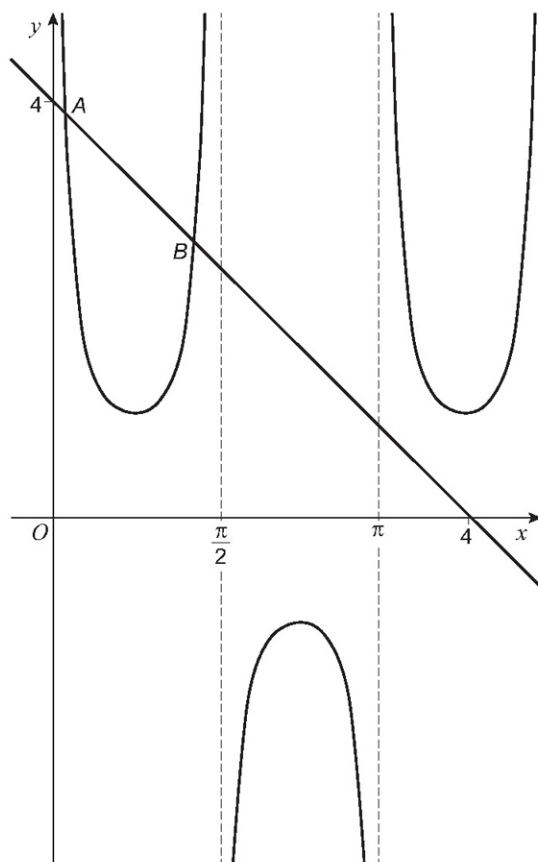


12

The diagram shows parts of the graphs of $y = \operatorname{cosec} 2x$ and $y = 4 - x$



The graphs intersect at the points A and B

12 (a)

A student is trying to solve the equation

$$\operatorname{cosec} 2x = 4 - x$$

The student looks at the graph and states:

"The line $y = 4 - x$ intersects $y = \operatorname{cosec} 2x$ in two places, so the equation $\operatorname{cosec} 2x = 4 - x$ must have exactly two solutions."

Explain the error in the student's reasoning.

[1 mark]

12 (b)

The smallest positive solution to the equation

$$\operatorname{cosec} 2x = 4 - x$$

is $x = a$

Using a small angle approximation, show that a satisfies

$$2a^2 - 8a + 1 \approx 0$$

[2 marks]

12 (c)

Using the result from part (b), find an approximate value for a

Give your answer to three significant figures.

[2 marks]