8.3 Mathematics Alt.B Paper 1 (122/1)

1. $\dfrac{-3\times {}^{+}6+{}^{-}2}{-4+{}^{+}5-{}^{-}3}=\dfrac{-18+{}^{-}2}{1+3}=-5$

(3marks)

2. $1890=2\times 3\times 3\times 3\times 5\times 7$
   $1008=2\times 2\times 2\times 2\times 3\times 3\times 7$
   Common prime factors
   3, 5, 7

(2marks)

3. 0850h + 6h 30min = 1520h
   1520h + 1h 45min = 1705h
   1705h + 3h 15min = 2020h
   2020h + 35min = 2055h
   Time of arrival in 12h system
   2055 – 12 = 8.55pm

(3marks)

4. $(4.321\times 10^{-1})^3=80.68\times 10^{-3}$
   $=0.08068$

(3marks)

5. $\pi r^2\times 45=25000$
   $r=\sqrt{\dfrac{25000}{\pi\times 45}}$
   $=13.29807601$
   $=13.3$

(3marks)

6. $3x\leq 2x+3$
   $x\leq 3$
   $2x+3<4x+5$
   $-x<1$
   $x>-1$
   Integral values: 0, 1, 2, 3.

(3marks)

7. $234=2\times 3^2\times 13$
   $270=2\times 3^2\times 5$
   $324=2^2\times 3^4$
   $\therefore$ HCF of 234,270 & 324 $=2\times 3^2=18$
   Number of pieces
   $\dfrac{234}{18}+\dfrac{270}{18}+\dfrac{324}{18}=46$

(4marks)

8.

$$\frac{\frac{6}{5}-\frac{3}{8}\times\frac{3}{2}}{\frac{6}{7}\times\frac{3}{2}-\frac{3}{8}}=\frac{\frac{6}{5}-\frac{9}{16}}{\frac{9}{7}-\frac{3}{8}}$$

$$=\frac{\frac{51}{80}}{\frac{51}{56}}$$

$$=\frac{7}{10}$$

(3marks)

9. $h^2 = 6.5^2 - 2.5^2$

$h = \sqrt{6.5^2 - 2.5^2}$

$= \sqrt{36}$

$= 6$

Height of pole

$= 6 + 0.9$

$= 6.9\text{m}$

(3marks)

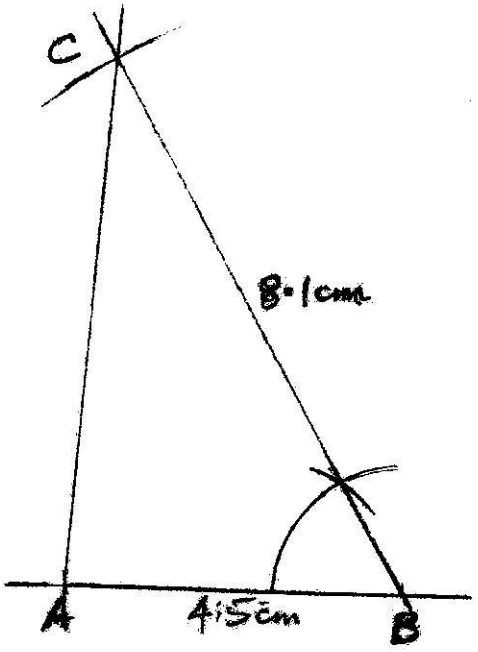
10.

No.	Log
2.5	0.3979_{+}
0.064	$\bar{2}.8062$
8.1	$\bar{1}..2041$
	0.9085
	$\bar{2}.2956 \times \frac{1}{2}$
0.1405	$\bar{1}.1478$

$= 0.1405$

(3marks)

11.



