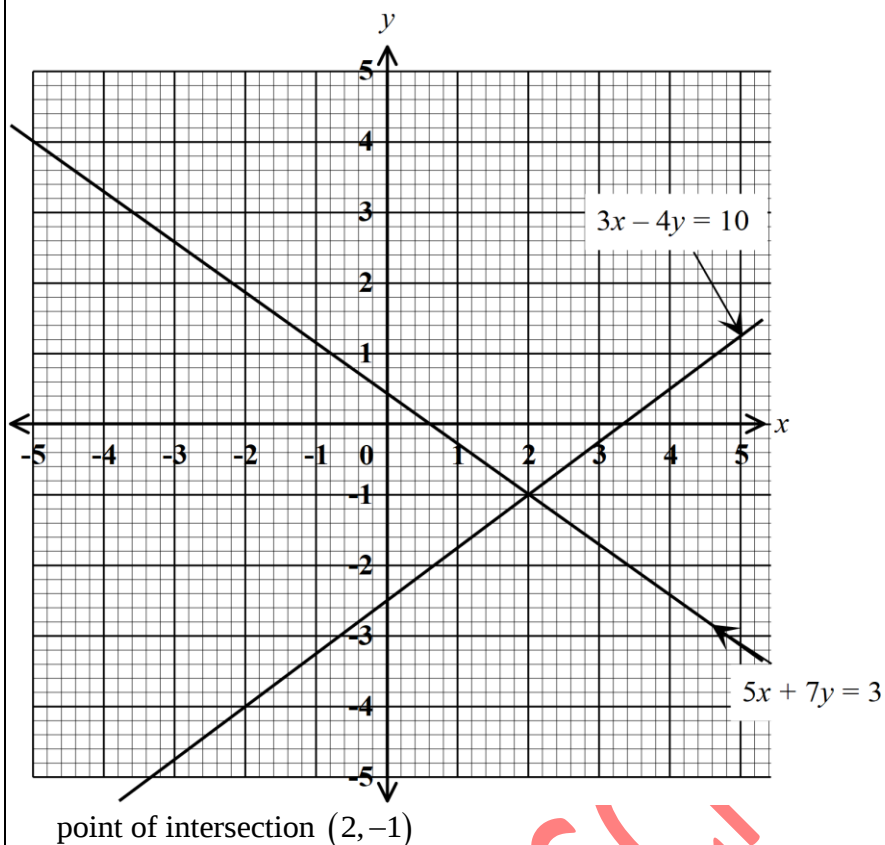


KAPSABET HIGH SCHOOL

MARKING SCHEME

	Marks and comments
1.	
(i) 97531	B ₁
(ii) 7000	B ₁
(iii) $2^3 \times 5^3 \times 7$	B ₂
	4
2.	
$40 = 2^3 \times 5$	B ₁
$250 = 2 \times 5^3$	B ₁
$750 = 2 \times 3 \times 5^3$	B ₁
$\text{L.C.M} = 2^3 \times 3 \times 5^3$	B ₁
$= 3000g$	
	3
3.	
$= \log \left(\frac{2^2 \times 3^2}{10^3} \right)$	M ₁
$= 2 \log 2 + 2 \log 3 - 3 \log 10$	M ₁
$= 2(0.3010) + 2(0.4771) - 3$	
$= -1.4438$	A ₁
$= -1.444$	
	3
4.	
Num $\frac{3}{4} + 1\frac{1}{2} \times \frac{11}{6} = \frac{3}{4} + \frac{11}{4} = \frac{14}{4}$	B ₁
Den $\frac{3}{4} \times \frac{5}{2} \div \frac{1}{2} = \frac{15}{4}$	B ₁
$= \frac{14}{4} \times \frac{4}{15} = \frac{14}{15}$	B ₁
	3

5.



