

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

1.
$$\frac{(0.52)^3 \times \sqrt{4.17}}{3.58911} = 0.08000239$$

$$= 0.080000$$

2 marks

2. a)
$$R = \begin{pmatrix} P & \\ 2 & 4 \\ -3 & -7 \end{pmatrix} - \begin{pmatrix} 2Q & \\ -2 & 4 \\ 0 & -6 \end{pmatrix}$$

$$= \begin{pmatrix} 4 & 0 \\ -3 & -1 \end{pmatrix}$$

b)
$$\begin{pmatrix} 2 & 4 \\ -4 & -7 \end{pmatrix} \begin{pmatrix} 4 & 0 \\ -3 & -1 \end{pmatrix}$$

$$= \begin{pmatrix} -4 & -4 \\ 9 & 7 \end{pmatrix}$$

4 marks

3.
$$2x^2 - 3x - 5 = 0$$

$$2x^2 - 5x + 2x - 5 = 0$$

$$x(2x - 5) + 1(2x - 5) = 0$$

$$(2x - 5)(x + 1) = 0$$

Either $2x - 5 = 0 \Rightarrow x = 2\frac{1}{2}$
 Or $x + 1 = 0 \Rightarrow x = -1$ }

3 marks

4.
$$B = \sqrt{\frac{EN}{N+P}} \Rightarrow B^2 = \frac{EN}{N+P}$$

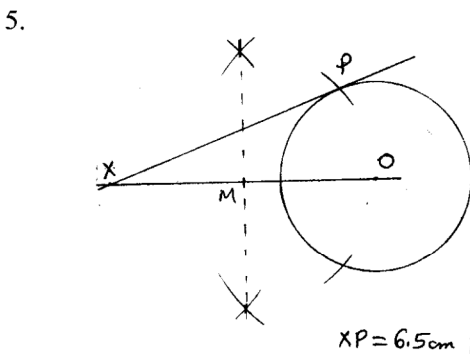
$$B^2 N + B^2 P = N$$

$$B^2 N - EN = B^2 P$$

$$N(B^2 - E) = B^2 P$$

$$N = \frac{-B^2 P}{B^2 - E} = \frac{B^2 P}{E - B^2}$$

3 marks



$$\begin{aligned}
 6. \quad AB &= 4q - 6q + 2p - 14q \\
 &= -4p - 10q \\
 -4p - 10q &= -2(2p + 5q) = m(2p + 5q) \\
 \therefore m &= -2
 \end{aligned}$$

4 marks

$$\begin{aligned}
 7. \quad a) \quad \frac{1}{5} - \frac{1}{8} &= \frac{8-5}{40} \\
 &= \frac{3}{40}
 \end{aligned}$$

$$b) \quad \frac{40}{3} = 13\frac{1}{3} \text{ hours}$$

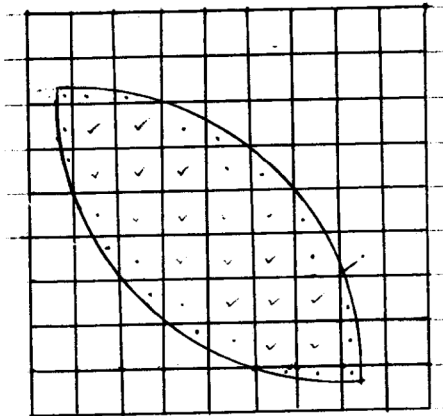
3 marks

$$\begin{aligned}
 8. \quad a) \quad \text{Angle representing maize} \\
 &= \frac{1}{2} [360^\circ - (120^\circ + 100^\circ + 76^\circ)] = 32^\circ
 \end{aligned}$$

$$\begin{aligned}
 b) \quad \text{Total expenditure} \\
 &= \text{Sh. } 528 \times \frac{360}{32} = \text{Sh. } 5940
 \end{aligned}$$

4 marks

9.



17 full squares (ticked ✓)
 + 24 part squares (dotted ·) ÷ 2

$$= 17 + \frac{24}{2} = 29$$

$$\begin{aligned}
 \text{Area in mm}^2 &= 29 \times 64 \\
 &= 1856 \text{ mm}^2
 \end{aligned}$$