$\angle CBA = 86 \pm 1^{\circ}$

(3marks)

12. Linear scale factor $= \sqrt{\frac{16}{25}} = \frac{4}{5}$

Volume scale factor $= \left(\frac{4}{5}\right)^3$

$\therefore$ Volume of smaller cylinder $= \frac{64}{125} \times 800 = 409.6 \text{ cm}^3$

(4marks)

13. $x^2 + 8x - 384 = 0$

$(x + 24)(x - 16) = 0$

$x = -24$ or $x = 16$

(3marks)

14. Sum of angles of regular polygon

$(2n - 4)\,90 = 1620$

$2n - 4 = 18$

$n = 11$

(2marks)

15. $p = 3 + q$

$(3+q)^2 - q^2 = 21$

$9 + 6q + q^2 - q^2 = 21$

$q = 2$

$p = 5$

(4marks)

16. Area of sector $= \frac{120^0}{360^0} \times 3^2 \times \pi$

$= 9.42$

Area of rhombus $= \frac{1}{2} \times 3^2 \times 2 \times \text{Sin } 120$

$= 7.79$

Area of shaded region $= 9.42 - 7.79$

$= 1.63$

(4marks)

17. (a) $800000 - 500000 = 300000$

$48000 + \frac{3}{100} \times 300000 = 57000$

(b) $780000 - 48000 = 30000$

$30000 \times \frac{100}{3} + 500000 = 1500000$

(c) $\frac{40}{100} \times \frac{3}{100} \times (2500000 - 500000) = 24000$

$24000 + 48000 = 72000$

(10marks)

18. (a) (i) $\frac{y-5}{x-0} = 2$

$y = 2x + 5$

(ii) Gradient of L_2

$m_1 \times m_2 = -1$

$2 \times m_2 = -1$

$m_2 = -\frac{1}{2}$

Equation of L_2

$\frac{y}{x+2.5} = -\frac{1}{2}$

$y = -\frac{1}{2}x - \frac{5}{4}$

(iii) Equation of L_3

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

$y = -\frac{1}{2}x + 2\frac{1}{2}$

b) At intersection of L_1 and L_3

$$2x+5=-\frac{1}{2}x+2\frac{1}{2}$$

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

$$x=-1$$

$$y=2(-1)+5=3$$

Coordinates of point of intersection = (-1,3)

(10marks)

19. a) Nehema's faction:

$$1-\left(\frac{1}{3}+\frac{2}{5}\right)=1-\frac{11}{15}=\frac{4}{5}$$

Amount Nehema got

$$\frac{4}{5}\times 750000=200000$$

b) Profit realized after taxation:

Before taxation

$$\frac{36}{100}\times 750000=270000$$

After taxation

$$\frac{95}{100}\times\ 270000=256500$$

c) Amount to be shared after each received 20000

$$=256500-60000$$

$$=196500$$

Ratio of sharing

Amani: Furaha: Nehema $= \frac{1}{3}:\frac{2}{5}:\frac{4}{15}$

$= 5:6:4$

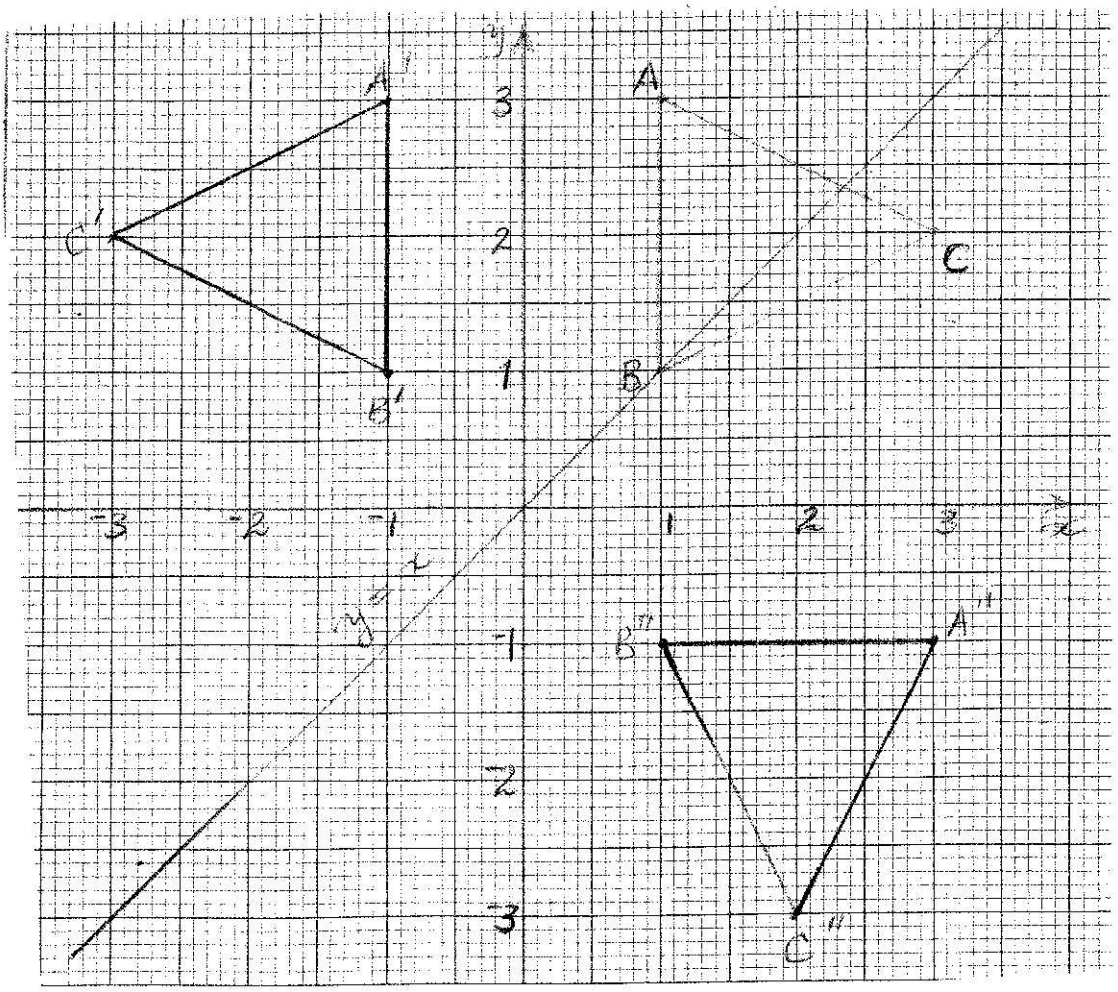
Furaha's share more than Nehema's

$$196500\left(\frac{6-4}{15}\right)=26\ 200$$

(10marks)

20.

(a) and (b)



(c) $\begin{pmatrix} a & b \\ c & d \end{pmatrix}\begin{pmatrix} 1 & 1 & 3 \\ 3 & 1 & 2 \end{pmatrix} = \begin{pmatrix} 3 & 1 & 2 \\ -1 & -1 & -3 \end{pmatrix}$

$a + 3b = 3$ $\qquad$ $c + 3d = -1$

$a + b = 1$ $\qquad$ $c + d = 1$

$2b = 2 \Rightarrow b = 1$ $\qquad$ $2d = 0 \Rightarrow d = 0$

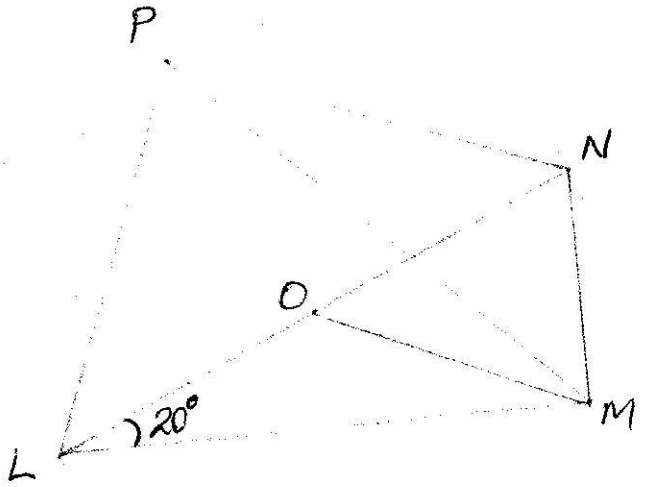
$a + 3 = 3 \Rightarrow a = 0$ $\qquad$ $c = -1$

Matrix $\begin{pmatrix} a & b \\ c & d \end{pmatrix} = \begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix}$

(d) Rotation of - 90^0 about point (0, 0)

(10marks)

21.



(a) $\angle MPN = \angle MLN = 20^\circ$
Angles subtended at the circumference by chord MN

(b) $\angle PLN = \frac{1}{2}(180^0 - 90^0) = 45^0$
Angle in semicircle equals 90° and base angles of isosceles triangle are equal.