L_1

L_1

B_1

3

6.

$$\text{angle at the centre} = 1.2^\circ \times 2 = 2.4^\circ$$

$$2.4 \times \frac{180}{\pi} = 137.51^\circ$$

$$137.51^\circ \div 2 = 68.75^\circ$$

$$\sin 68.75^\circ = \frac{5}{r}$$

$$r = 5.365 \text{ cm}$$

M_1

M_1

A_1

3

7.

$$\text{cost price} = \frac{100}{130} \times 24.05 = 18.5$$

$$= 22.95 - 18.5 = 4.45$$

$$= \frac{4.45}{18.5} \times 100\%$$

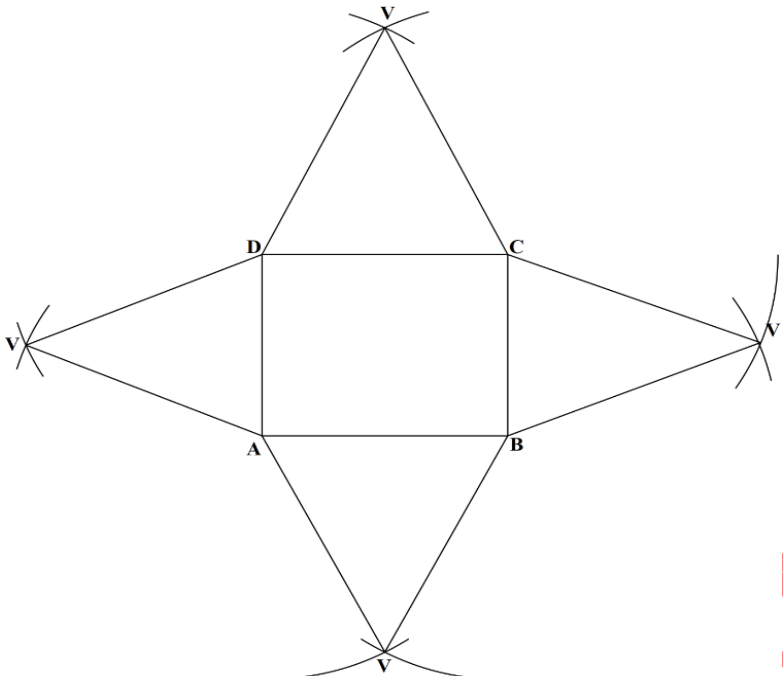
$$= 24.05\%$$

M_1

M_1

A_1

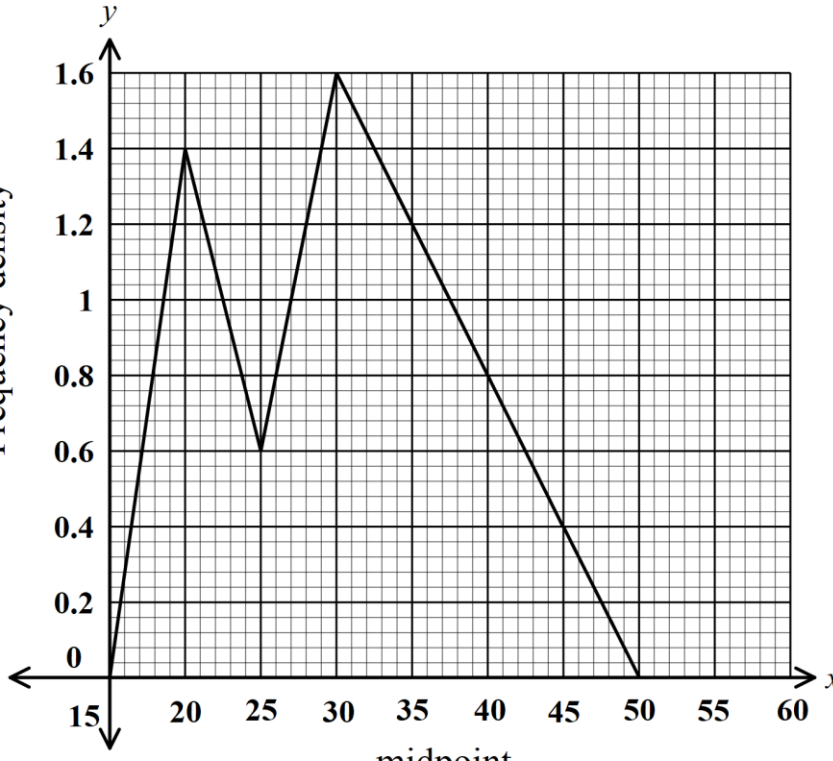
	3
8. $80 + 128(n-1) = (n-2)180$ $80 + 128n - 128 = 180n - 360$ $-48 + 360 = 180n - 128n$ $312 = 52n$ $n = 6$	M_1 M_1 A_1
	3
9. $= (3^4)^{\frac{3}{4}} - 5 - 1$ $= 27 - 5 - 1 = 21$	M_1 A_1
	2
10. (a) $x - 6 \leq -3x + 2$ $4x \leq 8$ $x \leq 2$ $-3x + 2 < -2x + 9$ $-7 < x$ $-7 < x \leq 2$ (b) 	B_1 B_1 B_1 B_1
	4

