

1. Find the first three terms, in ascending powers of x , of the binomial expansion of $(1 + 2x)^7$ giving each term in its simplest form. (4)

2. Given that $\int_1^4 (6x^2 + cx)dx = 96$, find the value of the constant c . (5)

3. In a geometric series the common ratio is equal to twice the first term. The sum to infinity of this series is 8.

Find the exact value of the first term of this series (4)

4. Find, giving your answer to 3 significant figures where appropriate, the value of x for which

(i) $2^x = 7$ (3)

(ii) $\log_3(3x + 1) - \log_3 x = 2$ (4)

5. (i) Given that $5 \sin x = 7 \cos x$ find the value of $\tan x$. (1)

(ii) Find, to 1 decimal place, all the solutions of $5 \sin x - 7 \cos x = 0$ in the interval $0 \leq x < 360^\circ$. (3)

(iii) Find all the solutions of $2 \sin^2 y = 2 - \cos y$ in the interval $0 \leq y < 360^\circ$. (6)

6. (i) Given that $(x - 2)$ is a factor of $f(x)$, where $f(x) = x^3 + 3x^2 - 4x + k$, show that $k = -12$. (2)

(ii) Divide $f(x)$ by $(x - 2)$ to find a quadratic factor of $f(x)$. (2)

(iii) Write $f(x)$ as a product of three linear factors. (2)

(iv) Calculate the remainder when $f(x)$ is divided by $(x - 3)$. (2)

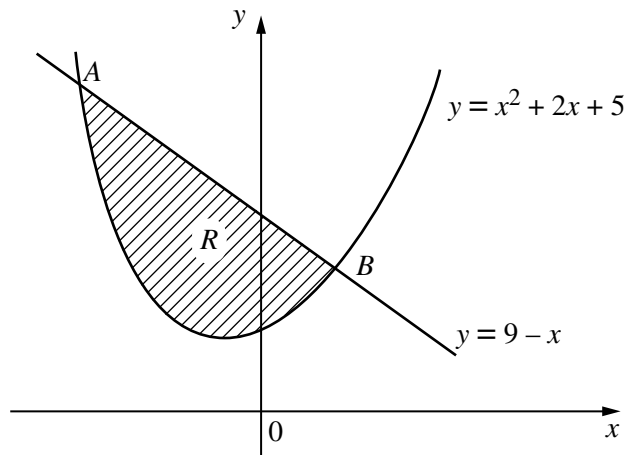
7. The first term of an arithmetic series is -7 and the eighth term of the series is 14.

(i) Find the common difference and the sum of the first thirty terms of the series. (4)

(ii) Find the value of n for which the n th term of the series is 210. (2)

(iii) Find the value of n for which the sum of the first n terms is 308. (4)

8.



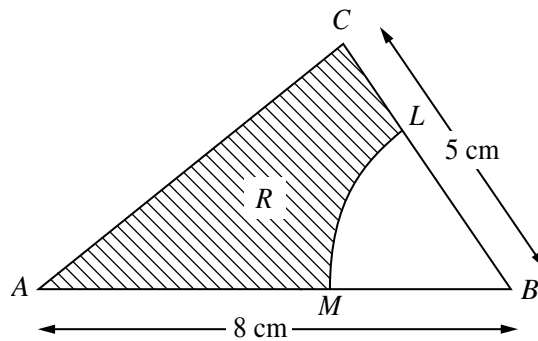
The line with equation $y = 9 - x$ cuts the curve with equation $y = x^2 + 2x + 5$ at the points A and B , as shown above.

(i) Use algebra to find the coordinates of A and the coordinates of B . (5)

The shaded region R is bounded by the line and the curve, as shown above.

(ii) Use calculus to find the exact area of R . (7)

9.



Triangle ABC has $AB = 8$ cm, $BC = 5$ cm and $\angle ABC = 1.3$ radians. A circle, centre B and radius 3 cm, intersects AB and BC at M and L respectively.

(i) Show that, to 3 decimal places, $AC = 8.222$ cm (3)

Calculate,

(ii) the area of sector BLM , (2)

(iii) the area of the shaded region R , (3)

(iv) the perimeter of the shaded region R . (4)