(c) $\angle LPM = \angle LNM = 90^\circ - 20^\circ = 70^\circ$
Complementary angles in a right angled triangle, angles subtended by chord LM equal to 70°

(d) $\angle MNP = 180^0 - (45^0 + 20^0) = 115^\circ$
Opposite angles of cyclic quadrilateral add up to 180°

(e) $\angle PMO = 90^\circ - (45^0 + 20^0) = 25^\circ$
Base $\angle$s of isosceles triangle OLM $= 20^\circ$
(i.e. $\angle NMP = \angle PLM$)
and $\angle$s subtended by chord PN at circumference equal.

(10marks)

22. (a) i) $AB = 12 \tan 40^\circ$
$= 10.07\text{cm}$

ii) $BD = 10.07 \tan 60^\circ$
$= 17.44$ cm

$CD = 17.44 - 12 = 5.44$ cm

(b) $\angle CBE$

$CE = CD \tan 30$

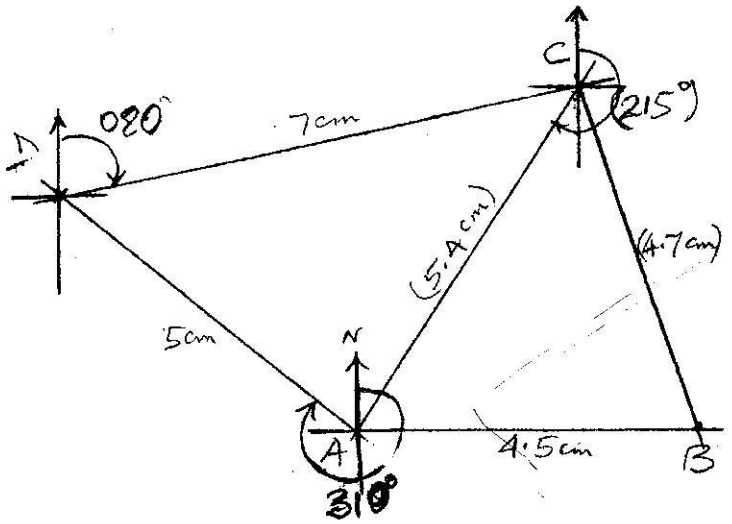
$= 5.44 \tan 30 = 3.141$

$\therefore \angle CBE = \tan^{-1} \dfrac{3.141}{12}$

$= 14.67^{\circ}$

(10marks)

23.



(b) Perimeter, 7 cm + 4.5cm + 4.7cm

= 21.2cm

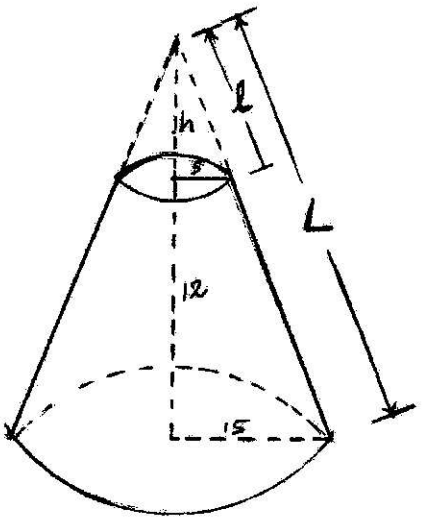
Actual perimeter = 2120m

(c) i) $5.4\ 5.4 \pm 0.1cm \rightarrow 540m$

ii) $215^0 \pm 1^0$

(10marks)

24.



a) Circular surface area

Larger circle $15^2\pi$

Small circle $5^2\pi$

Area of circular surface

$(15^2 + 5^2)\,\pi = 785.5\text{cm}^2$

(b) $\frac{h}{5} = \frac{h+24}{15}$

$15h = 5h + 120$

$10h + 120 \Rightarrow h = 12\text{cm}$

(c) Slant height (l) of cut off cone

$L = \sqrt{15 + 36} = 39$

Curved area

$\pi \times 15 \times 39 - \pi \times 4 \times 13 = \pi\,(585 - 65)$

$= 1633.84$

$= 1634$

(10marks)

8.4 Mathematics Alt. B Paper 2 (122/2)

1. (a) (i) $m = \dfrac{3}{0.089^2} = 378.74$

(ii) $n = \dfrac{1}{\sqrt{82.49}} = 0.11$

$m + n = 378.9$

(3 marks)

