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VCE Mathematical Methods ½
Graphs of Circular Function [4.4]
Test

19 Marks. 1 Minute Reading. 19 Minutes Writing.

Results:

Test Questions	_____ / 19

Section A: Test Questions (19 Marks)

Question 1 (4 marks)

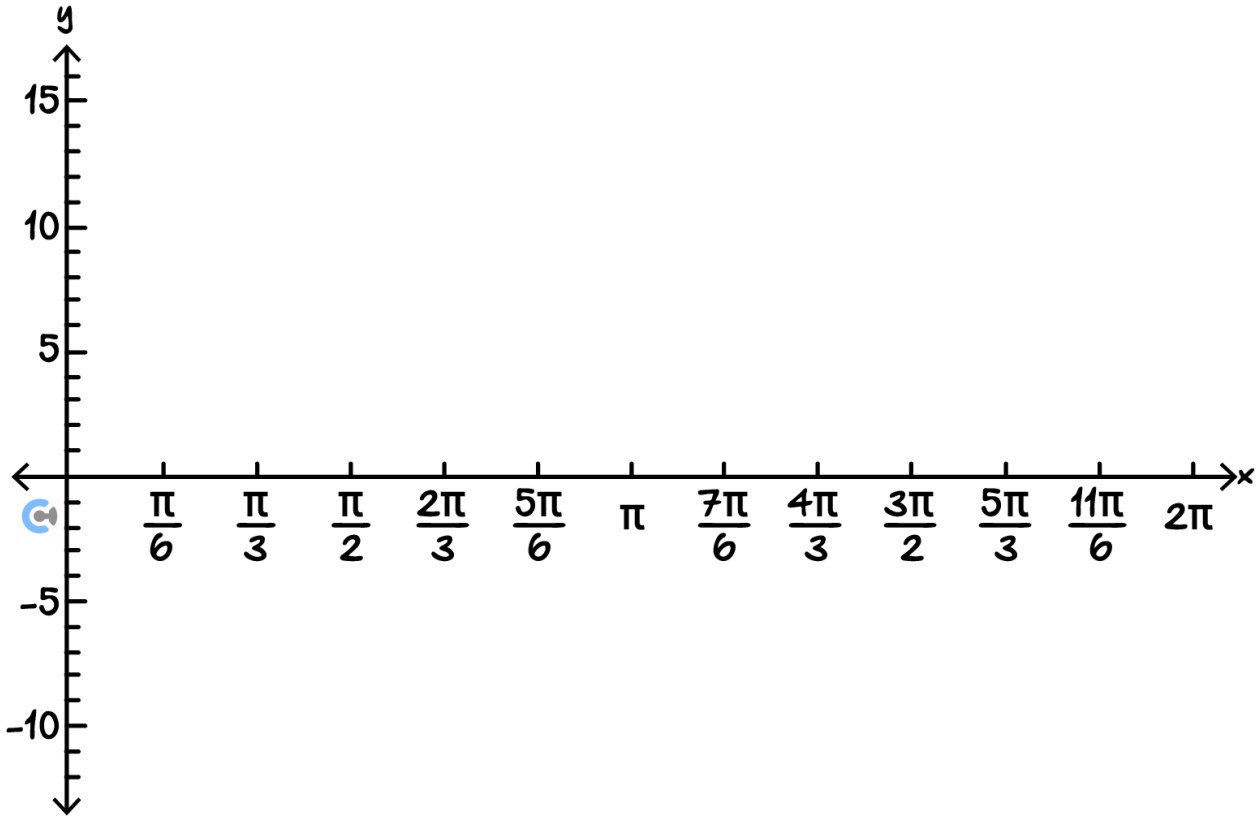
Tick whether the following statements are **true** or **false**.

Statement	True	False
a. To tackle horizontal translation for sin and cos graphs, we can start the period when the x value is equal to 0.		
b. To tackle horizontal translation for tan graphs, we simply find the asymptote by equating the inside to $\frac{\pi}{2}$.		
c. $\sin(x) \geq \frac{1}{2}$ for $\frac{1}{3}$ of its period.		
d. The amplitude of $a\sin(x)$ where $a < 0$ is a.		
e. The graph of $y = \cos\left(x + \frac{3\pi}{2}\right)$ is the same as the graph of $y = \sin(x)$.		
f. The asymptotes of the graph $y = \tan(2x)$ are $x = \frac{\pi}{4} + n\pi, n \in \mathbb{Z}$.		
g. The graph of $y = \sin(x) + \cos(x)$ has the same period as $y = \sin(x)$.		
h. A function f has a maximum value of 5, a minimum value of -1 and it attains a maximum value when $x = \frac{5\pi}{6}$. f could have the rule $f(x) = -3\sin\left(2x - \frac{\pi}{6}\right) + 2$.		

