

**Pearson Edexcel Level 3
GCE Mathematics 9MA0
Practice Paper C
Pure Mathematics**

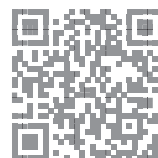
Time allowed: 2 hours

Centre:

Name:

Teacher:

Question	Points	Score
1	6	
2	5	
3	6	
4	4	
5	5	
6	4	
7	5	
8	7	
9	6	
10	5	
11	6	
12	6	
13	6	
14	4	
15	13	
16	12	
Total:	100	



1.

$$\frac{18x^2 - 98x + 78}{(x - 4)^2(3x + 1)} = \frac{A}{x - 4} + \frac{B}{(x - 4)^2} + \frac{C}{3x + 1}, \quad x > 4.$$

[6]

Find the values of the constants A, B and C .



4. The temperature of a mug of coffee at time t can be modelled by the equation

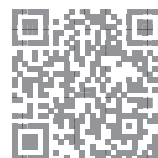
$$T(t) = T_R + (90 - T_R)e^{-\frac{1}{20}t},$$

where $T(t)$ is the temperature, in $^{\circ}\text{C}$, of the coffee at time t minutes after the coffee was poured into the mug and T_R is the room temperature in $^{\circ}\text{C}$.

(a) Using the equation for this model, explain why the initial temperature of the coffee is [2]
independent of the initial room temperature.

(b) Calculate the temperature of the coffee after 10 minutes if the room temperature is 20°C . [2]

Total: 4



7. An infinite geometric series has first four terms $1 - 4x + 16x^2 - 64x^3 + \dots$. The series is convergent.

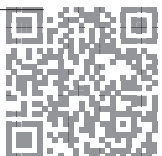
(a) Find the set of possible values of x for which the series converges. [2]

(b) Given that [3]

$$\sum_{r=1}^{\infty} (-4x)^{r-1} = 4,$$

calculate the value of x .

Total: 5



8.

$$f(x) = 2 - 3 \sin^3(x) - \cos(x),$$

where x is in radians.

(a) Show that $f(x) = 0$ has a root α between $x = 1.9$ and $x = 2.0$. [2]

(b) Using $x_0 = 1.95$ as a first approximation, apply the Newton–Raphson procedure once to $f(x)$ to find a second approximation to α , giving your answer to 3 decimal places. [5]

Total: 7



10. Use proof by contradiction to show that there are no positive integer solutions to the statement

[5]

$$x^2 - y^2 = 1.$$



11. The function $g(x)$ is defined by $g(x) = x^2 - 8x + 7, x \in \mathbb{R}, x > 4$.

[6]

Find $g^{-1}(x)$ and state its domain and range.



14. Find

$$\int_{\frac{\pi}{12}}^{\frac{\pi}{8}} \sin(4x)(1 - \cos(4x))^3 dx.$$

[4]



15.

$$\frac{4x^2 - 4x - 9}{(2x + 1)(x - 1)} \equiv A + \frac{B}{2x + 1} + \frac{C}{x - 1}.$$

- (a) Find the values of the constants A , B and C . [6]
- (b) Hence, or otherwise, expand $\frac{4x^2 - 4x - 9}{(2x + 1)(x - 1)}$ in ascending powers of x , as far as the x^2 term. [6]
- (c) Explain why the expansion is not valid for $x = \frac{3}{4}$. [1]

Total: 13