2. $3\mathbf{a} - 5\mathbf{b} = 3(2\mathbf{i} - 4\mathbf{j}) - 5(\mathbf{i} - 3\mathbf{j})$

$= 6\mathbf{i} - 12\mathbf{j} - 5\mathbf{i} + 15\mathbf{j}$

$= \mathbf{i} + 3\mathbf{j}$

(3 marks)

3. Volume $= \dfrac{0.36 \times 1000g}{2.5g/cm^3} = 144cm^3$

(2 marks)

4. $P^2 = \dfrac{S(T - R)}{V}$

$S(T - R) = AP^2$

$T - R = \dfrac{AP^2}{S}$

$T = \dfrac{AP^2}{S} + R$

(3 marks)

5 C. P. per litre $= \dfrac{140 \times 2 + 105 \times 5}{2 + 5}$

$= \dfrac{280 + 525}{7}$

$= 115$

S. P. Per litre = 115 ×1.2

= 138

(4 marks)

6. Angles for pie chart:

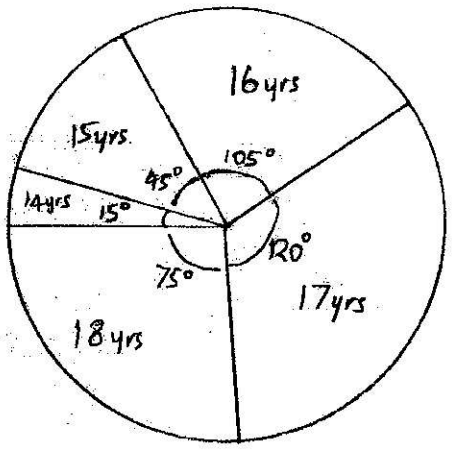
14 years - $\frac{2}{48}\times 360 = 15^0$

15 years - $\frac{6}{48}\times 360 = 45°$

16 years - $\frac{14}{48}\times 360 = 105^0$

17 years - $\frac{16}{48}\times 360 = 120°$

18 years - $\frac{10}{48}\times 360 = 75^0$



(3 marks)

7. $P^2 = \begin{pmatrix} 1 & -2 \\ -1 & 3 \end{pmatrix}\begin{pmatrix} 1 & -2 \\ -1 & 3 \end{pmatrix} = \begin{pmatrix} 3 & -8 \\ -4 & 11 \end{pmatrix}$

$R = \begin{pmatrix} 3 & -8 \\ -4 & 11 \end{pmatrix}\begin{pmatrix} 2 & 0 \\ 0 & 2 \end{pmatrix} = \begin{pmatrix} 6 & -16 \\ -8 & 22 \end{pmatrix}$

(3 marks)

8. Let the number be k

$$k + 1 \left(\frac{6}{2}\right)^2$$

$$k + 1 = 9$$

$$k = 8$$

(3 marks)

9. Length of tangent $= \sqrt{10^2 - 6^2} = 8$

(2 marks)

10. Let x be total number of balls:

$$\frac{3}{5}x = 36$$

$$x = 60$$

Number of yellow balls $= \frac{2}{5} \times 60 = 24$

(3 marks)

11. (i) $AB^2 = 18^2 + 10^2 - 2 \times 10 \times 18 \cos 80°$

$$AB = \sqrt{361.48} = 19.01$$

(ii) $\frac{Sin\theta}{18} = \frac{Sin80}{19.01}$

$$\theta = 68.83$$

(4 marks)

12. Tax charged on 1st $10164 = 10164 \times \frac{10}{100} = 1016.4$

Tax charged on remaining salary $= (18000 - 10164) \times \frac{15}{100} = 1175.4$

Tax deducted $= (1016.4 + 1175.4) - 1162 = 1029.8$

(4 marks)

13. Longitude difference $= \frac{360}{24} \times 6° = 90°$

Distance $= \frac{90°}{360°} \times 40000\text{km} = 10{,}000$ km

(3 marks)

