

K.C.S.E YEAR 2010 121/ 2 MARKING SCHEME

1. $\frac{(7.55 \times 5.25) - (7.45 \times 5.15) \times 100}{2 \times 7.5 \times 5.2}$
 = 1.628%

2. $\frac{4}{\sqrt{5} + \sqrt{2}} - \frac{3}{\sqrt{5} - \sqrt{2}}$
 = $4(\sqrt{5} + \sqrt{2})(\sqrt{5} - \sqrt{2})$
 = $4\sqrt{5} - 4\sqrt{2} - 3\sqrt{5} - 3\sqrt{2}$
 $\frac{5 - 2}{3}$
 = $\frac{\sqrt{5} - 7\sqrt{2}}{3}$

3. $\angle OCT = 36^\circ$
 $\angle OCT = 36^\circ$
 $\angle OCT = 90 - 36^\circ = 54^\circ$
 OR $\frac{108^\circ}{2} = 54^\circ$

4. $68X + 53Y = 62$
 $X + Y$
 $6X = 9Y$
 $X : Y = 9:6$
 = 3:2

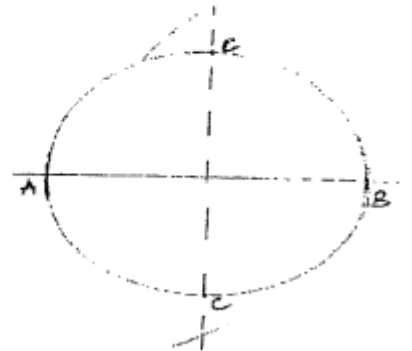
5. let length be X
 Length = 2x
 Area = (2x)(2s) = 60
 $X - x - 30 = 0$
 $(x - 6)(x + 5) = 0$
 $X = 6$

6. One person can build 1/5 x 3 huts in 21 days
 10 people can build 6 huts in 21 days
 2 people could build 6 huts in 15 days
 $X = 21 \times p \quad 6/3 \times 21/15 \times 5$
 = 14 people

7. = 4000 X R x
 $R = \frac{3800}{2000} = 1.9\%$
 $r = 1.9\%$
 $3420 = \frac{p \times 1.9 \times 7.5}{100}$

$P = \frac{3420 \times 100}{1.9 \times 7.5}$
 = 24000

8. .
 9. .
 10. .
 11. .
 12. .
 13.



- (a) Locus of P Drawn. B1
 (b) + bisector of AB Constructed B1
 (c) Position of C indicated in places B1
 3marks

14. $3y - y = \frac{p}{q + 1/x}$
 $2y(q + 1/x) = p$
 $q + 1/x = p/2y$
 $1/x = p/2y - q$
 $X = 2y$

15. $\log(15 - 5x) = \log(3x - 2)$
 $\frac{15 - 5x}{10} = 3x - 2$
 $15 - 5x = 30x - 20$
 $X = 1$

16. (a) (i) Coordinates of centre (1, -1)
 (ii) radius ; $r^2 = 1^2 + 3^2 = 10$
 $= r \sqrt{3.162}$
 Or = $\sqrt{10}$
 Accept it
 (b) equation:
 $(x - 1)^2 + (y + 1)^2 = 10$

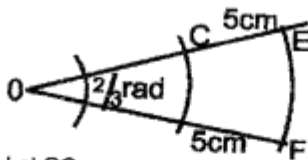
11. No of oranges for Friday
 $1948 - (750 + 750 + 240)$
 $= 208$
 No of oranges for Saturday
 $208 + 560 = 768$
 \therefore Amount = sh. 8 \times 768
 $= \text{sh. } 6144$

12. $\frac{x^2 + x - 4xy - 4y}{(x+1)(4y^2 - xy)} = \frac{x(x+1) - 4y(x+1)}{(x+1)(y)(4y-x)}$
 $= \frac{(x-4y)(x+1)}{(x+1)(-y)(x-4y)}$
 $= -\frac{1}{y}$

13. $\sin 3\theta = \cos 2\theta$
 $\therefore \sin 3\theta = \sin (90^\circ - 2\theta)$
 $\therefore 3\theta = 90^\circ - 2\theta$
 $5\theta = 90$
 $\theta = 18^\circ$

14. $2\pi r^2 + 2\pi rh = 154$
 $r = h$
 $2\pi r^2 + 2\pi r^2 = 154$
 $4\pi r^2 = 154$
 $r = \sqrt{\frac{154}{4 \times 3.142}}$
 $r = 3.500$
 \therefore diameter = $2r = 3.500 \times 2$
 $= 7.00(2dp)$

15.



