively.

Show that PQR is a triangle.

(b)(i) Find the coordinates of the point of intersection of the line $\boldsymbol{r = 2i - k + \gamma(i + 3j)}$ and the plane $\boldsymbol{5x - y - 7z - 9 = 0}$

(ii) Calculate the angle between a line and a plane in b(i) above.

15 (a) Show that the equation of the normal with gradient $\boldsymbol{m}$ to the parabola $y^2 = 4ax$ is given by $y + am^2 = mx - 2am$.

(b) $\boldsymbol{p}$ is a point $\boldsymbol{(ap^2, 2ap)}$ and q is a point $\boldsymbol{(aq^2, 2aq)}$ on the parabola $y^2 = 4ax$. The tangents at p *and* q *intersect at* R . Show that the area of triangle PQR *is* $\frac{1}{2}a^2(p-q)^3$

16 (a). Solve the differential equation. $\frac{1}{3x}\frac{dy}{dx} + \cos^2 y = 2$.

Where $x = 1$ and $y = \frac{\pi}{2}$

(b) The rate at which the temperature of a body falls is proportional to the difference between the temperature of the body and that of its surrounding. Initially the temperature of the body is $80°c$. After 10 minutes the temperature of the body is $60°c$. The temperature of the surrounding is $15°c$.

(i) Form a differential equation for the temperature of the body

(ii) Determine the time it takes for the temperature of the body to reach $40°c$.

Look out for answers next Tuesday

CHEMISTRY QUESTIONS (ACHEMS006)

SECTION A

1. (a) 0.98g of a cyclic organic compound Q , on complete combustion yielded 2.64g of carbon dioxide and 0.90g of water. Determine the empirical formula of Q.

(b) When Q was distilled in steam, the distillate took place at 98.5oC and standard pressure. The distillate was found to contain 0.60g of water and 14.88g of Q.
[The vapour pressure of water at 98.5oC is 0.18atmospheres]
(i) Determine the molecular formula of Q.
(ii) Q had no effect on ammoniacal silver nitrate solution. Identify Q.

(c) Write equation and suggest a mechanism for the reaction between Q and;
(i) Sodium hydrogen sulphite solution.
(ii) Acidified solution of semi- carbazide (NH2CONHNH2)
(iii) Acidified solution of potassium cyanide.

(d) Write equation to show how Q can be synthesized from bromobenzene.

2. (a) Describe the reactions of group (IV) element with
(i) Dry air
(ii) Bromine
(iii) Concentrated nitric acid.

(b) State what would be observed if the chlorides of carbon, silicon and lead in +4 oxidation state are separately shaken with water. Write equation(s) to illustrate your answer where necessary.

(c) Write an equation to show how lead (IV) chloride can be prepared in the laboratory. State the conditions for the reaction.

(d) Excess concentrated hydrochloric acid was added to lead (IV) chloride dropwise until in excess and to the resultant mixture ammonium chloride solution was added. State what would observed and write equation for the reaction when
(i) Excess concentrated hydrochloric acid was added to lead (IV) chloride.
(ii) Ammonium chloride solution was added to the resultant mixture.

3. (a) Define the following terms:
(i) Electrolytic conductivity
(ii) Molar conductivity

(b) (i) Describe an experiment to determine the solubility product of silver chromate by conductivity method.
(ii) The electrolytic conductivity of a saturated solution of silver chromate is $1.8589 \times 10^{-5}\ \Omega^{-1}cm^{-1}$ and that of pure water is $1.519 \times 10^{-6}\ \Omega^{-1}cm^{-1}$.
If the molar ionic conductivities of silver ions and chromate ions at infinite dilution and at 25°C are 61.9 and $124.5 \Omega^{-1}cm^2mol^{-1}$ respectively. Calculate the solubility product of silver chromate at 25°C.

(c) The table below shows the variation molar conductivities of ethanoic acid with concentration at 298K.

Concentration ($moldm^{-3}$)	0.000001	0.0001	0.01	0.0324
Molar conductivity ($\Omega^{-1}cm^2mol^{-1}$)	390	50	16	5

(i) Plot a graph of molar conductivity against square root of concentration.
(ii) State the shape of the graph.