14. (a) $S_{17} = \frac{17}{2}(17 + 81) = 748$

(b) Sum of 15 middle terms $= 748 - (7 + 81) = 660$

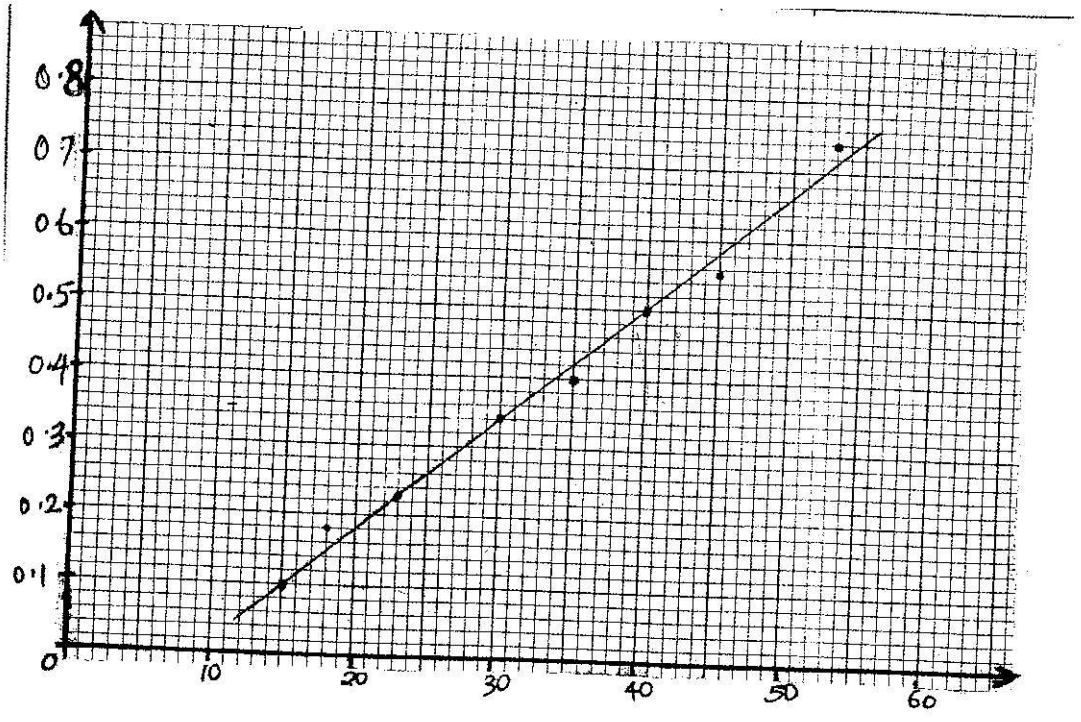
(4 marks)

15. Determinant $= 4 \times 2 - 6 \times 1 = 2$

Inverse matrix $= \frac{1}{2}\begin{pmatrix} 2 & -1 \\ -3 & 2 \end{pmatrix} = \begin{pmatrix} 1 & -\frac{1}{2} \\ -3 & 2 \end{pmatrix}$

(3 marks)

16.



(3marks)

17. (a) work done by P, Q, and R in 1hour

$$\frac{1}{8}+\frac{1}{12}+\frac{1}{16}=\frac{6+4+3}{48}=\frac{13}{48}$$

(b) (i) work done by P, Q and R in 1½ hours

$$\frac{13}{48}\times\frac{3}{2}=\frac{13}{32}$$

(ii) Fraction left after $1\frac{1}{2}$ hours $= 1-\frac{13}{32}=\frac{19}{32}$

(c) Fraction done by P and R in 1 hour

$$\frac{1}{8}+\frac{1}{16}=\frac{2+1}{16}=\frac{3}{16}$$

Time taken to complete the remaining work

$$\frac{19}{32}\div\frac{3}{16}=\frac{19}{32}\times\frac{16}{3}=\frac{19}{6}$$ = 3 hours 10 minutes

(10 marks)

18. (a) $\frac{ar^5}{ar^2}=\frac{486}{18}$

$r=\sqrt[3]{27}=3$

(b) $a\times 3^2=18$

$a=2$

(c) $T_9=2\times 3^8$ and $T_{10}=2\times 3^9$

$T_9+T_{10}=2\times 3^8+2\times 3^9=52488$

(d) $S_{16}=\frac{2(3^{16}-1)}{3-1}=43046720$

(10 marks)

19. (a) (i) $\mathbf{BC}=\begin{pmatrix}9\\8\end{pmatrix}-\begin{pmatrix}5\\6\end{pmatrix}=\begin{pmatrix}4\\2\end{pmatrix}$

