

KAPSABET HIGH SCHOOL

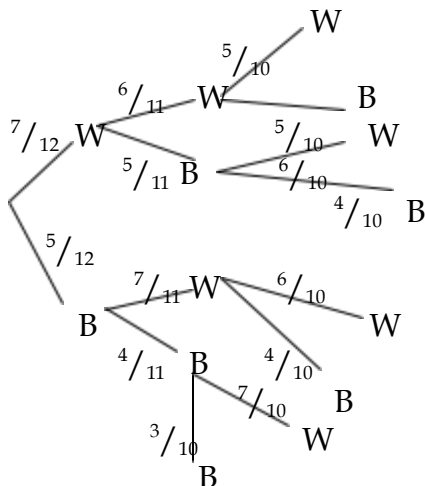
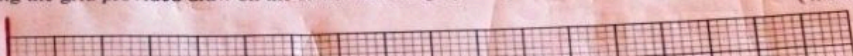
MATHEMATICS P2 MARKING SCHEME 2021

1.	$\frac{(\sqrt{2} + \sqrt{3})(\sqrt{6} + \sqrt{3})}{(\sqrt{6} - \sqrt{3})(\sqrt{6} + \sqrt{3})}$ $\frac{\sqrt{12} + \sqrt{6} + \sqrt{18} + 3}{6 - 3}$ $\frac{2\sqrt{3} + \sqrt{6} + 3\sqrt{2} + 3}{3}$	M ₁ M ₁ A ₁
2.	$3(2x-1) = 8x-1$ $6x-3 = 8x-1$ $-2x = 2$ $x = -1$	M ₁ A ₁
3.	$A = P \left[1 + \frac{r}{100} \right]^n$ $= 200,000 \left[1 + \frac{7}{100} \right]^4$ $= 200,000 (1.3107960)$ $= \text{Sh. } 262159.20$ $I = 262159.20 - 200000 = \text{Sh. } 62,159$	M ₁ A ₁ B ₁
4.	$12^{\text{th}} \text{ term} = ar^{11}$ $10^{\text{th}} \text{ term} = ar^9$ $\frac{ar^{11}}{ar^9} = \frac{9}{1}$ $r^{11-9} = 9$ $r^2 = 9$ $r = \pm 3$ $r = 3 \text{ or } -3$	M ₁ A ₁
5.	$(2 - \frac{1}{4}x)^5 = 2^5 + (2^4)(5)(\frac{1}{4}x)^2 +$ $10(2^2)(\frac{1}{4}x)^3 + 5(2)(\frac{1}{4}x)^4 + (\frac{1}{4}x)^5$ $= 32 - 20x + 5x^2 - \frac{5}{8}x^3 + \frac{5}{128}x^4 - \frac{1}{1024}x^5$	B ₁ M ₁ A ₁
ii.	$1.96^5 = 32 - 20(0.16) + 5(0.16)^2 - \frac{5}{8}(0.16)^3 + \frac{5}{128}(0.16)^4 - \frac{1}{1024}(0.16)^5$ $= 28.925$	 A ₁
6.	a) QW x QX = QY x QZ $11 \times 6 = 4(a+4)$ $4a + 16 = 66$ $4a = 50$ $a = 25$	M ₁ A ₁

