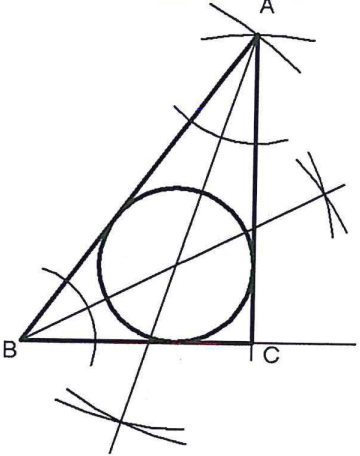


4.4.2 Mathematics Alternative B Paper 2 (122/2)

No	Marking scheme	marks	comments
1.	$\frac{2440 \times 0.2562}{0.0512} = \frac{2440 \times 0.2560 \times 10000}{0.0512 \times 10000}$ $= 12200$	B1 M1 A1 3	Rounding off For multiplying by 10000
2.	$r = 2$ $ar^5 = 1600$ 6 th month; $a \times 2^5 = 1600 \Rightarrow a = 50$ 10 th month; $50 \times 2^9 = 50 \times 512$ $= \text{Ksh } 25\,600$	B1 M1 A1 3	For 'a'
3.	Charges per km = $\frac{2800}{80 \times 14}$ $= \text{Ksh } 2.50$ Charges for 150km for 98 = $2.5 \times 150 \times 9$ $= \text{Ksh } 3375$	M1 M1 A1 3	
4.	(a) Y values to fill: 1.75; 3.75; 4; 3; 0 (b) Area = $0.5 \left\{ \left(\frac{1.75 + 1.75}{2} \right) + (3 + 3.75 + 4 + 3.75 + 3) \right\}$ $= 0.5(1.75 + 3 + 3.75 + 4 + 3.75 + 3)$ $= 9.625 \text{ sq units}$	B2 M1 A1 4	

5.	$x(x-10) = 2000$ $x^2 - 10x - 2000 = 0$ $(x+40)(x-50) = 0$ $x = -40 \text{ or } x = 50$ <p>The mass of 35 bags = $35 \times (50 - 10)\text{kg}$ = 1400 kg</p>	M1 M1 A1 B1 <hr/> 4	For equation For factorizing For solution For total mass
6.	$\frac{x+y}{x-y} = 9$ $-8x = -10y$ $x = \frac{10}{8}y$ $x = \frac{5}{4}y$	M1 <hr/> A1 <hr/> 2	
7.	 <p style="text-align: center;">Radius = 1.2cm ± 0.1</p>	B1 B1 B1 B1 <hr/> 4	For ΔABC For \angle bisectors For circle

8.	Difference in angle = $15 + 30 = 45^\circ$	M1	
	Difference in time = $\frac{45 \times 4}{60} = 3\text{hrs}$	M1	
	Time at y = $3.30 - 3\text{hrs}$ = 00.30 = 12.30a.m.	A1	
		3	
9.	(a) $PR^2 = 36 + 16 - 2 \times 6 \times 4 \times \cos 40$	M1	
	$PR = \sqrt{15.23}$		
	= 3.9cm	A1	
	(b) $\frac{\sin 40}{3.9} = \frac{\sin \angle QRP}{6}$	M1	
	$\sin \angle QRP = \frac{6 \times \sin 40}{3.9}$		
	= 0.9889		
	$\angle QRP = 81.4^\circ$		
	= $180 - 81.4$		
	= 98.6°	A1	
		4	
10.	at $x = 1, y = 4$		
	Inst. Rate of change		
	$= \frac{10 - 4}{4 - 1}$ $= \frac{6}{3}$ $= 2$	M1	
		A1	
		2	

