

Additional Mathematics Paper 1

SPMRSM 2019

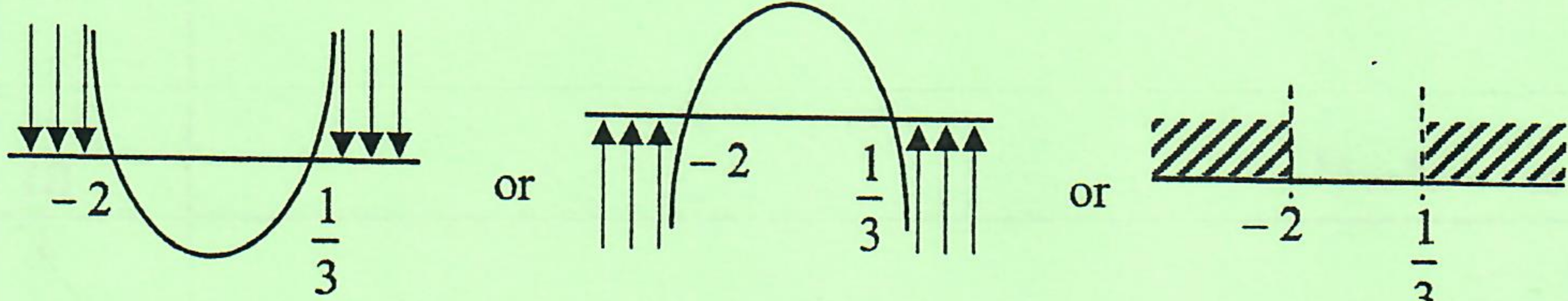
Answer Scheme

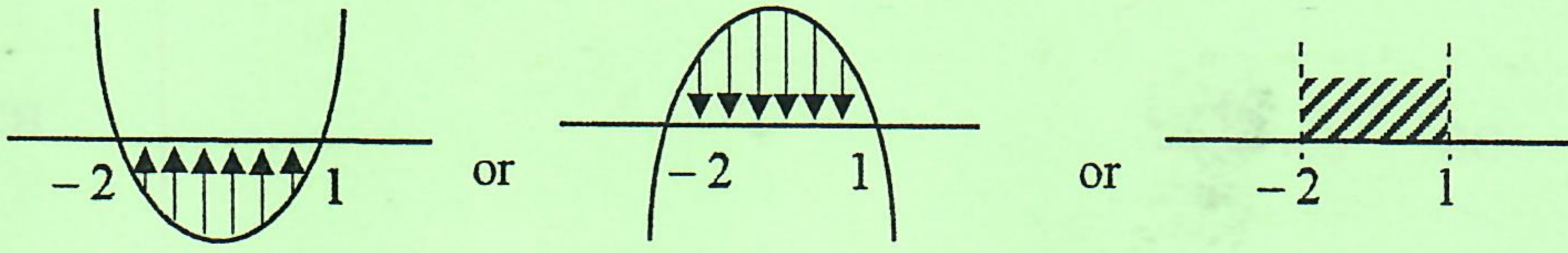
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No	Answer	Marks
1	44	3
	$63.5 = 59.5 + \left[\frac{\frac{k}{2} - 16}{15} \right] (10)$	B2
	At least 2 corrects from $L = 59.5, f_m = 15, F = 16, c = 10$	B1
2	40	3
	$\frac{n-6-15-13}{n} = \frac{3}{20}$ OR $\frac{7}{20} = \frac{15+13+6}{n}$	B2
	$n-6-15-13$ OR $15+13+6$	B1
3	(a) 1.25	2
	$\frac{6.7-5.2}{1.2}$	B1
	(b) 0.8944 // 0.89435	2
	0.1056 // 0.10565	B1
4	(a) 2100	2
	${}^5C_2 \times {}^5C_2 \times {}^7C_2$	B1
	(b) 39	2
	${}^3C_1 \times {}^5C_1$ or ${}^3C_1 \times {}^3C_1$	B1
5	0.9829	3
	${}^7C_0 (0.03)^0 (0.97)^7 + {}^7C_1 (0.03)^1 (0.97)^6$ OR	B2
	${}^7C_6 (0.97)^6 (0.03)^1 + {}^7C_7 (0.97)^7 (0.03)^0$	
	${}^7C_0 (0.03)^0 (0.97)^7$ or ${}^7C_1 (0.03)^1 (0.97)^6$ OR	B1
	${}^7C_6 (0.97)^6 (0.03)^1$ or ${}^7C_7 (0.97)^7 (0.03)^0$	

6	$\frac{1}{p^3}$ $\frac{\pi}{p} = p^2 \pi \left(\frac{dh}{dt} \right)$ $\frac{dV}{dh} = p^2 \pi \quad \text{or} \quad \frac{dV}{dt} = \frac{\pi}{p}$ <p>Note: for V accept any symbol except h and t.</p>	3 B2 B1
7	$y = -6x + 1$ <p>gradient = -6 or $-5 = -6(1) + c$ OR $y - (-5) = -6(x - 1)$</p> $-9x^2 + 3$	3 B2 B1
8	$\frac{9}{5} // 1\frac{4}{5} // 1.8$ $\left[\frac{3^2}{4} - \frac{0^2}{4} \right] - \frac{1}{4} \left[\frac{3^2 - 1}{3(3) + 1} - \frac{0^2 - 1}{3(0) + 1} \right]$ $\frac{x^2}{4} \quad \text{or} \quad \frac{1}{4} \left(\frac{x^2 - 1}{3x + 1} \right)$	3 B2 B1
9	$\frac{1}{\sqrt{61}} \begin{pmatrix} 5 \\ 6 \end{pmatrix} \quad \text{or} \quad \frac{5i + 6j}{\sqrt{61}}$ $\begin{pmatrix} 5 \\ 6 \end{pmatrix} \quad \text{or} \quad \sqrt{61}$	2 B1
10	$\frac{5}{3}$ $\frac{1}{2} \times (3 + 4) \times 2 - \frac{16}{3}$ $\frac{1}{2} \times (3 + 4) \times 2$	3 B2 B1