Let $OC = r$
 $\therefore CD = \frac{2}{3}r$ and $EF = \frac{2}{3}(r+5)$

$\frac{2}{3}r + \frac{2}{3}(r+5) + 5 + 5 = 24$

$\frac{4}{3}r = 10\frac{2}{3}$

$r = 8$

16.

Total number of seedlings
 $(5 \times 1) + (10 \times 3) + (15 \times 1) + (20 \times 4) + (30 \times 1) + (10 \times 2)$
 $= 5 + 30 + 15 + 80 + 30 + 20 = 180$
 % of height (h) : $23 \leq h < 27$
 $= \left(\frac{30+15}{180}\right) \times 100$
 $= 25\%$

17. (a) Total sales = sh. 360 \times 500
 $= \text{sh. } 180,000$

Commission = sh. $(180,000 - 100,000) \times \frac{2}{3}$
 $= \text{sh. } 1600$
 Total earnings = sh. $(12,000 + 1600)$
 $= 13600$

(b) (i) New salary = sh. $(12000 + 12000 \times \frac{10}{100})$
 $= \text{sh. } 13200$
 Commission paid = sh. $(17,600 - 13,200)$
 $= \text{sh. } 4400$
 Commission is paid on sh. $4400 \times \frac{100}{2}$
 $= 220,000$
 Total sales = sh. $220,000 + 100,000$
 $= 320,000$

(ii) No of handbags sold = $\frac{320,000}{500}$
 $= 640$

18. (a) (i) Internal volume of box = $150 \times 80 \times 40 \text{ cm}^3$
 $= 480,000 \text{ cm}^3$
 External volume of box = $152 \times 82 \times 42 \text{ cm}^3$
 $= 523488 \text{ cm}^3$
 \therefore Volume of wood = $(523488 - 480,000) \text{ cm}^3$
 $= 43488 \text{ cm}^3$

(ii) Mass of box = $\frac{43488 \times 0.6}{1000}$
 $= 26092.8$
 $= 26.1 \text{ kg}$

(b) (i) No of tins = $\frac{150}{10} \times \frac{80}{10} \times \frac{40}{10}$
 $= 240$

(ii) Total mass = $26.1 + \left(\frac{240 \times 120}{1000}\right)$
 $= 54.9 \text{ kg}$

19. (a) Det | 45 - 42 | = 3

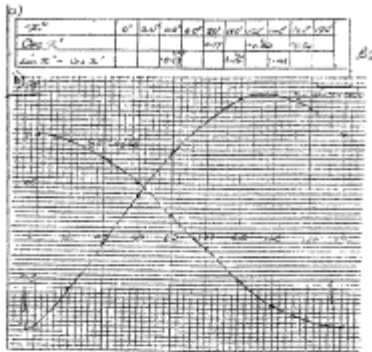
Inverse $A^{-1} = \frac{1}{3} \begin{pmatrix} 9 & -6 \\ -7 & 5 \end{pmatrix}$

(b) $\begin{pmatrix} 5 & 6 \\ 6 & 9 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 2440 \\ 3560 \end{pmatrix}$

(ii)

$\frac{1}{3} \begin{pmatrix} 9 & -6 \\ -7 & 5 \end{pmatrix} \begin{pmatrix} 5 & 6 \\ 6 & 9 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 3 & -2 \\ -7 & 5 \end{pmatrix} \begin{pmatrix} 2440 \\ 3560 \end{pmatrix}$

17.



(C) (i) $\sin x^\circ - \cos x^\circ = 1.2$
 $x^\circ = 103 + 1^\circ; 167^\circ + 1^\circ$
 (ii) $\cos x^\circ = \frac{1}{2} \sin x^\circ$
 $= \cos x^\circ = \sin x^\circ - \cos x^\circ$
 $= 63^\circ + 1^\circ$
 (iii) $\cos 63^\circ = 0.45 + 0.01$

18. (a) $OB = 3P + 3r$
 $AJ = 2P - 2R$
 (b) $OX = m(OB) = m(3p+3r)$
 $= 3mp + 3mr$
 (ii) $OX = 2r + p + n(2p-2r)$
 $= (1+2n)p + (2-2n)r + 2np$
 $3mp + 3mr = r(2-2n) + p(1+2n)$
 $3m = 1 + 2n \dots \dots (i)$
 $3m = 2 - 2n \dots \dots (ii)$
 $1 + 2n = 2 - 2n$
 $4n = 1 \quad n = \frac{1}{4}$
 Subst for $n = \frac{1}{4}$ in (i)
 $3m = 1 + 2 \times \frac{1}{4}$
 $3m = \frac{3}{2} = m = \frac{3}{2 \times 3} = 1$