	b) $QS^2 = QY \times QZ$ $= 4(4+12.5)$ $QS = \sqrt{66}$ $= 8.124$	M ₁ A ₁																					
7.	$x(x-1) - 3x(x+1) = 0$ $x^2 - x - 3x^2 - 3x = 0$ $-2x^2 - 4x = 0$ $-2x(x+2) = 0$ $x = 0$ or $x = -2$	M ₁ M ₁ A ₁																					
8.	<table border="1"> <thead> <tr> <th>x</th><th>f</th><th>cf</th></tr> </thead> <tbody> <tr><td>45 - 50</td><td>2</td><td>2</td></tr> <tr><td>51 - 56</td><td>10</td><td>12</td></tr> <tr><td>57 - 62</td><td>11</td><td>23</td></tr> <tr><td>63 - 68</td><td>20</td><td>33</td></tr> <tr><td>69 - 74</td><td>6</td><td>39</td></tr> <tr><td>75 - 80</td><td>1</td><td>40</td></tr> </tbody> </table> $\frac{1}{4} \times 50 = 12.5^{\text{th}} = \left[56.5 + \frac{12.5 - 12}{11} \right] 6$ $= 56.77\text{kg}$ $\frac{3}{4} \times 50 = 37.5^{\text{th}} ;$ $62.5 + \left[\frac{37.5 - 23}{20} \right] 6$ $= 66.85\text{kg}$ Quartile deviation $= \frac{1}{2} (66.85 - 56.77)$ $= 5.04$	x	f	cf	45 - 50	2	2	51 - 56	10	12	57 - 62	11	23	63 - 68	20	33	69 - 74	6	39	75 - 80	1	40	B ₁ B ₁ A ₁
x	f	cf																					
45 - 50	2	2																					
51 - 56	10	12																					
57 - 62	11	23																					
63 - 68	20	33																					
69 - 74	6	39																					
75 - 80	1	40																					
9.	$P = \frac{KQ^3}{\sqrt{R}}$ $P_1 = \frac{K(1.2Q)^3}{\sqrt{0.64R}}$ $= \frac{1.728KQ^3}{0.8\sqrt{R}}$ $= 2.16 \frac{KQ^3}{\sqrt{R}}$ $\frac{2.16 - 1}{1} \times 100$ $= 116\%$	M ₁ M ₁ A ₁																					
10.	Let cos x be y $8y^2 - 2y - 1 = 0$ $4y + 1)(2y - 1) = 0$	M ₁																					

	$y = -\frac{1}{4} \text{ or } \frac{1}{2}$ $\cos x = \frac{1}{4} \Rightarrow x = 75.52$ angle in 2 nd and 3 rd quadrant $\therefore x = 104.48, 255.52$ $\cos x = \frac{1}{2} \Rightarrow x = 60^\circ$ Angle in 1 st and 4 th quadrant. $x = 60^\circ, 300^\circ$ $\therefore x = 104.48, 255.52^\circ, 60^\circ, 300^\circ$	A ₁ B ₁
11.	$A^2 = \frac{3+2\chi}{5-4\chi}$ $5A^2 - 4A^2\chi = 3 + 2\chi$ $5A^2 - 3 = 2\chi + 4A^2\chi$ $5A^2 - 3 = \chi(2 + 4A^2)$ $\chi = \frac{5A^2 - 3}{4A^2 + 2}$ $A^2(5 - 4\chi) = 3 + 2\chi$	
12.	$AB = \begin{pmatrix} -2 \\ -1 \\ 2 \end{pmatrix} - \begin{pmatrix} 2 \\ -3 \\ 4 \end{pmatrix} = \begin{pmatrix} -4 \\ 2 \\ -2 \end{pmatrix}$ $/AB/ = \sqrt{16 + 4 + 4}$ $= \sqrt{24}$ $/AB/ = 4.90$	M1 M1 A1
13.	$x^2 - 6x + 9 + y^2 - 10y + 25 = -30 + 9 + 25$ $(x-3)^2 + (y-5)^2 = 4$ R=2 C (3,5)	B1 B1 B1
14.	$\begin{pmatrix} 3 & 1 \\ 2 & 4 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 3x + y \\ 2x + 4y \end{pmatrix} + \begin{pmatrix} -4 \\ 3 \end{pmatrix} = \begin{pmatrix} 13 \\ 13 \end{pmatrix}$ $3x + y = 17$ $2x + 4y = 10$ $X = 5.8$ $Y = -0.4$ $(-0.4, 5.8)$	