(ii) $\mathbf{AD} = 3\begin{pmatrix}4\\2\end{pmatrix} = \begin{pmatrix}12\\6\end{pmatrix}$

$$\mathbf{OD} = \mathbf{OA} + \mathbf{AD} = \begin{pmatrix}2\\2\end{pmatrix} + \begin{pmatrix}12\\6\end{pmatrix} = \begin{pmatrix}14\\8\end{pmatrix}$$

D(14,8)

(b) (i) $\mathbf{OT} = \mathbf{OA} + \frac{1}{2}\mathbf{AD} = \begin{pmatrix}2\\2\end{pmatrix} + \frac{1}{2}\begin{pmatrix}12\\6\end{pmatrix} = \begin{pmatrix}2\\2\end{pmatrix} + \begin{pmatrix}6\\3\end{pmatrix} = \begin{pmatrix}8\\5\end{pmatrix}$

T (8,5)

(ii) $\mathbf{TC} = \begin{pmatrix}8\\9\end{pmatrix} - \begin{pmatrix}8\\5\end{pmatrix} = \begin{pmatrix}1\\3\end{pmatrix}$

$|\mathbf{TC}| = \sqrt{1^2 + 3^2} = \sqrt{10} = 3.2$ units

(10 marks)

20. (a) (i) Time taken from T to U $= \frac{36}{x}$

(ii) Time taken from U to T $= \frac{36}{x+3}$

(b) $\frac{36}{x} - \frac{36}{x+3} = 1$

$36(x+3) - 36x = x(x+3)$

$36x + 108 - 36x = x^2 + 3x$

$x^2 + 3x - 108 = 0$

$(x-9)(x+12) = 0$

$x = 9$ km/h

$\therefore$ return speed = 12 km/h

(c) Average speed :

Total time; $\frac{36}{9} + \frac{36}{12} = 7$

$\therefore$ Average speed $= \frac{72}{7}$ $= 10.3$ km/h

(10 marks)

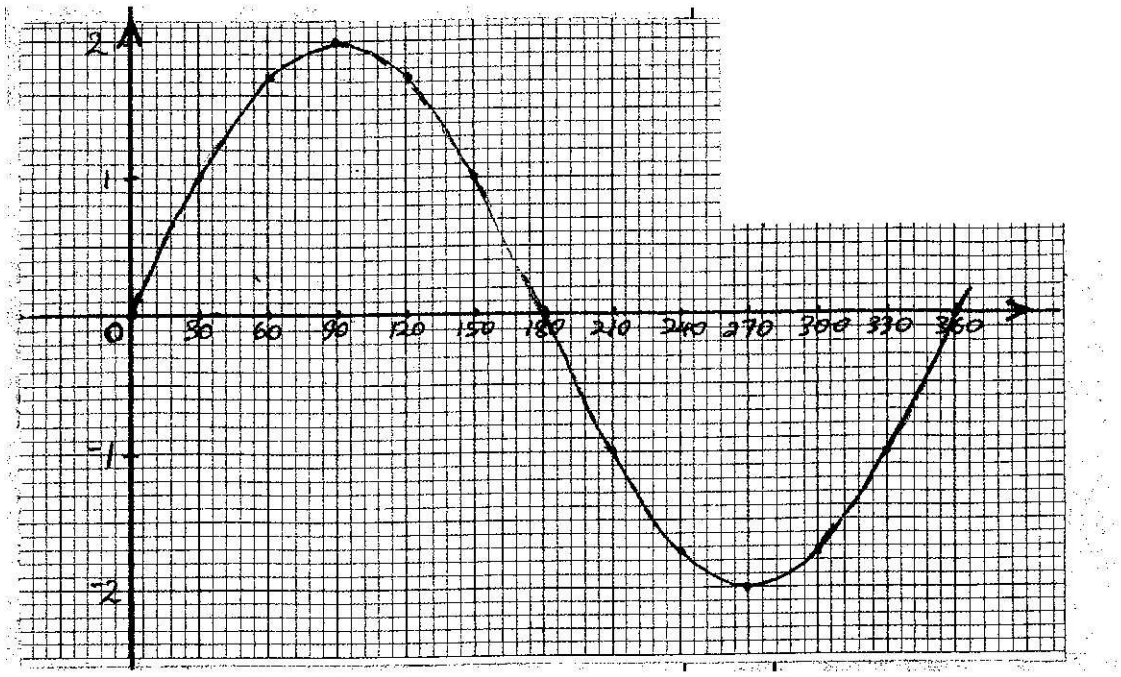
21.