11. 	B₃ correct drawn and labeled
	3
12. $AB = \begin{pmatrix} -2 \\ -1 \end{pmatrix} - \begin{pmatrix} 4 \\ 3 \end{pmatrix} = \begin{pmatrix} -6 \\ -4 \end{pmatrix}$ $AC = \begin{pmatrix} -5 \\ -3 \end{pmatrix} - \begin{pmatrix} 4 \\ 3 \end{pmatrix} = \begin{pmatrix} -9 \\ -6 \end{pmatrix}$ $AB = kAC$ $\begin{pmatrix} -6 \\ -4 \end{pmatrix} = k \begin{pmatrix} -9 \\ -6 \end{pmatrix}$ $AB = \frac{2}{3} AC$ $AB \parallel AC$ A, shared point hence point A, B and C are collinear	B₁ B₁ B₁
	3
13. amplitude = 1.5 period $360 \div 0.5 = 720^\circ$ phase angle -60°	B₁ B₁ B₁
	3
14.	

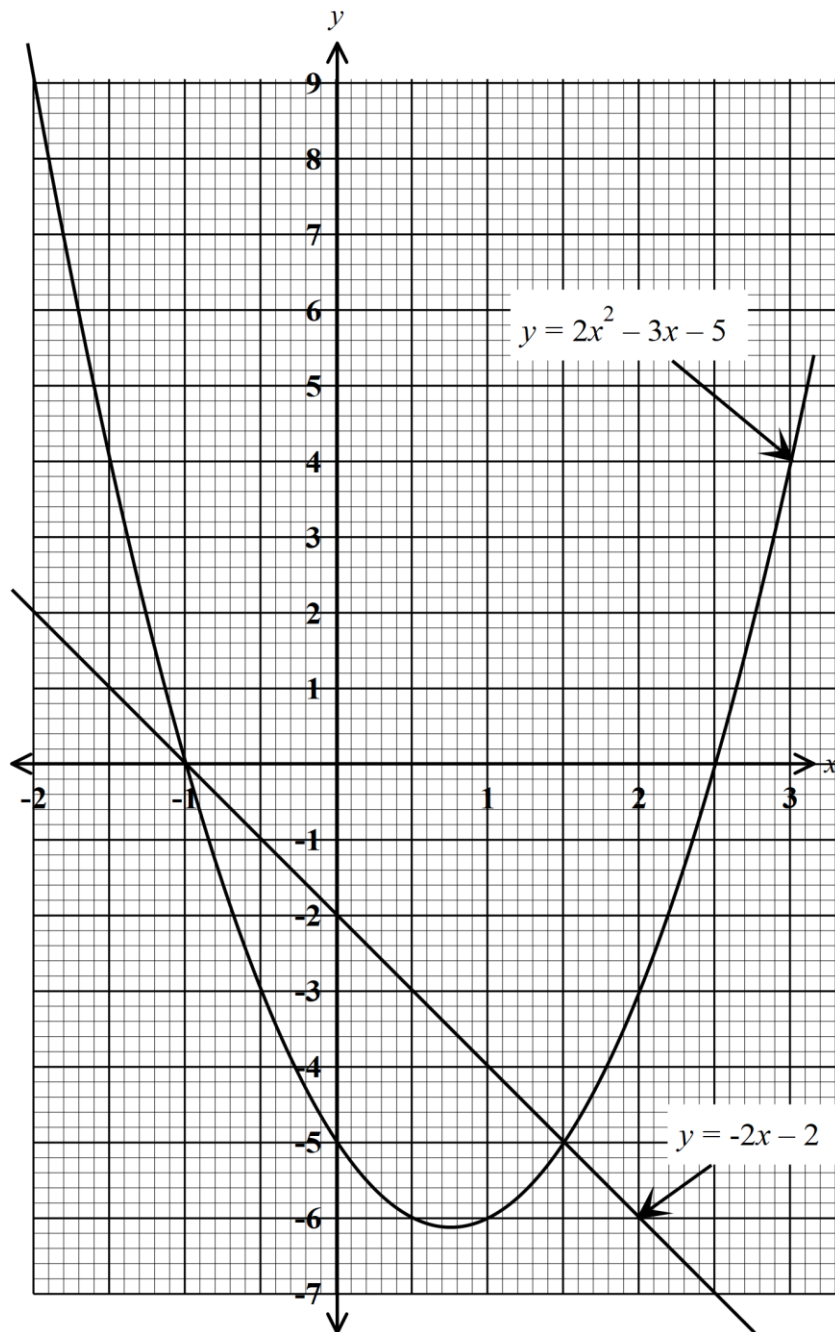
Num $3x^2 + 11x - 20$ $3x^2 + 15x - 4x - 20$ $3x(x+5) - 4(x+5)$ $(3x-4)(x+5)$ Den $4x(4-3x)$ $= \frac{(3x-4)(x+5)}{4x(4-3x)}$ $= \frac{-x-5}{4x}$	M_1 M_1 A_1
15.	3
$\frac{2 \times 80}{3 \times 80} = \frac{160}{240}$ $\frac{15 \times 15}{16 \times 15} = \frac{225}{240}$ $\frac{7 \times 40}{6 \times 40} = \frac{280}{240}$ $\frac{13 \times 16}{15 \times 16} = \frac{208}{240}$ 7:6, 15:16, 13:15, 2:3	B_1 B_1 B_1
16.	3
	M_1 A_1 M_1