15.	$\frac{2 \times 0.1}{4 - 0.1}$ $= \frac{0.2}{3.9}$ $= \frac{2}{39}$	M1 M1 A1
16.	$\text{Area scale factor} = \frac{54}{9} = 6$ $4x - 2(x - 1) = 6$ $x = 2$	B1 M1 A1
17.	a) Taxable income = 21,000 + 9000 p.a = sh. 30,000 $\frac{30000 \times 12}{12} = \text{K£ } 18,000 \text{ p.a}$ 2 x 3900 = 7,800 3 x 3900 = 11,700 4 x 3900 = 15,600 5 x 3900 = 19,500 7 x 2400 = <u>16,800</u> 71,400 $\frac{15}{100} \times 2000 = 300$ Total relief p.a = (300 + 1056) 12 = sh. 16,272 Tax paid 71400 - 16272 = sh. 55, 128 P.A.Y.E $\frac{55128}{12} = \text{sh } 4594$ b) Total deductions = 4594 + 2000 + 2000 + 2500 = sh. 11,094 per month Net salary = 30,000 - 11,094 = sh. 18,906	B ₁ B ₁ B ₁ B ₁ B ₁ B ₁ B ₁ M ₁ M ₁ A ₁
18.	i) $\frac{7}{200} \times 50 + \frac{19}{400} \times 30$ 1.75 + 1.425 = 3.175 ii) $\frac{3.175 \times 100}{80}$ = 3.96875%	M1 M1 A1 M1 A1

	iii) let the masses be x $\left[\frac{19}{400}x + \frac{7}{200}(50 - x) \right] 100 = 4$ $\left[\frac{1.25x + 1.75}{50} \right] 100 = 4$ $1.25x + 175 = 200$ $1.25x = 25$ $x = \frac{25}{1.25}$ $x = 20$ $x > 20$	M1 M1 M1 A1 B1																																										
19.	 b) i) $(\frac{7}{12} \times \frac{6}{11} \times \frac{5}{10}) + (\frac{7}{12} \times \frac{5}{11} \times \frac{6}{10}) + (\frac{5}{12} \times \frac{7}{11} \times \frac{6}{10})$ $= \frac{21}{44}$ ii) $(\frac{7}{12} \times \frac{5}{11} \times \frac{4}{10}) + (\frac{5}{12} \times \frac{7}{11} \times \frac{4}{10}) + (\frac{5}{12} \times \frac{4}{11} \times \frac{7}{10})$ $= \frac{7}{22}$ iii) $(\frac{5}{12} \times \frac{4}{11} \times \frac{7}{10}) + (\frac{5}{12} \times \frac{7}{11} \times \frac{4}{10}) + (\frac{7}{12} \times \frac{5}{11} \times \frac{4}{10}) + (\frac{5}{12} \times \frac{7}{11} \times \frac{6}{10}) + (\frac{7}{12} \times \frac{5}{10} \times \frac{6}{10}) + (\frac{7}{12} \times \frac{6}{11} \times \frac{5}{10}) + (\frac{7}{12} \times \frac{6}{11} \times \frac{5}{10})$ $= \frac{427}{440}$	M ₁ A ₁ M ₁ A ₁ M ₁ A ₁																																										
20.	17. (i) complete the table below, giving the values correct to 2 decimal places <table><tr><th>X°</th><th>0°</th><th>15°</th><th>30°</th><th>45°</th><th>60°</th><th>75°</th><th>90°</th><th>105°</th><th>120°</th><th>135°</th><th>150°</th><th>165°</th><th>180°</th></tr><tr><td>cos 2X°</td><td>1.00</td><td>0.87</td><td>0.50</td><td>0.00</td><td>-0.50</td><td>-0.87</td><td>-1.00</td><td>-0.50</td><td>-0.87</td><td>-1.00</td><td>-0.87</td><td>-0.50</td><td>0.00</td></tr><tr><td>sin (X°+30°)</td><td>0.50</td><td>0.71</td><td>0.87</td><td>0.97</td><td>1.00</td><td>0.97</td><td>0.87</td><td>0.71</td><td>0.50</td><td>0.26</td><td>0.00</td><td>-0.26</td><td>-0.50</td></tr></table> (ii) Using the grid provided draw on the same axes the graph of y=cos 2X° and y=sin(X°+30°) for 0° ≤ X ≤ 180°. 	X°	0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	cos 2X°	1.00	0.87	0.50	0.00	-0.50	-0.87	-1.00	-0.50	-0.87	-1.00	-0.87	-0.50	0.00	sin (X°+30°)	0.50	0.71	0.87	0.97	1.00	0.97	0.87	0.71	0.50	0.26	0.00	-0.26	-0.50	T2 P1 C1 P1
X°	0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°																															
cos 2X°	1.00	0.87	0.50	0.00	-0.50	-0.87	-1.00	-0.50	-0.87	-1.00	-0.87	-0.50	0.00																															
sin (X°+30°)	0.50	0.71	0.87	0.97	1.00	0.97	0.87	0.71	0.50	0.26	0.00	-0.26	-0.50																															