3 marks

10. a) Det. $= 3 \times 1 - 1 \times 1$
 $= 2$

b) Area of image rectangle $A^1B^1C^1D^1$
 $= 2 \times 15$
 $= 30$ square units

3 marks

11. $\frac{ar^4}{ar} = \frac{192}{24}$

$r^3 = 8 \Rightarrow r = 2$

1st term $a = \frac{24}{2} = 12$

3 marks

12. $TQ = 34 - 25 = 9$

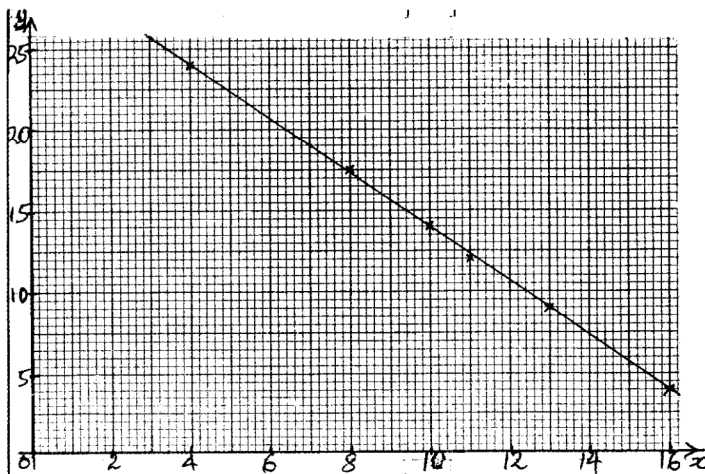
$RT.TS = x^2 = 25 \times 9 = 225$

$x = 15$

$\therefore RS = 30$

3 marks

13.



a) Points plotted

Line of best fit drawn

b) Value of y when $x = 7:19$

3 marks

14. Angle between A and B
 $= 32.8 + 21.2 = 54^\circ$

Distance between A and B

$= \frac{54}{360} \times 2 \times \frac{22}{7} \times 6370$

$= 6006$

3 marks

15. Value by end of 2007

$$= \frac{102}{100} \times 720000$$

$$= 734400$$

Value by end of 2009

$$= \left(\frac{95}{100}\right)^2 \times 734400$$

$$= 662796$$

3 marks

16. Time taken from 11 am to 2.15 am

$$= 2\text{h } 45\text{ min}$$

Average speed = $\frac{240}{2\frac{3}{4}}$

$$= 80\text{ km/h}$$

3 marks

17. (a) (i) Simple interest:
 Bal. to be charged = $80000 - 24000 = 56000$

$$\therefore \text{total interest} = 56000 \times \frac{15}{100} \times \frac{5}{12}$$

$$= 3500$$

(ii) Monthly instalments

$$= \frac{3500 + 56000}{5}$$

$$= \text{Sh. } 11900$$

(b) Cash price with discount

$$= 80000 \times \frac{96}{100}$$

$$= \text{Sh. } 76800$$

Difference in prices

$$24000 + (11900 \times 5) - 76800$$

$$= 83500 - 76800$$

$$= \text{Sh. } 67000$$

10 marks

18. (a) (i) Common difference

$$5 - 2 = 8 - 5 = 11 - 8 = 3$$

(ii) Next two terms 14, 17

(iii) $T_{30} = 2 + (30 - 1)3$

$$= 89$$

(b) Number of terms

$$5430 = \frac{n}{2}(2 + 179)$$

$$n = \frac{5430 \times 2}{181} = 60$$

(c) Sum of first fifty terms

$$S_{50} = \frac{50}{2} \{2 \times 2 + (50 - 1)3\}$$

$$= 25(4 + 147)$$

$$= 3775$$

10 marks

19. (a) fx
15
16
15
24
14
16

$$\frac{\sum fx}{20} = \frac{100}{20} = 5$$

(b)

$x - \bar{x}$	$f(x - \bar{x})^2$
-2	20
-1	4
0	0
1	4
2	8
3	18

$$\sum f(x - \bar{x})^2 = 54$$

$$\text{Variance} = \frac{\sum f(x - \bar{x})^2}{20}$$

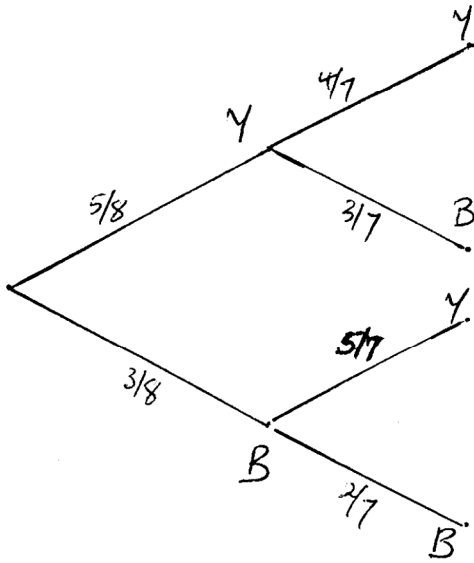
$$= \frac{54}{20}$$

$$= 2.7$$

(c) S.D. = $\sqrt{2.7}$
= 1.64

10 marks

20. (a)



(b) (i) $\frac{5}{8} \times \frac{4}{7} = \frac{20}{56} =$

(ii) $\frac{5}{8} \times \frac{4}{7} + \frac{3}{8} \times \frac{2}{7} = \frac{20}{56} + \frac{6}{56} = \frac{26}{56}$

(iii) $\frac{5}{8} \times \frac{3}{7} + \frac{3}{8} \times \frac{5}{7} = \frac{15}{56} + \frac{15}{56} = \frac{30}{56}$