$AB = \begin{pmatrix} 1 \\ 2 \end{pmatrix} - \begin{pmatrix} 3 \\ 1 \end{pmatrix} = \begin{pmatrix} -2 \\ 1 \end{pmatrix}$ $A' B' = \begin{pmatrix} 7 \\ 5 \end{pmatrix} - \begin{pmatrix} 3 \\ 7 \end{pmatrix} = \begin{pmatrix} 4 \\ -2 \end{pmatrix}$ $x \begin{pmatrix} -2 \\ 1 \end{pmatrix} = \begin{pmatrix} 4 \\ -2 \end{pmatrix}$ $x = -2 \text{ (s.f)}$ $-2 \begin{pmatrix} 3-x \\ 1-y \end{pmatrix} = \begin{pmatrix} 3-x \\ 7-y \end{pmatrix}$ $-2(3-x) = 3-x$ $-6+2x = 3-x$ $3x = 9$ $x = 3$ $-2(1-y) = 7-y$ $-2+2y = 7-y$ $3y = 9$ $y = 3$ $(3,3)$	A_1
17. (a) $\begin{pmatrix} 4 \\ 3 \end{pmatrix} - \begin{pmatrix} 1 \\ -1 \end{pmatrix} = \begin{pmatrix} 3 \\ 4 \end{pmatrix}$ $= \sqrt{3^2 + 4^2}$ $= 5$ (b) $\text{mid point } \left(\frac{-1+3}{2}, \frac{1+4}{2} \right) = (1, 2.5)$ $\text{Gradient of PQ} = \frac{4-1}{3+1} = \frac{3}{4}$ $m_2 = -\frac{4}{3}$ $\frac{y-2.5}{x-1} = -\frac{4}{3}$ $3(y-2.5) = -4(x-1)$ $3y = -4x + 11.5$ $y = -\frac{4}{3}x + 3\frac{5}{6}$	M_1 A_1 B_1 B_1 M_1 A_1