C1
B1

B1
B1
B1

21.

Class	Mid point X	f	$t = \frac{X-A}{C}$	ft	t ²	ft ²
15-19	17	6	-5	-30	25	150
20-24	22	10	-4	-40	16	160
25-29	27	9	-3	-27	9	81
30-34	32	5	-2	-10	4	20
35-39	37	7	-1	-7	1	7
40-44	42	11	0	0	0	0
45-49	47	15	1	15	1	15
50-54	52	13	2	26	4	52
55-59	57	8	3	24	9	72
60-64	62	7	4	28	16	112
65-69	67	5	5	25	25	125
70-74	74	4	6	24	36	144
			f = 100	ft = 28		ft ² = 873

a) (i) $x = 42 + \left(\frac{28}{100} \times 5\right) = 43.4$
(ii) $\frac{873}{100} - \left(\frac{28}{100}\right)^2 = 0.7856$
(b) $\left[49.5 + \left(\frac{75-63}{13}\right)5.29.5\right] \times \frac{1}{2}$
= 12.31

22.

13

23 (a) Using a ruler and a pair of compasses only, construct a parallelogram ABCD such that AB=9 cm, AD=7 cm and angle BAD=60°. (3 marks)

(a) On the same diagram, construct:

- the locus of a point P such that P is equidistant from AB and AD; (1 mark)
- the locus of a point Q such that Q is equidistant from AB and AD; (1 mark)
- the locus of a point T such that T is equidistant from AB and DC; (1 mark)

(b) (i) Shade the region R bounded by the locus of P, the locus of Q and the locus of T. (1 mark)

(ii) Find the area of the region shaded in (d)(i) above. (3 marks)

$$= \frac{1}{2} \times 2.4 \times 5.5 \times \sin 30$$

$$= 4.2625 \text{ cm}^2$$

23. $(a \ b \ c \ d) + (1 \ 4 \ 4 \ -2) = (7 \ 10 \ 4 \ 16)$

$A + 4b = 7 \dots\dots\dots(i) \times 4$

$4a + 16b \dots\dots\dots 10 \text{ (ii)}$

$4a + 16b = 28$

$\frac{4a - 2b = 10}{18b = 18}$

$18b = 18$

$b = 1$

$a = 9 - 4 = 3$

$c + 4d = 4 \dots\dots\dots(iii) \times 4$

$4c - 2d = 16 \dots\dots\dots(iv)$

$4c + 16d = 16$

$\frac{4c - 2d = 16}{20d = 0}$

$20d = 0$

$d = 0$

$c = 4$

$(a \ b \ c \ d) = (3 \ 1 \ 4 \ 0)$

ii. $(x \ y) = (3 \ 1 \ 4 \ 0)(-2 \ 0) = (-6 \ -8)$

$B^1(-6, -8)$

b) $A^1 \ B^1 \ C^1 \ A^{11} \ B^{11} \ C^{11}$

M1

M1

M1

A1

M1

A1

M1

A1