10 marks

21. (a) Area of Δ

$$= \frac{1}{2} \times 4 \times 7 \sin 100$$

$$= \frac{1}{2} \times 4 \times 7 \times 0.9848$$

$$= 13.79 \text{ cm}^2$$

(b) $AC^2 = 4^2 + 7^2 - 2 \times 4 \times 7 \cos 100$

$$= 16 + 49 - 56 \times -0.1736$$

$$= 65 + 9.7216$$

$$AC = \sqrt{74.7216} = 8.64$$

$$\therefore \text{perimeter} = 8.64 + 4 + 7$$

$$= 19.64$$

$$(c) \quad \frac{\sin \theta}{4} = \frac{\sin 100}{8.64}$$
$$\frac{\sin \theta}{4} = \frac{0.9848}{8.64}$$

$$\sin \theta = \frac{4 \times 0.9848}{8.64}$$
$$= 0.455925925$$

$$\therefore \theta = \sin^{-1} 0.455925925$$
$$= 27.12^\circ$$

10 marks

22. (a) Length of line passing thro'
2=9.8; 4=9.2; 6=8; 8=6

(b) Area

$$\begin{aligned} & \frac{1}{2} \times 2 [10 + 0 + 2(9.8 + 9.2 + 8 + 6)] \\ &= \frac{1}{2} \times 2 [10 + 2(33)] \\ &= \frac{1}{2} \times 2 \times 76 \\ &= 76 \end{aligned}$$

(c) Area of quadrant

$$\begin{aligned} &= \frac{1}{4} \times 3.142 \times 10^2 \\ &= 78.55 \end{aligned}$$

(d) $\% = \frac{76}{78.55} \times 100$
 $= 97\%$

10 marks

23. (a) (i) $AB = 4i + j - (2i + 5j)$
 $= 4i + j - 2i - 5j$
 $= 2i - 4j$

(ii) $AC = 2(4i + j) - (2i + 5j)$
 $= 8i + 2j - 2i - 5j$
 $= 6i - 3j$

(b) $OD = 2i + 5j + \frac{1}{2}(6i - 3j)$
 $= 2i + 5j + 3i - 1.5j$
 $= 5i + 3.5j$

Length of **OD**

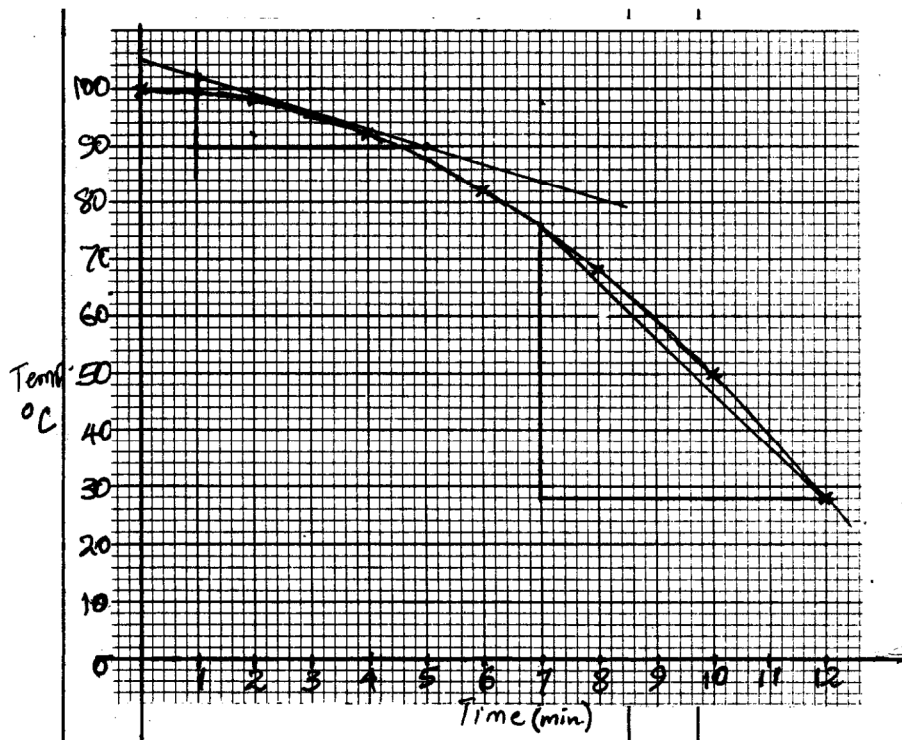
$$\begin{aligned} &= \sqrt{5^2 + 3.5^2} \\ &= 6.10 \end{aligned}$$

10 marks

24.

(a)

Time (t)	0	2	4	6	8	10	12
Temp ($^{\circ}\text{C}$)	100	98	92	82	68	50	28



- (b) Scale
Plotting
Smooth curve

(c) (i)
$$\frac{76-28}{5}$$

$$= \frac{48}{5} = 9.6^\circ$$

(ii) tangent at $t = 3$ drawn
Gradient $\frac{102-90}{4} = 3$

10 marks