11.	Principle $= 6400 \times \frac{100}{8} \times \frac{1}{2}$ $= 40000$ Mwau's Interest = $40000 \times \frac{6}{100} \times 3$ = Ksh 7200	M1													
		M1													
		A1													
		3													
12.	Tax = $11180 \times 0.1 + 10534(0.15 + 0.20 + 0.25) + 77218 \times 0.30$ = Ksh 30 603.80 Monthly Income Tax = $30603.80 - 1280$ = Ksh 29 323.80 Monthly Net Salary = $120\ 000 - 29323.80$ = Ksh 90 676.20	M1													
		M1													
		A1													
		B1													
		4													
13.	(a) <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Classes</th> <th>Frequency</th> </tr> </thead> <tbody> <tr> <td>8 - 12</td> <td>4</td> </tr> <tr> <td>13 - 17</td> <td>3</td> </tr> <tr> <td>18 - 22</td> <td>5</td> </tr> <tr> <td>23 - 27</td> <td>4</td> </tr> <tr> <td>28 - 32</td> <td>4</td> </tr> </tbody> </table> (b) Class size = 5	Classes	Frequency	8 - 12	4	13 - 17	3	18 - 22	5	23 - 27	4	28 - 32	4	B1	For classes
		Classes	Frequency												
		8 - 12	4												
13 - 17	3														
18 - 22	5														
23 - 27	4														
28 - 32	4														
B1	For frequency														
		B1													
		3													

14.	(a) $\begin{pmatrix} a & b \\ c & d \end{pmatrix} \begin{pmatrix} 2 & 2 & 4 \\ 2 & 4 & 5 \end{pmatrix} = \begin{pmatrix} -2 & -4 & -5 \\ 2 & 2 & 4 \end{pmatrix}$ $\left. \begin{array}{l} 2a + 2b = -2 \\ 2a + 4b = -4 \end{array} \right\} \begin{array}{l} a = 0, \\ b = -1, \end{array} \quad \left. \begin{array}{l} 2c + 2d = 2, \\ 2c + 4d = 2 \end{array} \right\} \begin{array}{l} c = -1 \\ d = 0 \end{array}$ $T = \begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix}$	M1	
		M1	
		A1	
		3	

15.	$P(O,A) \text{ or } P(A,O) =$ $\frac{8}{14} \times \frac{6}{13} + \frac{6}{14} \times \frac{8}{13}$ $= \frac{48}{91}$	M1 M1 A1 3	
16.	$\mathbf{b - a} = \begin{pmatrix} 5 \\ 2 \end{pmatrix} - \begin{pmatrix} 2 \\ 5 \end{pmatrix} = \begin{pmatrix} 3 \\ -3 \end{pmatrix}$ $ \mathbf{b - a} = \sqrt{(9+9)}$ $= \sqrt{18}$ $= 4.2$	M1 A1 2	
17.	<p>(a) $\frac{8 \times 24}{10} = 19.2 \text{ days}$</p> <p>(b) Workers for 16 days = $\frac{8 \times 24}{16} = 12 \text{ workers}$ No. of workers needed = $12 - 8 = 4 \text{ workers}$</p> <p>(c) Pay per hour = $\frac{80640}{8 \times 24 \times 7} = \text{Ksh } 60$</p> <p>(d) Fraction left after 10 days = $\frac{24}{24} - \frac{10}{24} = \frac{14}{24}$ Time to be taken by 5 workers $= \frac{8 \times 24}{5} \times \frac{14}{24}$ $= 22.4 \text{ days}$</p>	M1 A1 M1 A1 B1 M1 A1 B1 M1 A1 10	

18.			
(a)	(i) $\angle BDC = 45^\circ$	B1	or equivalent
	(ii) $\angle ADE = \angle ABD = \frac{180 - 45}{2}$ $= 67.5^\circ$	M1	or equivalent
	(iii) $\angle BCD = 67.5 - 45$ $= 22.5^\circ$	A1	
(b)	(i) Let $BC = x$		
	$x(x+5) = (9.2)^2$	M1	
	$x^2 + 5x - 84.64 = 0$	M1	
	$x = \left(\frac{-5 \pm \sqrt{363.56}}{2} \right)$	M1	
	$x = 7.0$	A1	
	(ii) Using $\triangle ABD$		
	$BD^2 = 5^2 + 5^2 - 2 \times 5 \times 5 \cos 45$		
	$= 16.64$	M1	
	$BD = 3.8\text{cm}$	A1	
		10	

19.

