

# Pearson Edexcel AS Mathematics 8MA0

## Unit Test 1 Algebra Functions

Time allowed: 50 minutes

School:

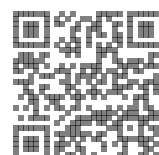
Name:

Teacher:

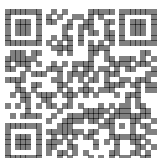
How I can achieve better:

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Question	Points	Score
1	4	
2	8	
3	9	
4	12	
5	5	
6	4	
7	8	
Total:	50	



1. Simplify  $\frac{6\sqrt{3} - 4}{8 - \sqrt{3}}$ , giving your answer in the form  $p\sqrt{3} - q$ , where  $p$  and  $q$  are positive rational numbers. [4]

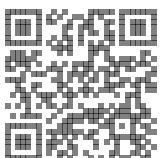


2.

$$f(x) = x^2 - (k + 8)x + (8k + 1)$$

- (a) Find the discriminant of  $f(x)$  in terms of  $k$  giving your answer as a simplified quadratic. [3]
- (b) If the equation  $f(x) = 0$  has two equal roots, find the possible values of  $k$ . [2]
- (c) Show that when  $k = 8$ ,  $f(x) > 0$  for all values of  $x$ . [3]

Total: 8



3. A stone is thrown from the top of a cliff. The height  $h$ , in metres, of the stone above the ground level after  $t$  seconds is modelled by the function  $h(t) = 115 + 12.25t - 4.9t^2$ .

(a) Give a physical interpretation of the meaning of the constant term 115 in the model. [1]

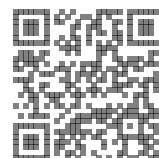
(b) Write  $h(t)$  in the form  $A - B(t - c)^2$ , where  $A$ ,  $B$  and  $C$  are constants to be found. [3]

(c) Using your answer to part *b*, or otherwise, find, with justification

i. the time taken after the stone is thrown for it to reach ground level [3]

ii. the maximum height of the stone above the ground and the time after which this maximum height is reached. [2]

Total: 9

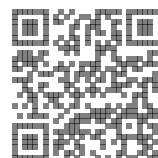


4.

$$p(x) = 3 - \frac{1}{2}x, \quad q(x) = x^2 - 10x - 20$$

- (a) Solve the equation  $q(x) = 0$ . Write your answer in the form  $a \pm 3\sqrt{b}$  where  $a$  and  $b$  are integers to be found. [2]
- (b) Sketch the graphs of  $y = p(x)$  and  $y = q(x)$  on the same set of axes. Label all points where the curves intersect the coordinate axes. [4]
- (c) Use an algebraic method to find the coordinates of any point of intersection of the graphs  $y = p(x)$  and  $y = q(x)$ . [4]
- (d) Write down, using set notation, the set of values of  $x$  for which  $p(x) < q(x)$ . [2]

Total: 12

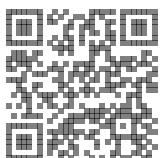


5.

[5]

$$g(x) = \frac{4}{x-6} + 5, x \in \mathbb{R}.$$

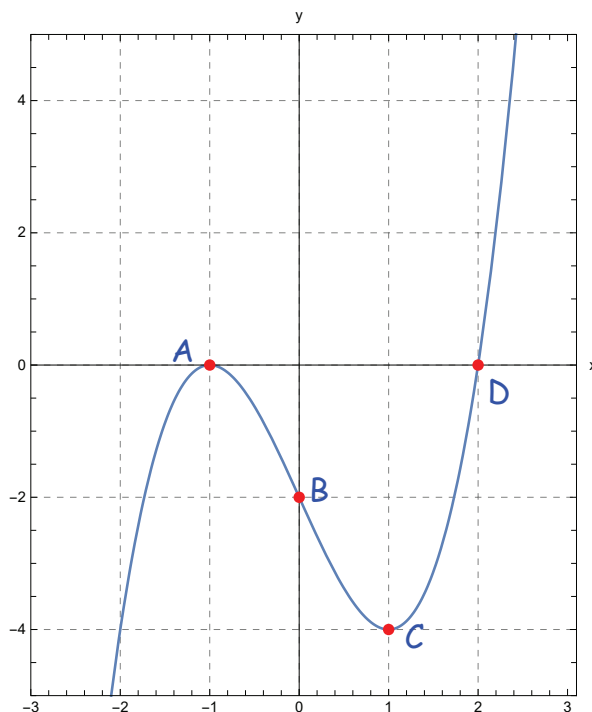
Sketch the graph  $y = g(x)$ . Label any asymptotes and any points of intersection with the coordinate axes.



6.

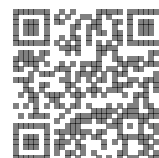
$$f(x) = x^3 - 3x - 2.$$

The figure below shows a sketch of part of the curve with equation  $y = f(x)$ .



- (a) On a separate set of axes, sketch the curve with equation  $y = f(2x)$  showing the location and coordinates of the images of points  $A, B, C$  and  $D$ . [2]
- (b) On a separate set of axes, sketch the curve with equation  $y = f(-x)$  showing the location and coordinates of the images of points  $A, B, C$  and  $D$ . [2]

Total: 4



7. (a) On a coordinate grid ( $x$  and  $y$  axes running from  $-6$  to  $6$ ), shade the region comprising all points whose coordinates satisfy the inequalities  $y \leq 2x + 5$ ,  $2y + x \leq 6$  and  $y \geq 2$ . [3]
- (b) Work out the area of the shaded region. [5]

Total: 8

