## **Functions Past Paper Answers GCSE Edexcel - Calculator**

1.

| stion | Answer    | Mark | Mark scheme  | Additional guidance   |
|-------|-----------|------|--|---|
| (a)   | 1.56      | B1   | 1.56 to 1.563  |   |
| (b)   | 3.63      | M1   | for a complete method to find $fg(34)$ eg 4 sin $65(=3.625)$ or $fg(x)$ eg 4 sin $(2x-3)$  |   |
|       |           | A1   | for answer in the range 3.6 to 3.63  | If an answer in the range is seen in working and then incorrectly rounded award full marks. |
| (c)   | Statement | C1   | for statement eg positive and negative square root required.  Acceptable examples  | and meeticetly rounded award run marks.   |
|       |           |      | The other answer is -9   |   |
|       |           |      | The quadratic should have 2 solutions.   |   |
|       |           |      | Not acceptable examples<br>He has not expanded the brackets.<br>He needed to $(x+4)$ twice as there is a squared sign.<br>$(x+4)^2$ is 16 not 25. Didn't expand the bracket. |   |

2.

| (a) | 2<br>25 | B1 | accept 0.08   |                                 |
|-----|---------|----|---|---------------------------------|
| (b) | 1 25    | M1 | $fg(x) = \frac{2}{(4x^3)^2}$ oe <b>or</b> $g(1) = 4$ <b>or</b> $\frac{2}{(4x1^3)^2}$ oe |                                 |
|     | 8       | A1 | oe (44)   | All powers and products must be |
|     |         |    |   | evaluated                       |

**3.** 

| 7, -1 | P1         | for strategy to use $g(3) = 20$ , e.g. $3a + b = 20$                                     |
|-------|------------|--|
|       | P1         | for $g(1) = a + b$   |
|       | P1         | for a process to find inverse of f. e.g. $f^{-1}(x) = \frac{x-3}{5}$ or $f^{-1}(33) = 6$ |
|       | P1         | for using $f^{-1}(33) = g(1)$ to find an equation e.g. $\frac{33-3}{5} = a+b$            |
|       | <b>A</b> 1 | for $a = 7$ , $b = -1$   |

4.

| (a) | 18            | B1       | cao  |
|-----|---------------|----------|--|
| (b) | 5(x-1)        | M1<br>A1 | for method to find inverse function for $5(x-1)$ or $5x-5$             |
| (c) | 9x - 48 shown | M1<br>A1 | for method to find composite function for working leading to $9x - 48$ |

**5.** 

| $3x^2 + 10x$ | M1  | start a chain of reasoning,<br>eg. $3(x+2)^2 - 2(x+2) - 8$ |
|--------------|-----|--|
|              | M1  | continue chain by expanding brackets correctly,            |
|              | 111 | eg. $3x^2 + 12x + 12 - 2x - 4 - 8$                         |
|              | A1  | for $3x^2 + 10x$ ( $a = 3, b = 10$ )                       |

6.

| (a) | $\frac{x+1}{4}$ | M1 start to method eg. $y = 4x - 1$ or $x = \frac{y+1}{4}$                        |
|-----|-----------------|---|
| (b) | $\frac{13}{16}$ | A1 oe P1 for start to process eg. $f(4k) = 16k - 1$ or $g(2) = \frac{12+1}{4}$ A1 |

7.

| $(x+3)^2 - 3^2$ or $(x+3)^2 - 9$ or $(y+3)^2 - 3^2$ or $(y+3)^2 - 9$ |                 |   | M1 | for completing the square                                       |
|--|-----------------|---|----|---|
| $y+9=(x+3)^2$ or $x+9=(y+3)^2$                                       |                 |   | M1 |   |
| $\sqrt{y+9} = x+3 \text{ or } \sqrt{x+9} = y+3$                      |                 |   | M1 |   |
|  | $-3+\sqrt{x+9}$ | 4 | A1 | oe<br>M3A0 for $-3 + \sqrt{y+9}$<br>and for $-3 \pm \sqrt{x+9}$ |

8.

|     |   | J-1     |   | 4 4 4 |                             |
|-----|---|---------|---|-------|-----------------------------|
| (a) |   | -11     | 1 | B1    |                             |
| (b) |   | 0.5 oe  | 1 | B1    |                             |
| (c) | $g(-1.5) = 1 \div (1 - 2 \times -1.5) (=0.25)$ or               |         |   | M1    | g(-1.5) must be the correct |
|     | $f_0(x) = 4 - 3 \times \left(\frac{1}{x}\right)$ or             |         |   |       | calculation alone.          |
|     | $fg(x) = 4 - 3 \times \left(\frac{1}{1 - 2x}\right) \text{ oe}$ |         |   |       |                             |
|     |   | 3.25 oe | 2 | A1    |                             |

9.

| (a) | $y = \frac{\sqrt{x^2 + k^2}}{x}, x^2 y^2 = x^2 + k^2 x^2 (y^2 - 1) = k^2$   |                        | 3 | M1 | for squaring and rearranging correctly to the form $x^2(y^2-1) = k^2$     |
|-----|---|------------------------|---|----|---|
|     | $y = \frac{\sqrt{x^2 + k^2}}{x}, x^2 y^2 = x^2 + k^2 x^2 (y^2 - 1) = k^2$ $\frac{k}{\sqrt{p^2 - 1}} = k$              |                        |   | M1 | (dep) for " $f^{-1}(p)$ " = $k$   |
|     |   | $\sqrt{2}$             |   | A1 |   |
|     | Alternative method $p = f(k)$   |                        |   | M1 |   |
|     | $p = \frac{\sqrt{k^2 + k^2}}{k}$  |                        |   | M1 |   |
|     |   | $\sqrt{2}$             |   | A1 |   |
| (b) | $(gf(a) =) \left(\frac{\sqrt{a^2 + k^2}}{a}\right)^2 \text{ or } (gf(x) =) \left(\frac{\sqrt{x^2 + k^2}}{x}\right)^2$ |                        | 3 | M1 |   |
|     | $ka^2 - a^2 = k^2$  |                        |   | M1 | (dep) for rearranging gf = $k$ and isolating correctly the terms in $a^2$ |
|     |   | $\frac{k}{\sqrt{k-1}}$ |   | A1 | oe eg $\sqrt{\frac{k^2}{k-1}}$  |

## **10.**

| uestion | Working   | Answer              | Mark | Notes   |
|---------|---|---------------------|------|---|
| a       |   | -6.5 oe             | 1    | B1  |
| b       | 4y = 3x - 5 or $4x = 3y - 5$  | $\frac{4x+5}{3}$ oe | 2    | M1  |
|         |   |                     |      | A1  |
| c       | $\sqrt{19-3}$ oe or f(4) or $\frac{3\sqrt{19-3}-5}{4}$ or $\frac{3\sqrt{19-x}-5}{4}$ oe | 1.75 oe             | 2    | M1  |
|         | or $\frac{3\sqrt{19-x}-5}{4}$ oe  |                     |      |   |
|         |   |                     |      | A1 for 1.750e (and no other solution)   |
| d       |   | x > 19              | 2    | B2 for $(x) > 19$ or an equivalent<br>statement in words<br>If not B2 then award<br>B1 for $(x) \ge 19$ |