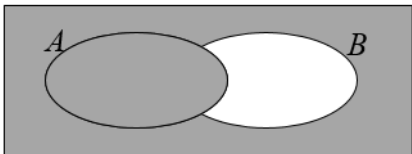
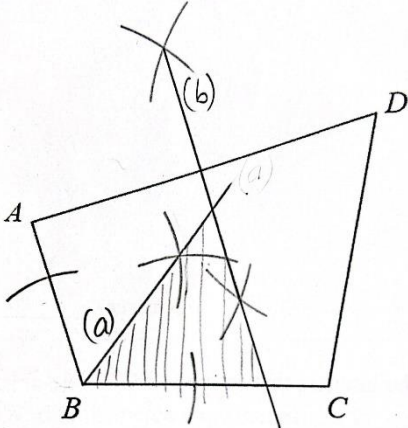
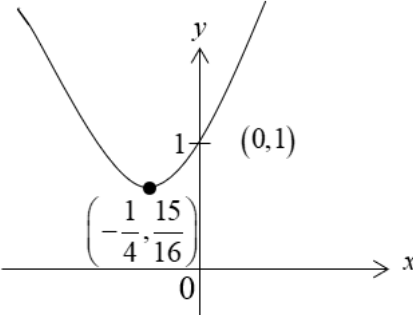
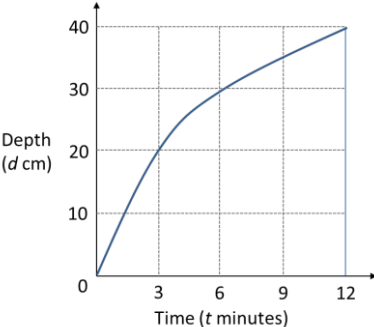


Mathematics Paper 1 Marking Scheme
Secondary 4 Express / 5 Normal Academic
Preliminary Exams 2024

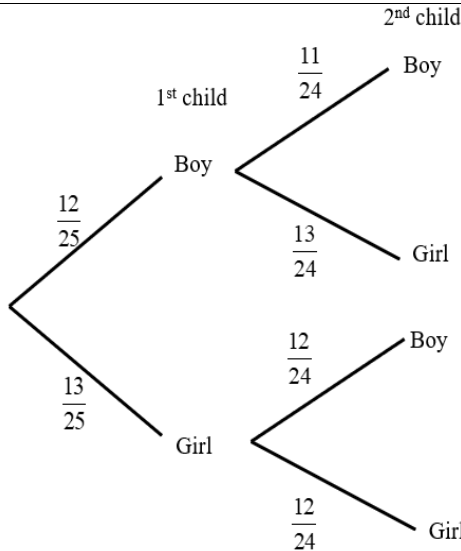
Qn		Steps/Answer	Remarks
1		$\sqrt{0.81}$ 0.902 $0.86^{\frac{2}{3}}$ $\frac{399}{441}$	
2		$= \frac{7x}{(x-5)^2} - \frac{1}{x-5}$	Also accept $\frac{7x}{(5-x)^2} + \frac{1}{5-x}$
		$= \frac{7x - (x-5)}{(x-5)^2}$	$= \frac{7x+5-x}{(5-x)^2}$
		$= \frac{6x+5}{(x-5)^2}$	$= \frac{6x+5}{(5-x)^2}$
3		$(254.9 \times 10^9) \div (2.45 \times 10^6)$	Accept $(254 \times 10^9) \div (2.45 \times 10^6)$ or higher accuracy
		$= 1.04 \times 10^5$	
4		$\frac{5c}{2} \div \frac{20c^2}{d}$	
		$= \frac{5c}{2} \times \frac{d}{20c^2}$	
		$= \frac{d}{8c}$	
5		$\frac{9kx^2 - kx^2}{kx^2} \times 100\%$	
		$= 800\%$	
6		(3-2) units -> \$20	
		Total 9 units -> \$180	
7	(a)	$-8 \leq 2 - 3x$ and $2 - 3x < 7 - \frac{1}{2}x$	
		$-10 \leq -3x$ and $-5 < 2\frac{1}{2}x$	
		$-2 < x \leq 3\frac{1}{3}$	cannot accept 3.33
	(b)	-1, 0, 1, 2, 3	
8	(a)	ε 	
	(bi)	$7 \notin B$	
	(bii)	$\{3, 7\} \subset A$	

9	 <p>Scanned with CamScanner</p>	Construction arcs are to be clearly seen.
	Correct angle bisector	
	Correct perpendicular bisector	
	Correct region shaded	
10	$(2p+1)(p-2)=0$ $p = -\frac{1}{2}, p = 2$	Accept $(2p+1)(3p-6)=0$
11	<p>Cost price of watch for Jimmy = $\frac{80}{100} \times 210$ = \$168</p> <p>Profit price = $\frac{120}{100} \times \\168 = \$201.60</p> <p>Marked price = $\frac{100}{90} \times \\$201.60 = \\224</p>	
12	<p>(a) Total time taken = $15+5+5=25$ min Yes, he will achieve his target as he will complete by 09 15.</p> <p>(b) $\frac{2.3 \times 1000}{25}$ = 92 m/min</p>	
13	<p>(a) $\frac{200}{V} = \left(\frac{1.49}{1}\right)^3$ $V = 60\text{g}$</p> <p>(b) Different vertical scales/intervals are used.</p>	
14	<p>(a) $1260 = 2^2 \times 3^2 \times 5 \times 7$</p> <p>(b) 84 and 180</p> <p>(c) $m = 3, n = 2$</p>	