(c) $\frac{y-3}{x-2}=\frac{3}{4}$ $4y-12=3x-6$ $\frac{4y}{6}-\frac{3x}{6}=\frac{6}{6}$ $-\frac{x}{2}+\frac{y}{1.5}=1$ $y \text{ intercept} = 1.5$	M₁ M₁ A₁ B₁																																			
	10																																			
18. (a) <table><tr><th>Marks</th><th>Frequency</th><th>midpoint (x)</th><th>fx</th><th>cf</th></tr><tr><td>18–22</td><td>7</td><td>20</td><td>140</td><td>7</td></tr><tr><td>23–27</td><td>3</td><td>25</td><td>75</td><td>10</td></tr><tr><td>28–32</td><td>8</td><td>30</td><td>240</td><td>18</td></tr><tr><td>33–37</td><td>6</td><td>35</td><td>210</td><td>24</td></tr><tr><td>38–42</td><td>4</td><td>40</td><td>160</td><td>28</td></tr><tr><td>43–47</td><td>2</td><td>45</td><td>90</td><td>30</td></tr></table>	Marks	Frequency	midpoint (x)	fx	cf	18–22	7	20	140	7	23–27	3	25	75	10	28–32	8	30	240	18	33–37	6	35	210	24	38–42	4	40	160	28	43–47	2	45	90	30	B₁ all classes B₁ correct frequency B₁ correct cf
Marks	Frequency	midpoint (x)	fx	cf																																
18–22	7	20	140	7																																
23–27	3	25	75	10																																
28–32	8	30	240	18																																
33–37	6	35	210	24																																
38–42	4	40	160	28																																
43–47	2	45	90	30																																
(b) (i) $\frac{\sum fx}{\sum f}=\frac{915}{30}$ $=30.5$ (ii) $=28.5+\left(\frac{15-10}{8}\right)5$ $=31.625$	M₁ A₁ M₁ A₁																																			

(c) 	B₁ correct midpoints B₁ correct plotting B₁ frequency polygon
10	
19. (a) $\frac{x}{x+24} = \frac{5}{15}$ $15x = 5x + 120$ $10x = 120$ $x = 12 \text{ cm}$ (b) (i) $\text{volume} = \left(\frac{1}{3} \times \frac{22}{7} \times 15^2 \times 36 - \frac{1}{3} \times \frac{22}{7} \times 5^2 \times 12 \right) + \frac{2}{3} \times \frac{22}{7} \times 15^3$ $= (8,845.71 - 314.29) + 7071.43$ $= 15242.86$ (ii) $\sqrt{12^2 + 5^2} = 13$ $\sqrt{36^2 + 15^2} = 39$ $\text{S.A} = \left(\frac{22}{7} \times 15 \times 39 - \frac{22}{7} \times 5 \times 13 \right) + 2 \times \frac{22}{7} \times 15^2 + \frac{22}{7} \times 5^2$ $= 3048.57 \text{ cm}^2$	M₁ A₁ M₁ M₁ A₁ B₁ B₁ M₂ A₁

20. (a) (i)

(ii) $x = -1$ and $x = 2.5$

(b)

$$\left. \begin{array}{l} x = -1, y = 0 \\ x = 1.5, y = -5 \end{array} \right\}$$

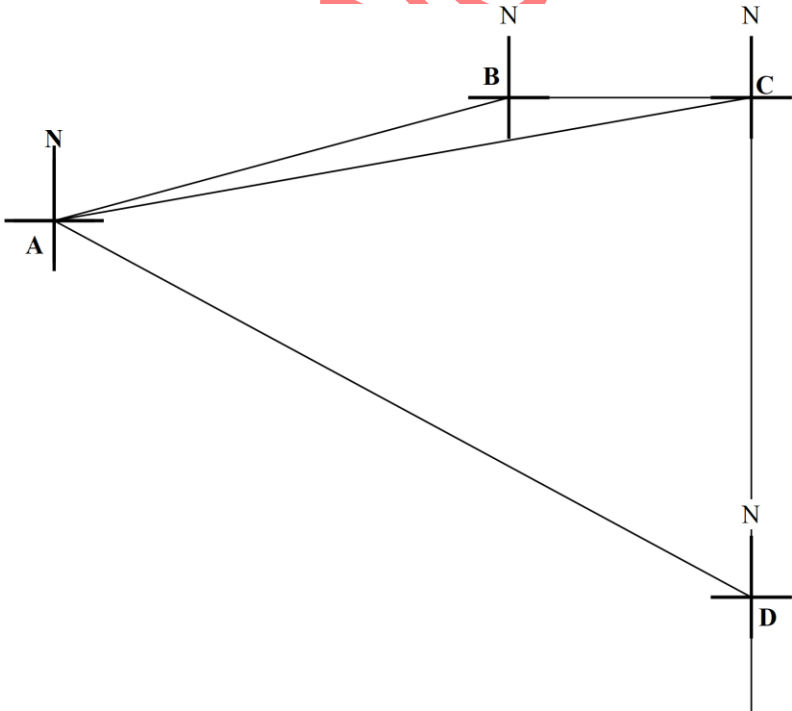
(c)