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(iii) Calculate the pH of 0.01M ethanoic acid (Assume that 1.0 $x^{-6}moldm^{-3}$ is at infinite dilution)

4. (a) Explain what is meant by the term first electron affinity?

(b) The table below shows the first electron affinities of period 2 elements of the Periodic Table.

Element	Li	Be	B	C	N	O	F
Atomic number	3	4	5	6	7	8	9
First electron affinity ($kJmol^{-1}$)	-52	+50	-29	-120	-3	-142	-348

(i) Plot a graph of first electron affinity against atomic number.
(ii) Explain the shape of the graph.

(c) The thermodynamic data about lithium and oxygen are given below.

$2Li(s) + \frac{1}{2}O_2(g) \longrightarrow Li_2O(s)$ $\quad \Delta H = -596 kJmol^{-1}$

$Li_2O(s) \longrightarrow 2Li^+(g) + O^{2-}(g)$ $\quad \Delta H = +2852.8 kJmol^{-1}$

$Li(s) \longrightarrow Li(g)$ $\quad \Delta H = +161 kJmol^{-1}$

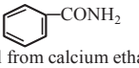
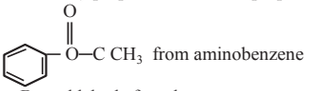
$Li(g) \longrightarrow Li^+(g) + e^-$ $\quad \Delta H = +519 kJmol^{-1}$

$O_2(g) \longrightarrow 2O(g)$ $\quad \Delta H = +496 kJmol^{-1}$

(i) Draw an energy level diagram for the formation of lithium oxide.
(ii) Use your diagram in c (i) and the table in (b) to calculate the second electron affinity of oxygen.

(d) Comment on the electron affinities of oxygen.

SECTION B

5. Write equations to show how the following compounds can be synthesised.
(a) Iodobenzene from 
(b) Propane-1, 2 – diol from calcium ethanoate.
(c) 2- methylpropanoic acid from propene
(d)  from aminobenzene
(e) Benzaldehyde from benzene

6 (a) Soap can be prepared from a vegetable oil or animal fat.
(i) Distinguish between a vegetable oil and animal fat.
(ii) Briefly explain how vegetable oil can be extracted from a natural source.

(b) (i) Briefly describe how soap can be prepared from a vegetable oil. State the chemical principles involved.
(ii) Write the equation for the reaction leading to the formation of soap.
(iii) State one advantage and one disadvantage of using soap.

(c) (i) Briefly explain the cleansing action of soap.
(ii) Explain why an aqueous solution of soap is alkaline.

(d) (i) Distinguish between soap and non-soapy detergent.
(ii) Starting from duodecan- 1- ol write equations to show how you would prepare a detergent.
State one advantage and one disadvantage of using a detergent in washing.

7. Explain the following observations:
(a) When hydrogen peroxide solution was added to lead (II) sulphide, a black solid turned to white solid.

(b) Benzoic acid liberates carbon-dioxide from carbonates whereas phenol does not.

(c) When potassium iodide solution was added to copper (II) sulphate solution, a white precipitate and a brown solution were formed.

(d) When excess water was added to a solid mixture of copper (II) carbonate and iron (III) sulphate, a blue solution and brown precipitate were formed.

(e) Ethanoic acid is weaker acid than chloroethanoic acid.

8. (a) Describe how:
(i) Concentrated sulphuric acid is manufactured from zinc blende.
(ii) Dilute sulphuric acid reacts with zinc granules.

(b) Write an equation to show how concentrated sulphuric acid reacts with
(i) Glucose
(ii) Calcium phosphate
(iii) Hydrogen bromide.

(c) Name a reagent that can be used to distinguish between the following pairs of ions and in each case state that would be observed when the reagent is treated with each ion in the pair.
(i) SO_4^{2-} and CO_3^{2-}
(ii) $S_2O_3^{2-}$ and SO_3^{2-}

Answers and more questions next Tuesday

O'LEVEL GEOGRAPHY & ENTREPRENEURSHIP TOMORROW

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