

Topical Worksheets for Cambridge IGCSE™
Mathematics (0580/0980)

Functions

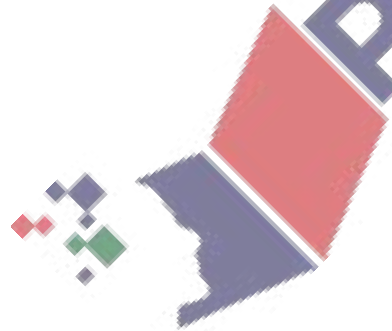
Mark Scheme

1st edition, for examination until 2025

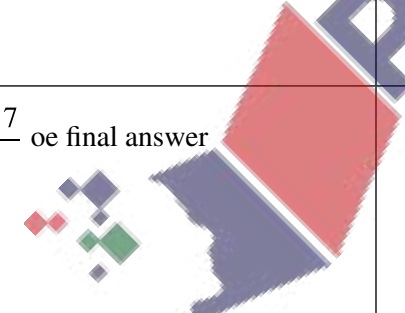
| Question | Answer | Marks | AO Element | Notes | Guidance |
|----------|-----------------------------------|-------|------------|---|----------|
| 1 | $\frac{3x + 1}{5}$ | 3 | | <p>M2 for $x = \frac{3y + 1}{5}$, $5y = 3x + 1$ or $y - \frac{1}{5} = \frac{3x}{5}$</p> <p>M1 for $x = \frac{5y - 1}{3}$, $3y = 5x - 1$ or $y + \frac{1}{3} = \frac{5x}{3}$</p> | |
| 2(a) | 19 | 2 | | M1 for $3(2^x) - 5$ soi or for $f(8)$ | |
| 2(b) | $\frac{x + 5}{3}$ oe final answer | 2 | | M1 for correct first step $y + 5 = 3x$ or $\frac{y}{3} = x - \frac{5}{3}$ or $x = 3y - 5$ | |
| 3 | $[p =] -13$ | 2 | | M1 for $4(5x - 4) + 3$ or better | |
| 4 | $5 - 2x$ final answer | 2 | | M1 for $2(1 - x) + 3$ oe | |
| 5(a) | 82 | 2 | | M1 for $(3^x)^2 + 1$ soi by $(3^2)^2 + 1$ or $g(9)$ isw | |

| Question | Answer | Marks | AO Element | Notes | Guidance |
|----------|---------------------------------|-------|------------|--|----------|
| 5(b) | $\frac{x+2}{7}$ final answer | 2 | | M1 for $y + 2 = 7x$ or $\frac{y}{7} = x - \frac{2}{7}$ or $x = 7y - 2$ | |
| 5(c) | $[a =] 1, [b =] 2, [c =] 2$ | 3 | | B2 for $x^4 + x^2 + x^2 + 1 + 1$ or M1 for $(x^2 + 1)^2 + 1$ | |
| 5(d) | $\frac{6}{7}$ oe | 3 | | M2 for $7x - 2 = 4$ or M1 for $3^x = 81$ soi $f(x) = 4$ or for $3^{7x-2} = 81$ or better | |
| 6(a) | -3 | 1 | | | |
| 6(b) | $\frac{12}{11}$ oe | 2 | | M1 for $\frac{3}{\frac{3}{x+2} + 2}$ soi | |
| 6(c) | $64x - 45$ final answer | 2 | | M1 for $8(8x - 5) - 5$ isw | |
| 6(d) | $\frac{x+5}{8}$ oe final answer | 2 | | M1 for a correct first step $y + 5 = 8x, \frac{y}{8} = x - \frac{5}{8}$ or $x = 8y - 5$ | |

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|----------|---|-------|------------|---|----------|
| 6(e) | $\frac{8x^2 + 11x - 13}{x + 2}$ final answer | 3 | | <p>M1 for $(8x - 5)(x + 2) - 3$ oe isw</p> <p>B1 for common denominator $(x + 2)$</p> | |
| 6(f)(i) | <p>M1 for $(8x - 5)^2 + 6 = 19$</p> <p>B1 for $64x^2 - 40x - 40x + 25$</p> <p>A1 for $64x^2 - 40x - 40x + 25 + 6 = 19$ oe leading to $16x^2 - 20x + 3 = 0$</p> | 3 | | <p>with no errors and must show $(8x - 5)^2 + 6 = 19$ with no omissions after this</p> | |



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|----------|---|-------|------------|---|----------|
| 6(f)(ii) | <p>B2 for</p> $\frac{[- -]20 \pm \sqrt{([- -]20)^2 - 4 (16) (3)}}{2 \times 16}$ <p>oe</p> <p>B2 for 0.17 and 1.08 final ans</p> | 4 | | <p>B1 for</p> $\sqrt{([- -]20)^2 - 4 (16) (3)}$ <p>or better</p> <p>or B1 for</p> $\frac{[- -]20 + \sqrt{q}}{2 (16)}$ <p>oe</p> $\frac{[- -]20 - \sqrt{q}}{2 (16)}$ <p>or</p> <p>B1 for each</p> <p>If 0 scored, SC1 for answer 0.2 and 1.1 or answer - 0.17 and -1.08 or 0.174... and 1.075 to 1.076 seen or 0.17 and 1.08 seen in working</p> | |
| 7(a) | 27 | 2 | | M1 for 3^{3x} seen | |
| 7(b) | 3 | 2 | | M1 for $7 + 3x = 2^4$ | |
| 7(c) | $\frac{x-7}{3}$ oe final answer  | 2 | | <p>M1 for $x = 7 + 3y$</p> <p>or $y - 7 = 3x$</p> <p>or $-3x = 7 - y$</p> <p>or $\frac{y}{3} = \frac{7}{3} + x$</p> | |