S_1 correct scale
 P_1 correct plotting
 C_1 correct curve
 award P_1 and C_1 with
 correct turning point $(0.75, -6.25)$

B_1 both correct
 L_1 correct line
 and
 B_2 all correct values of x and y

$2x^2 - 3x - 5 = -2x - 2$ $2x^2 - x - 3 = 0$	B_1
	10
21. (a)(i) $\frac{1}{2}(150 + 325)h = 5225$ $h = 22 \text{ m/s}$ 79.2 km/h (ii) $\frac{22 - 0}{75} = 0.2933 \text{ m/s}$ (b) (i) time difference $8.30 \text{ am} - 8.00 \text{ am} = 0.5 \text{ hr}$ Distance covered by van $0.5 \times 80 = 40 \text{ km/h}$ R.S $= 120 - 80 = 40 \text{ km/h}$ time taken by van to catch up $= \frac{40}{40} = 1 \text{ hr}$ distance covered by car $1 \times 120 = 120 \text{ km/h}$ (ii) time of the day $= 8.30 \text{ am} + 1 \text{ hr} = 9.30 \text{ am}$	M_1 A_1 B_1 $M_1 A_1$ B_1 B_1 B_1 B_1 B_1
	10
22.	$B_2 \Delta P' Q' R'$ $B_3 \Delta P''' Q''' R'''$ B_1

(a) Reflection in line $x = 0$ (c) Rotation through -90° about $(0,0)$ (e) $P' Q' R'$ and PQR , $P'' Q'' R''$ and $P''' Q''' R'''$, PQR and $P'' Q'' R''$, $P' Q' R'$ and $P''' Q''' R'''$	B_2 B_1 B_1
	10
23. (a) (i) $\frac{dy}{dx} = 3x^2 - 4x$ $3x^2 - 4x = 0$ $x(3x - 4) = 0$ $x = 0$ $x = 1\frac{1}{3}$ $y = (0)^3 - 2(0)^2 - 1 = -1$ $(0, -1)$ $y = \left(\frac{4}{3}\right)^3 - 2\left(\frac{4}{3}\right)^2 - 1 = -2\frac{5}{27}$ $\left(1\frac{1}{3}, -2\frac{5}{27}\right)$ (ii) $(0, -1)$ maximum $\left(1\frac{1}{3}, -2\frac{5}{27}\right)$ minimum (b) (i) when $x = 1$, gradient $= 1$ when $x = 1$, $y = -2$ $\frac{y+2}{x-1} = -1$ $y+2 = -x+1$ $y = -x-1$ (ii) gradient $= 1$ $\frac{y+2}{x-1} = 1$ $y+2 = x-1$ $y = x-3$	M_1 A_1 B_1 B_1 B_1 M_1 A_1 M_1 A_1

24. (a)	10
	B_3 locating B,C and D

(b) (i) $2.7 \pm 0.1 \times 10 = 27 \text{ km} \pm 1$ (ii) $306^0 \pm 1^0$ $9.6 \pm 0.1 \times 10 = 96 \text{ km} \pm 1$ (iii) $7.7 \pm 0.1 \times 10 = 77 \text{ km} \pm 1$ (c) $\left(\frac{1}{2} \times 56 \times 77\right) + \frac{1}{2}(77 + 27)14 = 2884 \text{ km}^2$	B_2 B_1 B_1 B_1 $M_1 A_1$
	10

MARKING SCHEME 2023