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|------------|---|-------------------------|
| (b) | $(f(x) =) \int \frac{1}{4}x^3 - 8x^{-\frac{1}{2}} dx = \frac{1}{4} \frac{x^4}{4} - \frac{8x^{\frac{1}{2}}}{\frac{1}{2}} (+c)$ | M1 A1 |
| | $f(4) = 12 \Rightarrow 16 - 32 + c = 12 \Rightarrow c = \dots (28)$ | dM1 A1 |
| | So $(f(x) =) \frac{x^4}{16} - 16\sqrt{x} + "28"$ | A1ft |
| | | (5) |

| Question Number | Scheme | Marks |
|-----------------|--|--|
| 4 | $\int \frac{3x^{\frac{3}{2}} - 15x^{\frac{1}{2}} + 2x - 10}{4\sqrt{x}} dx = \int \frac{3}{4}x - \frac{15}{4} + \frac{1}{2}x^{\frac{1}{2}} - \frac{5}{2}x^{-\frac{1}{2}} dx$ $x^n \rightarrow x^{n+1}$ $\frac{3}{8}x^2 - \frac{15}{4}x + \frac{1}{3}x^{\frac{3}{2}} - 5x^{\frac{1}{2}} + C$ | M1A1A1 dM1 A1A1 |
| | | (6 marks) |

| Question | Scheme | Marks |
|----------|---|----------------|
| 1 | $\int \left(10x^4 - \frac{3}{2x^3} - 7 \right) dx = 2x^5 + \frac{3}{4}x^{-2} - 7x + c$ | M1A1A1 |
| | | (3) |
| | | Total 3 |

| Question | Answer | Marks | Guidance |
|----------|---|-----------|-------------------------|
| 9(a) | $\cos BAO = \frac{6}{8}$ or $\frac{8^2 + 12^2 - 8^2}{2 \times 8 \times 12}$ | M1 | Or other correct method |
| | $BAO = 0.723$ | A1 | |
| | | 2 | |

| Question Number | Scheme | Marks |
|------------------|--|-------------------------------------|
| 8 (a) (i) | $x = 4, f'(x) = 10, f'(x) = 3\sqrt{x} + kx^2 \Rightarrow 10 = 3\sqrt{4} + 4^2k \Rightarrow k = \dots$ $10 = 3 \times 2 + k \times 16 \Rightarrow k = \frac{1}{4} *$ | M1 A1* |
| (ii) | $x = 4, y = 12$ on $y = 10x + c \Rightarrow 12 = 10 \times 4 + c$ $\Rightarrow c = -28$ | M1 A1 (4) |
| (b) | $f''(x) = \frac{3}{2}x^{-\frac{1}{2}} + \frac{1}{2}x$ $\{ \Rightarrow f''(4) \} = \frac{11}{4}$ | M1 A1ft A1 (3) |
| (c) | $f(x) = 2x^{\frac{3}{2}} + \frac{1}{12}x^3 + d$ Uses $P(4, 12) \Rightarrow 12 = 2 \times 8 + \frac{1}{12} \times 4^3 + d \Rightarrow d = \dots$ $\{ f(x) = \} 2x^{\frac{3}{2}} + \frac{1}{12}x^3 - \frac{28}{3}$ | M1, A1ft dM1 A1 (4) |
| | | (11 marks) |

| Question Number | Scheme | Marks |
|-----------------|--|---|
| 6(a) | $\frac{2(4)^2 + a \times 4 + b}{4\sqrt{4}} = 7 \Rightarrow 32 + 4a + b = 56 \Rightarrow 4a + b = 24 *$ | M1A1* (2) |
| (b) | $4a + b = 24, a + b = -9 \Rightarrow a = 11, b = -20$ $\frac{x^{\frac{3}{2}}}{2} + \frac{11x^{\frac{1}{2}}}{4} - 5x^{-\frac{1}{2}}$ $\int \frac{x^{\frac{3}{2}}}{2} + \frac{11x^{\frac{1}{2}}}{4} - 5x^{-\frac{1}{2}} dx \Rightarrow$ Two of $\frac{x^{\frac{5}{2}}}{5}, \frac{11x^{\frac{3}{2}}}{6}, \frac{-20x^{\frac{1}{2}}}{2}$ $\frac{(4)^{\frac{5}{2}}}{5} + \frac{11(4)^{\frac{3}{2}}}{6} - 10(4)^{\frac{1}{2}} + c = -5 \Rightarrow c = \dots$ $(f(x) =) \frac{1}{5}x^{\frac{5}{2}} + \frac{11}{6}x^{\frac{3}{2}} - 10x^{\frac{1}{2}} - \frac{91}{15}$ | M1A1 M1 dM1A1ft M1 A1 (7) |
| (c) | (7, -5) | B1 (1) |
| | | (10 marks) |

| Question Number | Scheme | Marks |
|-----------------|---|------------------|
| 1. | $\int 12x^3 + \frac{1}{6\sqrt{x}} - \frac{3}{2x^4} dx = 12 \times \frac{x^4}{4} + \frac{1}{6} \times 2x^{\frac{1}{2}} - \frac{3}{2} \times \frac{x^{-3}}{-3}$ | M1 |
| | $= 3x^4 + \frac{1}{3}x^{\frac{1}{2}} + \frac{1}{2}x^{-3} + c$ | A1A1A1A1 |
| | | (5) (5 marks) |

| Question Number | Scheme | Marks |
|-----------------|---|------------|
| 6(a) | $\frac{2(4)^2 + a \times 4 + b}{4\sqrt{4}} = 7 \Rightarrow 32 + 4a + b = 56 \Rightarrow 4a + b = 24 \quad *$ | M1A1* |
| | | (2) |
| (b) | $4a + b = 24, \quad a + b = -9 \Rightarrow a = 11, \quad b = -20$ | M1A1 |
| | $\frac{x^2}{2} + \frac{11x^{\frac{1}{2}}}{4} - 5x^{-\frac{1}{2}}$ | M1 |
| | $\int \frac{x^2}{2} + \frac{11x^{\frac{1}{2}}}{4} - 5x^{-\frac{1}{2}} dx \Rightarrow \text{Two of } \frac{x^{\frac{5}{2}}}{5}, \frac{11x^{\frac{3}{2}}}{6}, \frac{-20x^{\frac{1}{2}}}{2}$ | dM1A1ft |
| | $\frac{(4)^{\frac{5}{2}}}{5} + \frac{11(4)^{\frac{3}{2}}}{6} - 10(4)^{\frac{1}{2}} + c = -5 \Rightarrow c = \dots$ | M1 |
| | $(f(x) =) \frac{1}{5}x^{\frac{5}{2}} + \frac{11}{6}x^{\frac{3}{2}} - 10x^{\frac{1}{2}} - \frac{91}{15}$ | A1 |
| | | (7) |
| (c) | (7, -5) | B1 |
| | | (1) |
| | | (10 marks) |

| Question Number | Scheme | Marks |
|-----------------|--|-----------|
| 4. | $\frac{4x^2 + 1}{2\sqrt{x}} = \frac{4x^2}{2\sqrt{x}} + \frac{1}{2\sqrt{x}} = 2x^{\frac{3}{2}} + \frac{1}{2}x^{-\frac{1}{2}}$ | M1 A1 |
| | $\int \frac{4x^2 + 1}{2\sqrt{x}} dx = \frac{4}{5}x^{\frac{5}{2}} + x^{\frac{1}{2}} + c$ | M1 A1 A1 |
| | | (5 marks) |