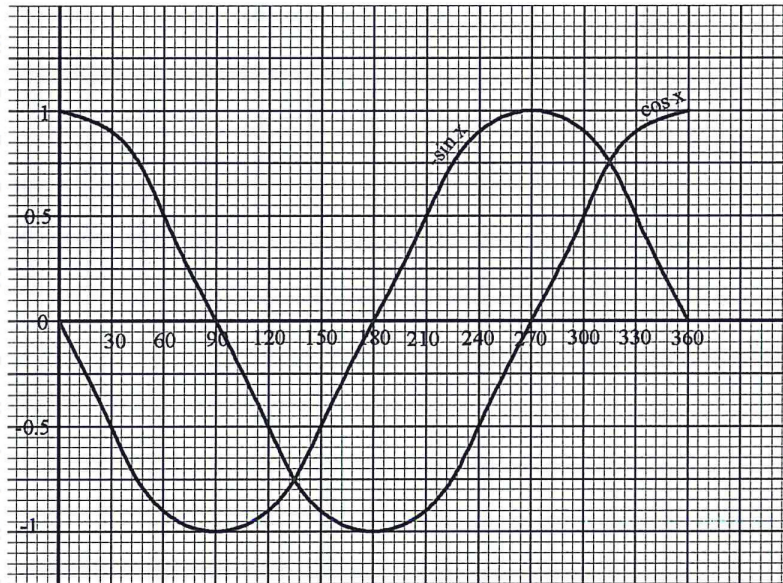
(a)

x	0	30	60	90	120	150	180	210	240	270	300	330	360
cos x		0.9				-0.9	-1		-0.5		0.5		
sin x		-0.5		-1	-0.9				0.9			0.5	

B2

B1 for
At least 5

(b)



S1

P1

P1

C1

C1

(c) (i) $\cos x + \sin x = 0$ $x = 135^\circ$ or $x = 315^\circ$

B1

B1

(ii) At $\cos x = -\sin x$; $y = 0.75 \pm 0.01$

or $y = -0.75 \pm 0.01$

B1

10

20.		B1	
(a)	$M = k \frac{d}{r^3}$	M1	
	$16 = \frac{8}{27} k;$		
	$k = \frac{16 \times 27}{8}$		
	$= 54$	A1	
	$M = 54 \frac{d}{r^3}$	B1	
(b)	$40.5 = \frac{54 \times 6}{r^3}$	M1	
	$r^3 = \frac{54 \times 6}{40.5} = 8$	M1	
	$r = \sqrt[3]{8}$	A1	
	$= 2$		
(c)	$\text{New } M = \frac{54d}{(1.1r)^3}$	M1	
	$\text{Change in } M = \frac{54d}{1.331r^3} - \frac{54d}{r^3} = -0.249 \frac{54d}{r^3}$	M1	
	$= 0.249 \times 100\%$		or equivalent
	$= 24.9\% \text{ decrease}$	A1	
		10	

21	(a) (i)	$\frac{350000 \times 8 - 1500000}{1500000} \times 100\%$	M1
		$= 86.7\%$	A1
	(ii)	$1500000 \times \left(1 + \frac{r}{100}\right)^2 = 2800000$	M1
		$\left(r + \frac{r}{100}\right) = \sqrt{\left(\frac{28}{15}\right)}$	M1
		$\frac{r}{100} = 0.366$	A1
		$r = 36.6\%$	
	(b) (i)	$1129080 = P \left(1 - \frac{3}{100}\right)^2$	M1
		$= P(0.97)^2$	M1
		$P = \frac{1129080}{(0.97)^2}$	A1
		Original value = 1 200 000	
(ii)	$\% \text{ decrease} = \frac{1200000 - 1129080}{1200000}$	M1	
	$= \frac{70920}{1200000} \times 100\%$		
	$= 5.91\%$	A1	
		10	

22

(a) Modal Class = 41-50

B1

(b)

classes	x	f	fx	c.f
11 - 20	15.5	3	46.5	3
21 - 30	25.5	5	127.5	8
31 - 40	35.5	8	284	16
41 - 50	45.5	18	819	34
51 - 60	55.5	10	555	44
61 - 70	65.5	6	393	50

