

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

9 $N = 480 \times 10^9$

(a) Write N as a number in standard form.

(1)

(b) Write N as a product of powers of its prime factors.
Show your working clearly.

(3)

(c) Find the largest factor of N that is an odd number.

(1)

(Total for Question 9 is 5 marks)



10 The shape, shown shaded in the diagram, is the region between two semicircles.

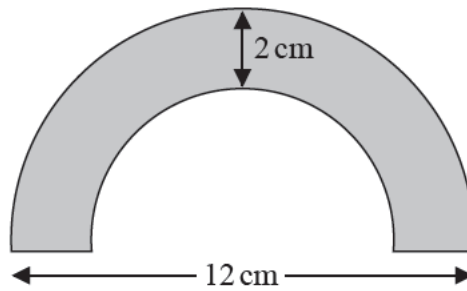


Diagram **NOT**
accurately drawn

The diameter of the outer semicircle is 12 cm.
The shape has constant thickness 2 cm.

Calculate the area of the shape.
Give your answer as a multiple of π .

cm²

(Total for Question 10 is 3 marks)



DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

11 There are 12 boys and 8 girls in a class.
The boys and the girls have some coins.

The mean number of coins that the boys have is 5.5
The girls have a total of 18 coins.

Work out the mean number of coins the 20 children have.

(Total for Question 11 is 3 marks)



12 Here are the first four terms of a sequence of fractions.

$$\frac{1}{1} \quad \frac{2}{3} \quad \frac{3}{5} \quad \frac{4}{7}$$

The numerators of the fractions form the sequence of whole numbers 1 2 3 4 ...

The denominators of the fractions form the sequence of odd numbers 1 3 5 7 ...

(a) Write down an expression, in terms of n , for the n th term of this sequence of fractions.

(2)

(b) Using algebra, prove that when the square of any odd number is divided by 4 the remainder is 1

(3)

(Total for Question 12 is 5 marks)



13 A curve C has equation $y = x^3 - x^2 - 8x + 12$

(a) Find $\frac{dy}{dx}$

$$\frac{dy}{dx} = \quad (2)$$

The curve C has two turning points.

(b) Work out the x coordinates of the two turning points.
Show your working clearly.

(3)

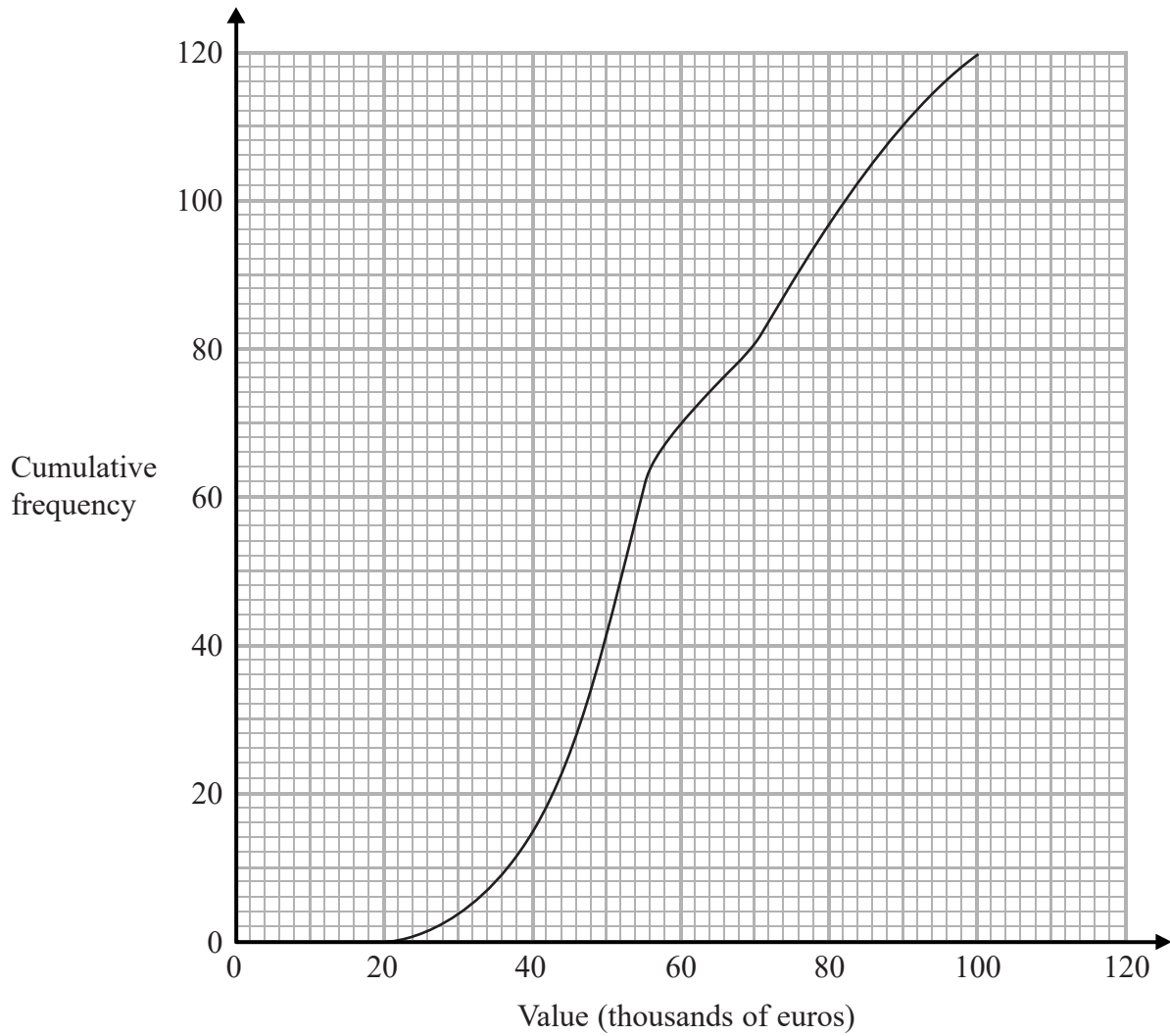
(c) Show that the x -axis is a tangent to the curve C.

(2)

(Total for Question 13 is 7 marks)



14 The cumulative frequency diagram gives information about the values, in thousands of euros, of 120 apartments in 2015



(a) Find an estimate for the number of these apartments with a value of 80 thousand euros or less in 2015

(1)

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



The table gives information about the values, in thousands of euros, of the same 120 apartments in 2018

Value in thousands of euros (v)	Cumulative frequency
$0 < v \leq 20$	0
$0 < v \leq 40$	15
$0 < v \leq 60$	44
$0 < v \leq 80$	85
$0 < v \leq 100$	102
$0 < v \leq 120$	120

- (b) On the grid opposite, draw a cumulative frequency diagram for this information. (2)
- (c) Find an estimate for the increase in the median value for these apartments from 2015 to 2018

thousand euros
(2)

(Total for Question 14 is 5 marks)



15 (a) Simplify $(3x^2y^5)^4$

(2)

(b) Expand and simplify $4n(n - 3)(n + 5)$

(2)

(c) Factorise $4c^2 - 9d^2$

(1)

(d) Simplify fully $\frac{x^2 - 7x + 12}{4x - x^2}$

(3)

(Total for Question 15 is 8 marks)

