AQA, Edexcel, OCR, MEI

A Level

A Level Mathematics

C1 Algebra

Name:

MME
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Total Marks: /49

1. Let n and m be two numbers. Complete the statements below by writing the correct symbol ($\Rightarrow, \Leftarrow$, or $\Leftrightarrow$) onto the dotted lines below.

    (a) $\frac{n}{2}$ is an integer $\ldots\ldots$ n is even. [1]

    (b) $m^2 \geq 4$ $\ldots\ldots$ $m \geq 2$. [1]

2. True or false: if $p \Rightarrow q$ and $q \Rightarrow r$, then $p \Rightarrow r$? [1]

3. Solve $2x + 3 = 9$. [1]

4. Solve $x^2 + x - 2 = 0$. [2]

5. Rearrange $y = \sqrt{\frac{1}{x-2}}$ to make x the subject. [2]

6. Consider the quadratic function $f(x) = 2x^2 + x + 1$.

    (a) Calculate the discriminant of the quadratic equation $2x^2 + x + 1 = 0$. What does this tell us about the solutions to the equation? What does this tell us about the graph of $f(x)$? [3]

    (b) By completing the square, show that the minimum point of $f(x)$ is $\left(-\frac{1}{4}, \frac{7}{8}\right)$. [3]

    (c) Sketch $f(x)$. Be sure to clearly mark the coordinates of any intersections with the axes. [2]

7. Let $g(x) = x^2 - 4x + 3$ and $h(x) = 2x - 2$.

    (a) Find the coordinates of the points where $g(x)$ and $h(x)$ intersect? [3]

    (b) By completing the square, show that the minimum point of $g(x)$ is $(2, -1)$. [3]

    (c) On the same set of axes sketch the graphs of $g(x)$ and $h(x)$, clearly indicating the coordinates of intersection with the axes. [2]

8. Give the range of values of x for which $x^2 - 4x + 3 \leq 0$. *(Hint: use your sketch of $g(x)$ from above)* [2]

9. Give the range of values of x for which $2x + 10 > 0$. [2]

10. Rationalise the denominator of $\frac{3}{\sqrt{3}}$. [2]

11. Rationalise the denominator of $\frac{1}{\sqrt{2}+1}$. [2]

12. Evaluate $\left(\frac{1}{8}\right)^{\frac{4}{3}}$. [2]

13. Simplify $\frac{\left(9a^2bc^4\right)^{\frac{1}{2}}}{6ab^{\frac{3}{2}}c}$. [3]

14. Evaluate 3^{-2}. [1]

15. Evaluate 8^0. [1]

16. Evaluate $\left(2^{\frac{1}{2}} + 2\right)^2 - 2^{\frac{5}{2}}$. [3]

17. Consider the function $f(x)$ plotted below. You are given that $f(x)$ is a quadratic function of the form $f(x) = x^2 + ax + b$.
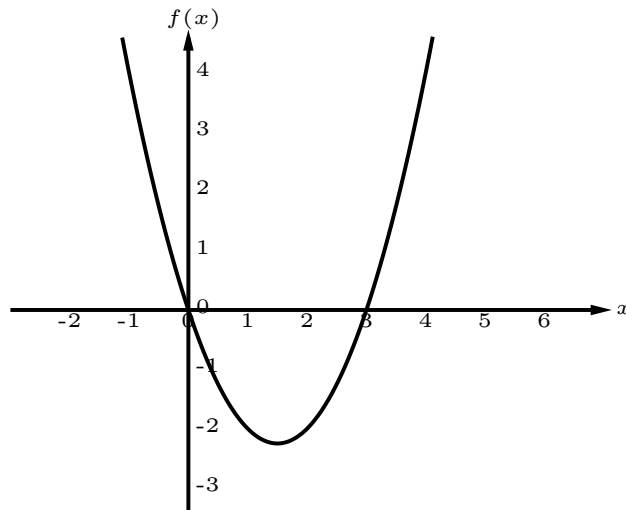

Figure 1: A plot of a quadratic function $f(x)$.

   (a) Find the values of a and b. *(Hint: substitute known coordinates into the equation for $f(x)$)* [4]

   (b) By completing the square, verify that $f(x)$ has a line of symmetry at $x = 1.5$. [3]