15	(a)	$x^2 + \frac{1}{2}x + 1$ $= \left(x + \frac{1}{4}\right)^2 + \frac{15}{16}$	
	(b)		
16	(a)	$\mathbf{V} = \begin{pmatrix} 320 & 120 \\ 380 & 100 \\ 410 & 130 \end{pmatrix}$	
	(b)	$\mathbf{C} = \begin{pmatrix} 2 \\ 0.5 \end{pmatrix}$	
	(c)	$\mathbf{P} = \begin{pmatrix} 700 \\ 810 \\ 885 \end{pmatrix}$	
	(d)	A represents the average ERP charges collected across the three days.	
17	(a)	$\frac{\frac{1}{2} \times \text{base} \times 20 \times \text{width}}{\frac{1}{2} \times (2 \times \text{base}) \times 40 \times \text{width}} \times 12$ $= 3 \text{ min}$	$\text{or } \left(\frac{20}{40}\right)^2 \times 12$
	(b)		

18		$QP = \frac{8}{\tan 0.7 \text{ rad}} = 9.4979$	
		Area of triangle $OPQ = \frac{1}{2}(8)(9.4979) = 37.992$	
		Area of sector = $\frac{1}{2}(8^2)\left(\frac{\pi}{2} - 0.7\right) = 27.865$	
		Area of shaded region = 10.1 cm^2	
19	(a)	$\frac{1}{2}(6)v + (18-6)v + \frac{1}{2}(23-18)v = 385$	
		$v = 22 \text{ m/s}$	
	(b)	$\frac{30-0}{T-35} = \frac{25-0}{45-35}$	$\frac{10}{2} = 2$
		$30(10) = 25(T-35)$	or
		$T = 47\text{s}$	or $45+2=47$
20	(a)	angle $PBC = \text{angle } QBR$ (common angle) angle $BQR = \text{angle } BPC$ (corr. angles, $PC \parallel QR$) Triangle PCB and triangle QRB are similar (AA test)	
	(b)	Triangles ABC and QRC or Triangles ABQ and CPQ	
	(c)	$\frac{CR}{CB} = \frac{3}{7}$	
		$\frac{QR}{PC} = \frac{BR}{BC}$ $\frac{3}{PC} = \frac{4}{7}$	
		$PC = 5.25$	

21	(a)	$\left(\frac{4a^6}{b^4}\right)^{\frac{1}{2}}$	
		$= \left(\frac{b^4}{4a^6}\right)^{\frac{1}{2}}$	
		$= \frac{b^2}{2a^3}$	
	(b)	$\frac{2^k}{\sqrt[4]{8}} = 4^{2k}$	
		$\frac{2^k}{2^{\frac{4}{3}}} = 2^{4k}$	
		$2^{\frac{k}{3}} = 2^{4k}$	
		$k = 4k + \frac{3}{4}$	
		$k = -\frac{1}{4}$	
22	(a)	$T_n = n(n+1) + 10 - 4(n-1)$ $= n^2 + n + 10 - 4n + 4$ $= n^2 - 3n + 14$	
	(b)	$T_{50} = 2364$	
	(c)	$n^2 - 3n + 14 = n(n-3) + 14$	
		When n is even n(n-3) is (even x odd) = even. When n is odd, n(n-3) is (odd x even) = even. Adding to 14 which is also even, $T_n = n^2 - 3n + 14$ will always be even for all terms.	
23	(a)	$\angle EDC = \angle BAE = \frac{(5-2) \times 180}{5} = 108^\circ$	
		$\angle AEB = \frac{180-108}{2} = 36^\circ$	
		$\angle BED = 108 - 36 = 72^\circ$	
		$\angle BED + \angle EDC = 72 + 108 = 180^\circ$	
		By the converse of interior angles, BE is parallel to CD	
	(b)	$\angle EBX = 180 - 36 = 144^\circ$	Or equivalent methods, with correct reasoning. (eg BE // CX and a pair of opposite equal angles)
		$\angle BEC = 108 - 36 - 36 = 36^\circ$	
		As $\angle EBX + \angle BEC = 180^\circ$, by the converse/property of interior angles , EC // BX .	
		BE CX is a rhombus as BE // CX (or DX) and EC // BX and adjacent sides BE = EC .	

24	(ai)	5	
	(aii)	Gradient of PQ = $\frac{-3}{4}$	
		$-2 = \frac{-3}{4}(8) + c$	
		$c = 4$	
		Equation is $y = \frac{-3}{4}x + 4$	
	(b)	$2\left(\frac{-3}{4}x + 4\right) - 4x = 19$	Or elimination method correctly follow-thru from a(ii)
		$x = -2, y = 5.5$	
		$(-2, 5.5)$	
25	(a)		
	(b)	$\left(\frac{12}{25}\right)\left(\frac{11}{24}\right) = \left(\frac{11}{50}\right)$	
	(c)	$\left(\frac{13}{25}\right)\left(\frac{12}{24}\right) \times 2$	
		$= \left(\frac{13}{25}\right)$	
	(d)	$1 - \left(\frac{12}{25}\right)\left(\frac{11}{24}\right)\left(\frac{10}{23}\right) - \left(\frac{13}{25}\right)\left(\frac{12}{24}\right)\left(\frac{11}{23}\right)$ or $P(\text{BBG}) + P(\text{BGB}) + P(\text{GBB}) + P(\text{GGB}) + P(\text{GBG}) + P(\text{BGG})$ $= \left(\frac{12}{25}\right)\left(\frac{11}{24}\right)\left(\frac{13}{23}\right) \times 3 + \left(\frac{13}{25}\right)\left(\frac{12}{24}\right)\left(\frac{12}{23}\right) \times 3$	
		$= 0.78 \text{ or } \left(\frac{39}{50}\right)$	