Mark scheme

Functions

Mathematics 0580 · Questions from Paper 2 and Paper 4

Total marks

60

MARKS FOR EACH QUESTION

1	2	3	4	5	6	7	8	9	10	Total
2	2	3	3	4	6	8	10	11	11	**60**

Question 1 [2]

1	$5 - 2x$ final answer	**2**	**M1** for $2(1 - x) + 3$ oe

Question 2 [2]

2	$\sqrt[3]{x-1}$ or $(x-1)^{\frac{1}{3}}$	**2**	**M1** for $x = y^3 + 1$ or for $y - 1 = x^3$ or better

Question 3 [3]

3(a)	4	**1**	
3(b)	$\frac{1}{343}$	**2**	**M1** for [x =] f(1) or better

Question 4 [3]

4	$25x^2 - 8$ final answer	**3**	**M1** for $(5x - 3)^2 + 6(5x - 3) + 1$ **M1** for $25x^2 - 15x - 15x + 9$ soi or better

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Question 5 **[4]**

5	$[x =] -2.1$ oe	**4**	**M3** for $x^2 + 10x = x^2 - 21$ or better OR **M1** for $(x + 1 + 4)^2 - 25$ or better **M1** for $x^2 - 25 + 4$ or better If 0 scored **SC1** for answer $-\frac{11}{6}$ oe

Question 6 **[6]**

6(a)	27	**2**	**M1** for 3^{3x} seen
6(b)	3	**2**	**M1** for $7 + 3x = 2^4$
6(c)	$\frac{x-7}{3}$ oe final answer	**2**	**M1** for $x = 7 + 3y$ or $y - 7 = 3x$ or $-3x = 7 - y$ or $\frac{y}{3} = \frac{7}{3} + x$

Question 7 **[8]**

7(a)	-10	**1**	

7(b)	$\frac{x+4}{3}$ oe	**2**	**M1** for correct first step $y + 4 = 3x$ or $x = 3y - 4$ or $\frac{y}{3} = x - \frac{4}{3}$
7(c)	$a = 12$, $b = -1$	**2**	**B1** for either a or b correct or **M1** for $3(4x + 1) - 4$
7(d)	$\frac{22-7x}{(3x-4)(4x+1)}$ or $\frac{22-7x}{12x^2-13x-4}$ final answer	**3**	**B1** for $2(4x + 1) - 5(3x - 4)$ oe or better isw **B1** for common denominator $(3x - 4)(4x + 1)$ oe isw

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Question 8 **[10]**

8(a)	–7	**1**	
8(b)	$\frac{4}{64}$ or better	**2**	**M1** for g(4^3) soi or $\frac{4}{4^x}$ or better
8(c)	$\frac{3-x}{2}$ oe final answer	**2**	**M1** for $x = 3 - 2y$ or $2x = 3 - y$ or $\frac{y}{2} = \frac{3}{2} - x$ or $\frac{y-3}{-2}$ oe as final answer
8(d)	4^{3-2x}	**M1**	
	Correctly interprets the indices	**M1**	Dep on previous **M1** e.g. $4^3 \times 4^{-2x}$ or $4^3 \times \frac{1}{4^{2x}}$ or $\frac{4^3}{4^{2x}}$
	$\frac{64}{16^x}$ nfww	**A1**	Correct completion with no errors
8(e)	1.5	**2**	**B1** for $4^x = 8$ or better

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Question 9 **[11]**

9(a)(i)	10	**1**	
9(a)(ii)	–17	**2**	**M1** for g(–7) oe or $3\left(\frac{21}{2x-1}\right)+4$ oe soi
9(a)(iii)	$\frac{21+x}{2x}$ or $\frac{21}{2x}+\frac{1}{2}$ oe final answer	**3**	**M2** for one step from answer e.g. $x=\frac{21+y}{2y}$ or $x=\frac{21}{2y}+\frac{1}{2}$ or $2y=\frac{21}{x}+1$ or $2xy = 21 + x$ or $2y=\frac{21+x}{x}$ or **M1** for correct first step e.g. $x=\frac{21}{2y-1}$ or better or $y(2x – 1) = 21$ or better
9(b)	$\frac{5}{3}$ and $-\frac{5}{2}$ oe	**5**	**B3** for $6x^2 + 5x – 25$ [= 0] or **M1** for $21 = (2x – 1)(3x + 4)$ oe **B1** for $6x^2 – 3x + 8x – 4$ or better and **M1** for correct method to solve *their* three-term quadratic e.g. $(3x – 5)(2x + 5)$ [= 0] or $\frac{-5\pm\sqrt{5^2-4\times6\times-25}}{12}$ oe

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Question 10 **[11]**

10(a)(i)	64	**1**	
10(a)(ii)	127	**1**	**FT** $2 \times$ *their* **(a)(i)** $- 1$
10(b)	$\pm\frac{1}{2}$ oe nfww	**4**	**M1** for $(2x-1)^2 + 2(2x-1)$ **B1** for $4x^2 - 2x - 2x + 1$ or $(2x-1)(2x-1+2)$ **B1** for $4x^2 - 1$ [= 0] or $(2x-1)(2x+1)$ [= 0] OR **M1** for $x(x + 2) = 0$ (solving g(x) = 0) **A1** for $x = 0$ or -2 **B1** for $2x - 1 = 0$ or $2x - 1 = -2$
10(c)	$\frac{x+1}{2}$ oe final answer	**2**	**M1** for $y + 1 = 2x$ or $\frac{y}{2} = x - \frac{1}{2}$ or $x = 2y - 1$
10(d)	$-\frac{1}{6}$ oe nfww	**3**	**B2** for $3x = -\frac{1}{2}$ oe OR **M1** for $2^{2x} \times 2^x$ oe or $4^{\frac{1}{2}x} \times 4^x$ oe or 8^x oe **M1** for $2^{-\frac{1}{2}}$ or $4^{-\frac{1}{4}}$ or $8^{-\frac{1}{6}}$ soi

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