Mark scheme

Fractional and negative indices

Mathematics 0580 · Questions from Paper 2 and Paper 4

Total marks

34

MARKS FOR EACH QUESTION

1	2	3	4	5	6	7	8	9	10	Total
1	2	2	3	3	3	4	5	5	6	**34**

Question 1 [1]

1	$\frac{1}{4}$ or 0.25	**1**	

Question 2 [2]

2	−12	**2**	**B1** for 2^3, 2^{-3}, 2^{12} or 2^{-12}

Question 3 [2]

3	4	**2**	**M1** for $y^{\frac{2}{3}} = x^{\frac{1}{6}}$ or $y^2 = \sqrt{x}$ or $y^4 = x$

Question 4 [3]

4	81	**3**	**M2** for $m^{\frac{3}{4}} = 27$ or better or **M1** for $\frac{1}{m^{\frac{1}{4}}} = \frac{27}{m}$ or better or $m^{-\frac{1}{4}--1} = 27$ If **0** scored **SC1** for answer $\frac{1}{81}$

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Question 5 **[3]**

5	$-\frac{8}{3}$ or $-2\frac{2}{3}$ oe	**3**	**M2** for $-x = 2(x + 4)$ oe or **M1** for $(3^{-1})^x$, 3^{-x}, $(3^2)^{x+4}$, $3^{2(x+4)}$ or $\left(\frac{1}{3}\right)^{-2(x+4)}$ oe

Question 6 **[3]**

6	$[m =] \frac{6n+1}{10}$ oe	**3**	**M2** for $2(5m) - 1 = 3(2n)$ oe or better or **M1** for $42(5m)$ or for $43(2n)$ oe or better

Question 7 **[4]**

7(a)	$8x^{12}$ final answer	**2**	**B1** for $8x^k$ or kx^{12} in final answer $k \neq 0$
7(b)	9	**2**	**M1** for $27^{\frac{2}{3}}$ or 3^k or $p^{\frac{1}{2}} = 3$ or $p^3 = 729$

Question 8 **[5]**

8(a)	6	**2**	**B1** for 3^4 or 3^{x-2} or **M1** for $3^x = 81 \times 3^2$ or better
8(b)	8	**3**	**M2** for $x^{\frac{5}{3}} = 32$ or better or **M1** for $\frac{1}{x^{\frac{1}{3}}} = \frac{32}{x^2}$ or better or $x^{-\frac{1}{3}--2} = 32$ or better

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Question 9 **[5]**

9(a)	x^{-2} or $\frac{1}{x^2}$ final answer	**1**	
9(b)	$\frac{2}{3}$	**1**	
9(c)	1 nfww	**3**	**M1** for $3^{-2(4-3x)}$ oe or better or $9^{\frac{3x}{2}} \times 9^{-(4-3x)} = 9^{\frac{1}{2}}$ oe or better **M1** for $3x + (their - 2) \times (4 - 3x) = 1$ oe or better or $their\frac{3x}{2} - (4-3x) = their\frac{1}{2}$ oe or better

Question 10 **[6]**

10(a)	$[\pm]\frac{x^3}{8}$ final answer	**2**	**B1** for $\frac{x^3}{k}$ or $\frac{x^k}{8}$
10(b)	6 nfww	**4**	**B3** for $4x - x = 2(x + 3)$ oe or for correctly combining to a single base on each side with no brackets in the powers e.g. $2^{3x} = 2^{2x+6}$ oe or better OR **M1** for $(2^4)^x$ or $(2^{-1})^x$ or $2^{2(x+3)}$ or better seen **M1** for correctly forming a linear equation in x from *their* powers of *their* consistent base

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