

$$\int_1^4 (2x + 3\sqrt{x}) \, dx.$$

(Total 5 marks)



2. (a) Find the first 3 terms, in ascending powers of x , of the binomial expansion of

$$(2 + kx)^7$$

where k is a constant. Give each term in its simplest form.

(4)

Given that the coefficient of x^2 is 6 times the coefficient of x ,

- (b) find the value of k .

(2)



3.

$$f(x) = (3x - 2)(x - k) - 8$$

where k is a constant.

- (a) Write down the value of $f(k)$.

(1)

When $f(x)$ is divided by $(x - 2)$ the remainder is 4

- (b) Find the value of k .

(2)

- (c) Factorise $f(x)$ completely.

(3)



This image shows a full page of blank, lined paper. It features approximately 28 horizontal grey lines spaced evenly across the page, typical of notebook paper. The lines are thin and light grey, set against a plain white background. There is no handwriting or other markings on the page.

5. The third term of a geometric sequence is 324 and the sixth term is 96
- (a) Show that the common ratio of the sequence is $\frac{2}{3}$ (2)
- (b) Find the first term of the sequence. (2)
- (c) Find the sum of the first 15 terms of the sequence. (3)
- (d) Find the sum to infinity of the sequence. (2)

This image shows a full page of white paper with horizontal blue or grey ruling lines. The lines are evenly spaced and run across the width of the page, typical of notebook paper. There are no margins, text, or other markings on the page.

(Total 9 marks)





7. (i) Solve, for $-180^\circ \leq \theta < 180^\circ$,

$$(1 + \tan \theta)(5 \sin \theta - 2) = 0.$$

(4)



(ii) Solve, for $0 \leq x < 360^\circ$,

$$4\sin x = 3\tan x.$$

(6)

Q7

(Total 10 marks)



8. (a) Find the value of y such that

$$\log_2 y = -3$$

(2)

(b) Find the values of x such that

$$\frac{\log_2 32 + \log_2 16}{\log_2 x} = \log_2 x$$

(5)

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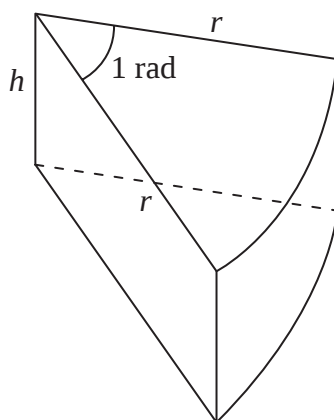


Figure 2 shows a closed box used by a shop for packing pieces of cake. The box is a right prism of height h cm. The cross section is a sector of a circle. The sector has radius r cm and angle 1 radian.

(a) Show that the surface area of the box, $S \text{ cm}^2$, is given by

$$S = r^2 + \frac{1800}{r} \quad (5)$$

(b) Use calculus to find the value of r for which S is stationary. (4)

(c) Prove that this value of r gives a minimum value of S . (2)

(d) Find, to the nearest cm^2 , this minimum value of S . (2)

[illegible]

(Total 13 marks)

TOTAL FOR PAPER: 75 MARKS

END

