

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

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

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

$m + n = 378.9$

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

(2 marks)

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

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

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

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

(3 marks)

5. C. P. per litre $= \frac{140 \times 2 + 105 \times 5}{2 + 5}$
 $= \frac{280 + 525}{7}$
 $= 115$

17

$$\begin{aligned} \text{S. P. Per litre} &= 115 \times 1.2 \\ &= 138 \end{aligned}$$

(4 marks)

18

6. Angles for pie chart:

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

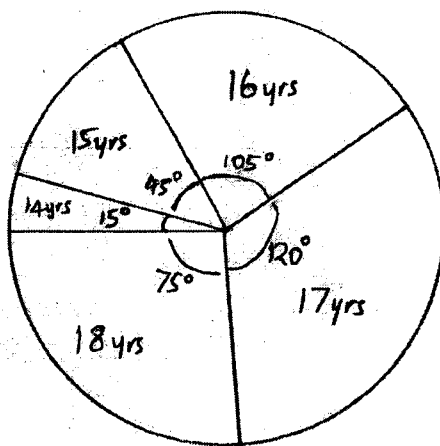
$$15 \text{ years} - \frac{6}{48} \times 360 = 45^\circ$$

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

19

$$17 \text{ years} - \frac{16}{48} \times 360 = 120^\circ$$

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



20

(3 marks)

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

21

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

(b)

(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:

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

$$x = 60$$

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

(3 marks)

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

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

$$(ii) \frac{\sin \theta}{18} = \frac{\sin 80}{19.01}$$

$$\theta = 68.83$$

(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 = $\frac{360}{24} \times 6^\circ = 90^\circ$

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

(3 marks)

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

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

(4 marks)

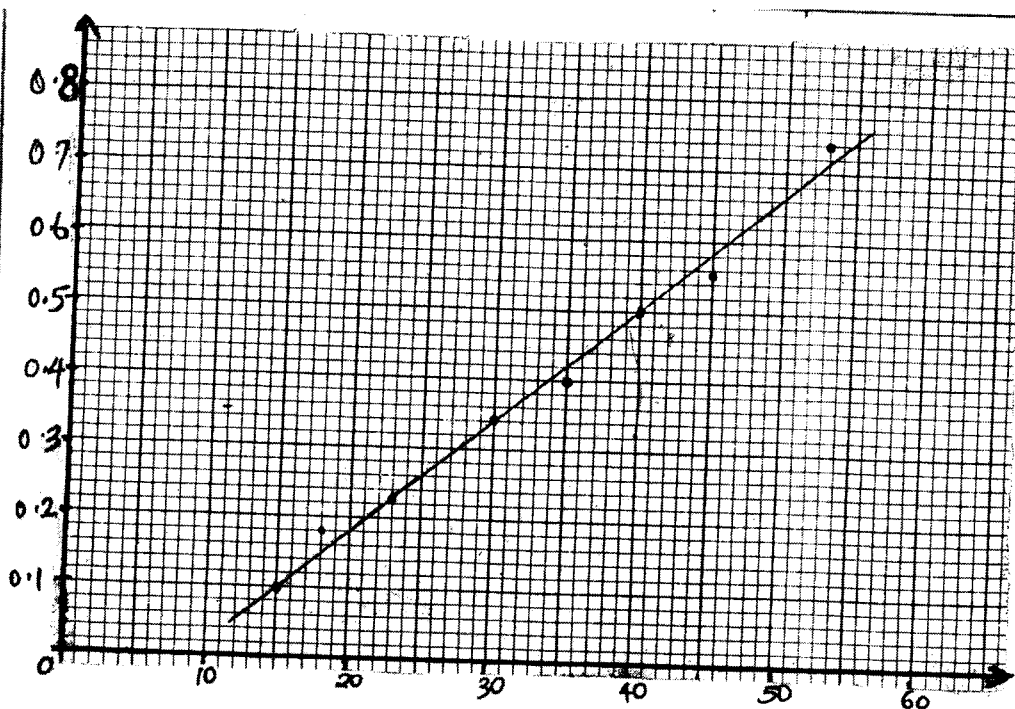
15. Determinant = $4 \times 2 - 6 \times 1 = 2$

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.

20



21

(b)

(3 marks)

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

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

(b) (i) work done by P, Q and R in $1\frac{1}{2}$ 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

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

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

1

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

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

D(14,8)

1

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

T(8,5)

1

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

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

(10 marks)

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

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

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

2

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

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

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

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

$$x = 9 \text{ km/h}$$

$$\therefore \text{return speed} = 12 \text{ km/h}$$

$$(c) \quad \text{Average speed :}$$

2

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

(t

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

(10 marks)

21.