The ratio in which x divides AJ
 $AX = n AJ = \frac{1}{4} AJ$
 Ratio 1:3

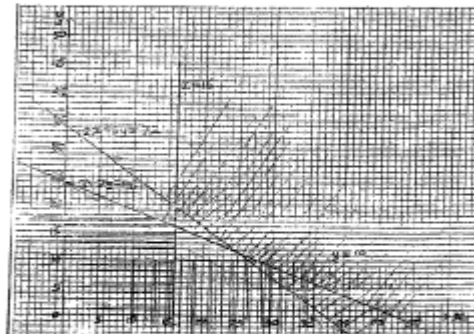
19. (i) Angle subtended (longitude)
 $= 16 + 24 = 40^\circ$

$AVC AB = 60 \times 40 \times \cos 34^\circ$
 $= 1989.69 \approx 1990 \text{ nm}$

(ii) Arc AC : latitude difference
 $= 26 + 34 = 60^\circ$

$\therefore \text{Arc AC} = 60 \times 60 \text{ NM}$
 $= 3600$

(b) (i) treat time at B
 $1330 + 40 \text{ H}$



15
 $1330 + 2 \text{ h } 40 \text{ min}$
 $= 1610 \text{ h}$
 (ii) Time taken to travel from
 A to B
 $= \frac{1990}{40}$
 $= 49 \text{ H } 45 \text{ min}$
 Time of arrival
 Wednesday at $1610 + 1 \text{ h } 45 \text{ min}$
 $= \text{Wed at } 1755 \text{ h}$

20. (a) $4x + 6y \geq 144$
 $100x + 200y \geq 4800$
 $x \geq 16$
 $y > 10$

b) Ecolebooks.com

$$2x + 3y \geq 72 \text{ drawn \& shaded}$$

$$X + 2y \geq 48 \text{ drawn \& shaded}$$

$$X \geq 16$$

$$Y > 10$$

At least 2 visible points inspected or search the drawn substituting in equation

21. (a) 1ct number of rows be and number of persons per row be p

$$Pr = 600$$

$$(r+5)(p-6) = 600$$

$$(r+5)(600-6) = 600$$

$$(r+5)(\underline{600}-6) = 600$$

r

$$(r+5)(600-6r) = 600r$$

$$600r - 6r^2 + 3000 - 30r = 600r$$

$$r^2 + 5r - 500 = 0$$

$$(r+25)(r-20) = 0$$

$$r = 20$$

(b) No of rows in new arrangement

$$20 + 5 = 25$$

No. of empty spaces per row with 450 people sealed

$$600 - 450$$

$$= \underline{150}$$

$$25$$

$$= 6$$

22. (a) $T6 = p + 5c$

$$T5 = P + 4d$$

$$P + 4d = p + 5c$$

$$4d = 5c$$

$$d = 5/4c$$

(b) $P + 3d - (p + 3c) = 1\frac{1}{2}$

$$3d - 3c = 1\frac{1}{2}$$

$$15c - 3c = 1\frac{1}{2}$$

$$\times c = \frac{3}{2} = C = 2$$

$$d = 2\frac{1}{2}$$

$$(c) S_2 = \frac{1}{2}n(2p+10) = \frac{1}{2} \cdot 5(2p+10) = 5p+25$$

$$(6p+30) - (5p+25) = 10$$

$$P+5 = 10$$

$$P = 5$$

23. (a) $S = at + bt^2$

$$80 = 2a + 4b \dots\dots(i)$$

$$135 = 3a + 9b \dots\dots(ii)$$

$$(ii) \times 2 \implies 270 = 6a + 18b$$

$$\times 3 \implies 240 = 6a + 12b$$

$$30 = 6b \implies b = 5$$

Substitute for b = 5 in (i)

$$80 = 2b + 4a$$

$$60 = 2a \implies a = 30$$

$$\text{Expression : } S = 30t + 5t^2$$

(b) (i) Distance when $t = 5$ seconds

$$S = 30 \times 5 + 5 \times 25$$

$$= 275\text{m}$$

$$(ii) 560 = 30t + 5t^2$$

$$5t^2 + 30t - 560 = 0$$

$$T + 6t - 112 = 0$$

$$(t+14)(t-8) = 0$$

$$\text{Time taken, } t = 8 \text{ seconds}$$

24.

$$(a) (i) \angle OSR = 90^\circ - 50^\circ = 40^\circ$$

$$(ii) \therefore \angle USP = 30^\circ + 50^\circ = 80^\circ$$

$$(iii) \angle PSR = 50^\circ$$

$$(iv) \angle PQR = 180^\circ - 50^\circ = 130^\circ$$

$$(b) (i) PT \times TR = TS^2$$

$$(7+X)(7) = 9^2$$

$$7X = 81 - 49 = 32$$

$$X = \frac{32}{7} = 4.57$$

$$(ii) \frac{4.57}{\sin \theta} = 25$$

$$r = \frac{4.57}{2 \sin \theta}$$

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