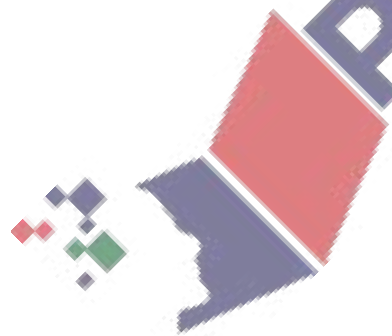
| Question | Answer | Marks | AO Element | Notes | Guidance |
|----------|---------------------------------|-------|------------|---|----------|
| 8 | 5 | 2 | | M1 for $a \times (-2)^2 + 1 = 21$ | |
| 9(a) | $5x^3 + 2$ final answer | 1 | | | |
| 9(b) | $\frac{x-2}{5}$ final answer | 2 | | M1 for correct first step e.g. $y - 2 = 5x$, $x = 5y + 2$, $\frac{y}{5} = x + \frac{2}{5}$ | |
| 10(a) | 0 | 1 | | | |
| 10(b) | 5 | 2 | | M1 for $3(3^x) + 4$ or better or $f\left(\frac{1}{3}\right)$ or $f(3^{-1})$ | |
| 10(c) | $\frac{x+1}{2}$ oe final answer | 2 | | M1 for $x = 2y - 1$ or $y + 1 = 2x$ or $\frac{y}{2} = x - \frac{1}{2}$ or better | |
| 10(d) | $9x + 16$ | 2 | | M1 for $3(3x + 4) + 4$ oe | |
| 10(e) | $9x^2 + 24x + 16$ | 2 | | B1 for three terms from $9x^2 + 12x + 12x + 16$ correct | |

| Question | Answer | Marks | AO Element | Notes | Guidance |
|-----------|---------------------------------|-------|------------|--|----------|
| 10(f) | 27 | 2 | | M1 for $x = h$ (<i>their</i> $g(2)$) | |
| 11(a) | -17 | 2 | | M1 for $f(11)$ seen or $5 - 2(5 - 2x)$ or better | |
| 11(b)(i) | $4x^2 + 8$ oe | 1 | | | |
| 11(b)(ii) | $\frac{5-x}{2}$ oe final answer | 2 | | M1 for $x = 5 - 2y$ or $2x = 5 - y$ or $y - 5 = -2x$ or $\frac{y}{2} = \frac{5}{2} - x$ | |
| 12(a) | 26 | 2 | | M1 for $g(5)$ or for $(x^2 + 1)^2 + 1$ | |
| 12(b) | $x^2 + 4x + 5$ | 2 | | M1 for $(x + 2)^2 + 1$ | |
| 12(c) | 5 | 2 | | M1 for $2x - 3 = 7$ | |
| 12(d) | $\frac{x+3}{2}$ oe | 2 | | M1 for $x = 2y - 3$ or $y + 3 = 2x$ or $\frac{y}{2} = x - \frac{3}{2}$ oe | |
| 13(a) | 1 | 2 | | M1 for $h(0)$ or for 2^{8-3x} | |

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| 13(b) | 8 | 2 | | M1 for $g(\frac{1}{4})$ or for $\frac{10}{2^x + 1}$ | |
| 13(c) | $\frac{10-x}{x}$ or $\frac{10}{x} - 1$ final answer | 3 | | M2 for $x = \frac{10-y}{y}$ or better or $xy = 10 - x$ or better or $y + 1 = \frac{10}{x}$ or M1 for $x(y + 1) = 10$ or $y(x + 1) = 10$ or $x = \frac{10}{y + 1}$ or $x + 1 = \frac{10}{y}$ | |
| 13(d) | 5 | 1 | | | |
| 14(a) | 2 | 2 | | M1 for $f(5)$ or $7 - (7 - x)$ or better | |
| 14(b) | $30 - 4x$ final answer | 2 | | M1 for $4(7 - x) + 2$ or better or for correct answer then spoil | |

| Question | Answer | Marks | AO Element | Notes | Guidance |
|----------|-----------------------------|-------|------------|--|----------|
| 14(c) | $15 - 4x^2$ final answer | 2 | | M1 for $15 - (2x)^2$ or better or for correct answer then spoil | |
| 15(a) | [0].70 cao | 2 | | B1 for [0].696 to [0].697 | |
| 15(b) | 4 cao | 1 | | | |
| 16(a) | $9x^2$ | 1 | | | |
| 16(b) | $\frac{x - 5}{3}$ | 2 | | M1 for correct first algebraic step e.g. $y - 5 = 3x$ or $\frac{y}{3} = x + \frac{5}{3}$ or better or for interchanging x and y , e.g. $x = 3y + 5$, this does not need to be the first step | |
| 16(c) | $9x + 20$ cao final answer | 2 | | M1 for $3(3x + 5) + 5$ | |
| 17(a) | -13 | 1 | | | |
| 17(b) | $-3x - 1$ or $5 - 3(x + 2)$ | 1 | | | |

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|--------------|-----------------------------------|-------|------------|--|----------|
| 17(c) | $9x - 10$ cao | 2 | | M1 for $5 - 3(5 - 3x)$ | |
| 17(d) | $\frac{5 - x}{3}$ final answer oe | 2 | | M1 for correct first step e.g. $y + 3x = 5$ or $\frac{y}{3} = \frac{5}{3} - x$ or $y - 5 = -3x$ or better or for interchanging x and y , e.g. $x = 5 - 3y$, this does not need to be the first step | |
| [Total: 101] | | | | | |



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