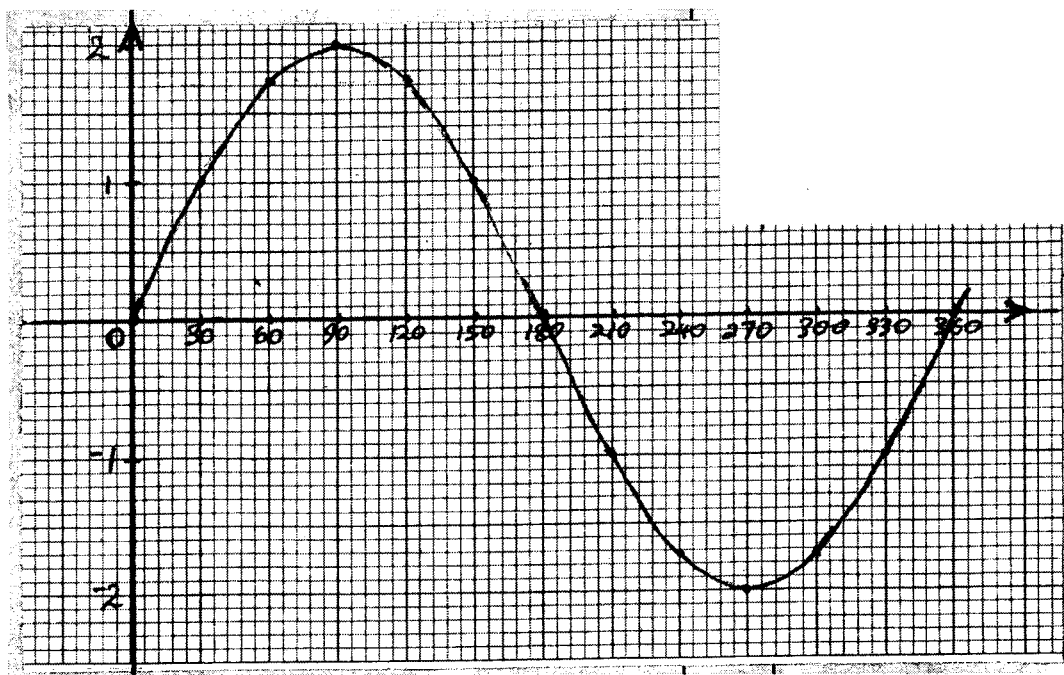
Dr				Cr.			
Date	Particulars	Folio	Amount	Date	Particulars	Folio	Amount
April 1 st	Balance b/d		8 000	4 th	Fertilizer		3 500
12 th	Sale of bananas		15 000	5 th	Water		600
15 th	Sale of cabbages		5 000	9 th	Chemicals		1 500
20 th	Sale of tomatoes		9 500	16 th	Wages		3 000
28 th	Sale of onions		2 500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

1
14
19



- (b) (i) $x = 48^\circ$ and $x = 132^\circ$
(ii) $30^\circ < x < 150^\circ$

(10 marks)

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

$$\frac{1.2 \times 2 + 1.3 \times 4 + 1.4 \times 6 + 1.5 \times 12 + 1.6 \times 8 + 1.7 \times 5 + 1.8 \times 3}{40} = \frac{60.7}{40} = 1.5 \text{ kg}$$

20

(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		$\sum fd^2 = 0.95$

21

(b)

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

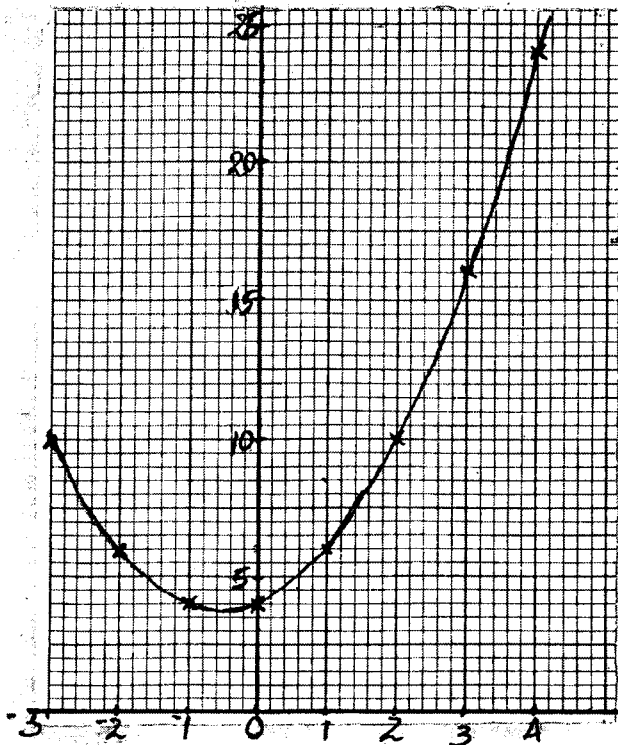
(c) Standard deviation = $\sqrt{0.02375} = 0.1541$

(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)