Dr					Cr.			
Date	Particulars	Folio	Amount		Date	Particulars	Folio	Amount
April 1st	Balance b/d		8 000		4th	Fertilizer		3 500
12th	Sale of bananas		15 000		5th	Water		600
15th	Sale of cabbages		5 000		9th	Chemicals		1 500
20th	Sale of tomatoes		9 500		16th	Wages		3 000
28th	Sale of onions		2 500		24th	Electricity		840
			40 000		25th	Seeds		450
					30th	Spray pump		7 500
May 1st	Balance b/d		22 610		30th	Bal c/d		22 610
								40 000

(10 marks)

22. (i)

x°	0	30	60	90	120	150	180	210	240	270	300	330	360
$y = 2\sin x$	0	1	1.73	2	1.73	1	0	- 1	- 1.73	- 2	- 1.73	- 1	0



(b) (i) $x = 48^0$ and $x = 132^0$

(ii) $30° < x < 150°$

(10 marks)

23. (a) mean $(\bar{x})$

$$\frac{1.2\times2+1.3\times4+1.4\times6+1.5\times12+1.6\times8+1.7\times5+1.8\times3}{40} = \frac{60.7}{40} = 1.5 \text{ kg}$$

(b)

x	f	fx	d= x – 1.5	Fd^2
1.2	2	2.4	-0.3	0.18
1.3	4	5.2	-0.2	0.16
1.4	6	8.4	-0.1	0.06
1.5	12	18	0	0
1.6	8	12.8	0.1	0.08
1.7	5	8.5	0.2	0.2
1.8	3	5.4	0.3	0.27
		$\sum fx$ = 60.7		$\sum fd^2$= 0.95

$$\text{Variance} = \frac{\sum fd^2}{\sum f} = \frac{0.95}{40} = 0.02375$$

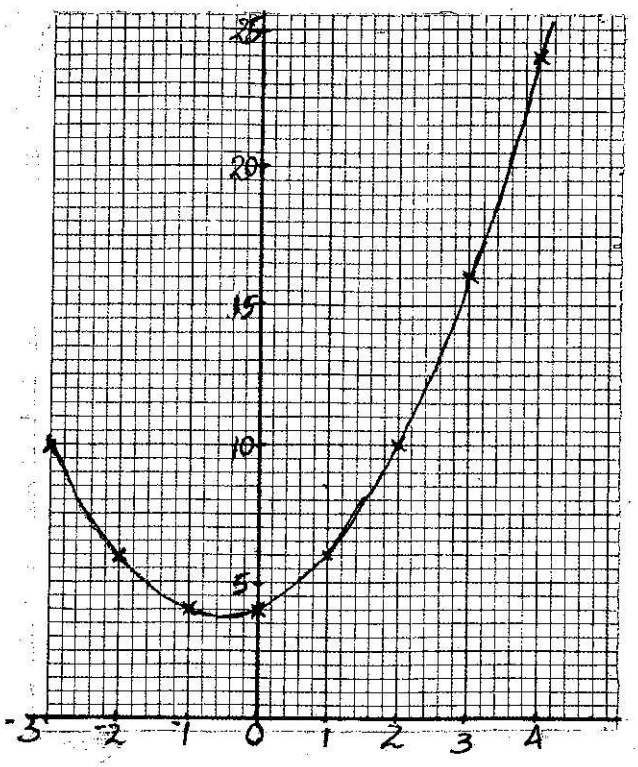
(c) Standard deviation $= \sqrt{0.02375} = 0.1541$

(10marks)

24. (a)

x	-3	-2	-1	0	1	2	3	4
y	10	6	4	4	6	10	16	24

(b)



(c) $A = \frac{1}{2} \times 1\{(10+24) + 2(6+4+4+6+10+16)\} = \frac{1}{2}\{34 + 2(46)\} = \frac{1}{2}\{126\} = 63$

(10 marks)