11	$153.43^\circ, 333.43^\circ // 153^\circ 34', 333^\circ 34'$ $26.57^\circ // 26^\circ 34'$ $\tan \theta = -\frac{1}{2}$	3 B2 B1
12	632.80 $\frac{1}{2}\pi(50)^2 - \frac{1}{2}(54)^2\left(\frac{\pi}{6}\right)$ $\frac{1}{2}\pi(50)^2$ or $\frac{1}{2}(54)^2\left(\frac{\pi}{6}\right)$ 30° or $\frac{\pi}{6}$	4 B3 B2 B1
13	$x^2 + y^2 - 2x - 12y + 12 = 0$ $\sqrt{(x-1)^2 + (y-6)^2} = 5$ OR $\left(\frac{y-10}{x+2}\right)\left(\frac{y-2}{x-4}\right) = -1$ $(1,6)$ or 5 seen OR $\frac{y-10}{x+2}$ or $\frac{y-2}{x-4}$	3 B2 B1
14	<p>(a) $\overline{QR} = -2\overline{PQ}$ or equivalent</p> $\overline{PQ} = -(3a+b) + 2(a-b)$ and $\overline{QR} = -2(a-b) + 4a + 4b$ $\overline{PQ} = -(3a+b) + 2(a-b)$ or $\overline{QR} = -2(a-b) + 4a + 4b$	3 B2 B1
	(b) No, the value of constant is -2 or $-\frac{1}{2}$	1
15	<p>Two correct linear function</p> <p>One correct linear function</p> <p>e.g: $f(x) = 9x$, $f(x) = x + \frac{8}{3}$, $f(x) = 2x + \frac{7}{3}$, $f(x) = \frac{10}{3} - x$ or equivalent</p> <p>Note: Accept any correct linear function.</p>	2 B1

16	$h = \frac{2k-3}{6}$ $k = \frac{6h+3}{2} \quad \text{OR} \quad 6 = \frac{2k-3}{h}$ $f(6) = k \quad \text{OR} \quad \frac{2x-3}{h}$	<p>3</p> <p>B2</p> <p>B1</p>
17	$x \leq -2, x \geq \frac{1}{3}$  <p> $(3x-1)(x+2) \geq 0$ or $(-3x+1)(x+2) \leq 0$ or $(3x-1)(-x-2) \geq 0$ or $3x^2 + 5x - 2 \geq 0$ or $-3x^2 - 5x + 2 \leq 0$ </p> <p>Note: Accept any symbol : $>, <, \geq, \leq$ for B1 only.</p>	<p>3</p> <p>B2</p> <p>B1</p>
18	$k = 9$ $5 = -(0-2)^2 + k$ $h = 2 \quad \text{seen}$	<p>3</p> <p>B2</p> <p>B1</p>
19	$x^2 - \frac{10}{3}x + \frac{4}{3} = 0 \quad \text{or equivalent}$ $2\left(\frac{5}{3}\right) \quad \text{and} \quad 4\left(\frac{1}{3}\right)$ $p+q = \frac{-(-5)}{3} \quad \text{or} \quad pq = \frac{1}{3}$	<p>3</p> <p>B2</p> <p>B1</p>

20	$-2 < k < 1$  $(2k)^2 - 4(1)(2-k) < 0$	3 B2 B1
21	-1 $4^m = \frac{1}{4}$ $4^m \times 4$ or $4^m \times 4^2$	3 B2 B1
22	$\frac{p+2q}{2p}$ $\frac{\log_r 3 + 2 \log_r 5}{2 \log_r 3}$ OR $r^{p+2q} = r^{p(2q)}$ OR $\frac{(p+2q) \log_r r}{2 \log_r 3}$ $\log_r 3 + 2 \log_r 5$ OR $r^p \times r^{2q} = q^y$ OR $\frac{\log_r r^{p+2q}}{\log_r 9}$ $\log_r 5^2$ or $\log_r 3$ or $\log_r 3$ or $\log_a 8$ OR $75 = q^y$ OR $3 = r^p$ OR $5 = r^q$ Note: (i) Award B1 for using any one law correctly (ii) Award B2 for using any two laws correctly (iii) y can any unknown except p , q , and r .	4 B3 B2 B1
23	126 $n = 7$ OR $\frac{7}{2}[2(9) + (7-1)3]$ $140 = \frac{n}{2}[2(9) + (n-1)3]$ $a + (5-1)(3) = 21$	4 B3 B2 B1

	<p><u>Alternative method</u></p> <p>126</p> $9 + 12 + 15 + 18 + 21 + 24 + 27$ <p>$n = 7$</p> <p>9, 12, 15, 18, 21, 24, 27</p> <p>Note: Must list completely</p>	<p>4</p> <p>B3</p> <p>B2</p> <p>B1</p>
24	<p>32</p> $\frac{16}{1 - \frac{1}{2}}$ $r = \frac{1}{2}$ $a(ar^7) = ar^3$	<p>4</p> <p>B3</p> <p>B2</p> <p>B1</p>
25	<p>$b = 100$ and $k = \frac{1}{4}$</p> <p>$\log_{10} b = 2$ or $2k(2) = 1$</p> <p>$\{m = 2\}$ seen OR $\log_{10} y = x^2 \log_{10} b + 2k \log_{10} b$</p>	<p>3</p> <p>B2</p> <p>B1</p>