M1 for mid-value

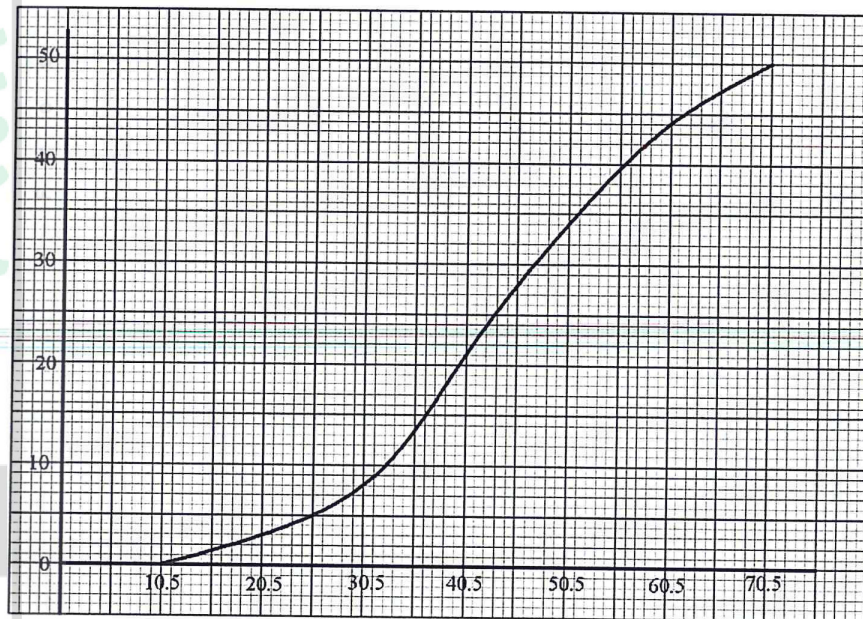
M1 for fx

$$\text{Mean} = \frac{\sum fx}{50} = \frac{2225}{50} = 44.5$$

M1

A1

(c)



B1 cf

S1

P1

C1

B1

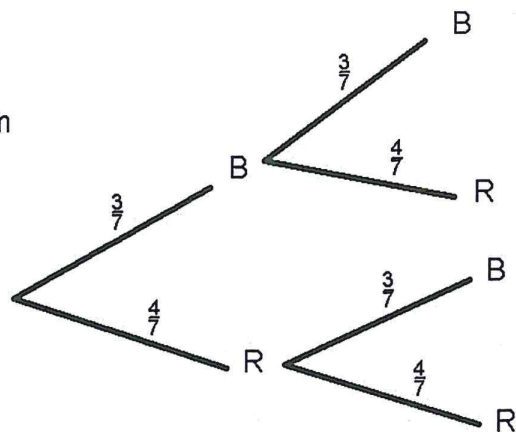
10

Median = 43 ± 0.5

23.

(a)

(a) Tree diagram



B1

B1

M1

A1

(b)(i) $P(B, B) = \frac{3}{7} \times \frac{3}{7} = \frac{9}{49}$

(ii) $P(B, B) + P(R, R) = \frac{3}{7} \times \frac{3}{7} + \frac{4}{7} \times \frac{4}{7}$
 $= \frac{9}{49} + \frac{16}{49} = \frac{25}{49}$

M1

M1

A1

(iii) $P(B, R) + P(R, B) = \frac{3}{7} \times \frac{4}{7} + \frac{4}{7} \times \frac{3}{7}$
 $= \frac{12}{49} + \frac{12}{49}$
 $= \frac{24}{49}$

M1

M1

A1

10

<p>24.</p> <p>(a) $\text{Det } A = 25 - 21 = 4$</p> $\begin{pmatrix} 5 & 3 \\ 7 & 5 \end{pmatrix}^{-1} = \frac{1}{4} \begin{pmatrix} 5 & -3 \\ -7 & 5 \end{pmatrix}$ $= \begin{pmatrix} \frac{5}{4} & \frac{-3}{4} \\ \frac{-7}{4} & \frac{5}{4} \end{pmatrix}$ <p>(b) (i) $5x + 3y = 110$ $7x + 5y = 170$</p> <p>(ii)</p> $\begin{pmatrix} \frac{5}{4} & \frac{-3}{4} \\ \frac{-7}{4} & \frac{5}{4} \end{pmatrix} \begin{pmatrix} 5 & 3 \\ 7 & 5 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} \frac{5}{4} & \frac{-3}{4} \\ \frac{-7}{4} & \frac{5}{4} \end{pmatrix} \begin{pmatrix} 110 \\ 170 \end{pmatrix}$ $\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} \frac{5}{4} & \frac{-3}{4} \\ \frac{-7}{4} & \frac{5}{4} \end{pmatrix} \begin{pmatrix} 110 \\ 170 \end{pmatrix}$ $\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 10 \\ 20 \end{pmatrix}$ <p>$x = 10$ and $y = 20$</p> <p>(c) Kantai paid = $30 \times 10 + 25 \times 20$ = Ksh 800</p>		B1	
		M1	
		A1	
		B1	
		B1	
		M1	
		M1	
		A1	
		M1	
		A1	
		10	