Space for Personal Notes

Question 2 (3 marks)

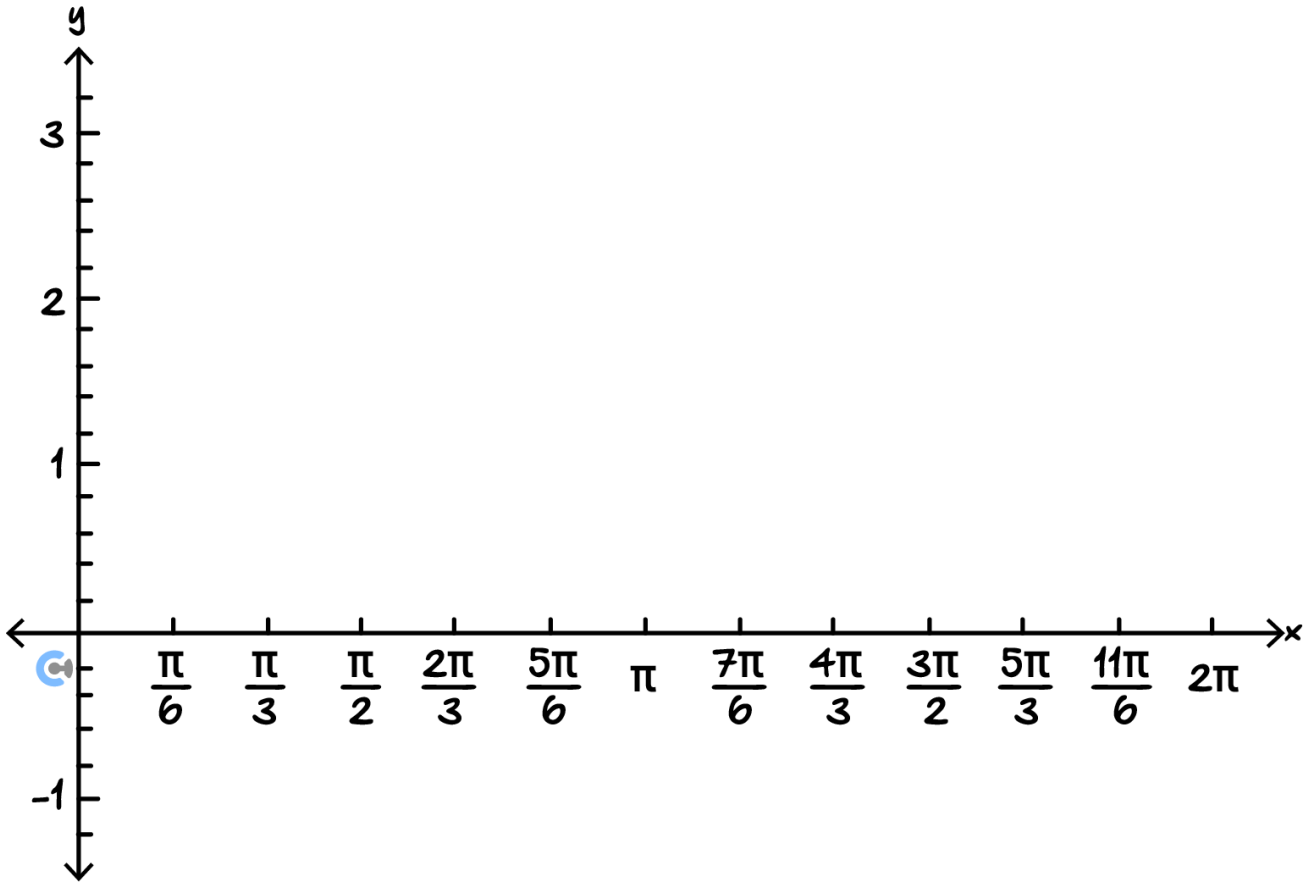
Sketch the graph of $f(x) = 2\tan\left(x + \frac{\pi}{6}\right) + 2$ for $x \in [0, 2\pi]$ on the axes below, labelling all asymptotes, intercepts and endpoints with their coordinates.



Space for Personal Notes

Question 3 (3 marks)

Sketch the graph of $f(x) = -2\cos\left(2x + \frac{\pi}{3}\right) + 1$ for $x \in [0, 2\pi]$ on the axes below, labelling all intercepts and endpoints with their coordinates.



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Question 4 (9 marks)

The population of foxes in a certain forest varies according to the rule:

$$P(t) = 50 - 30\cos\left(\frac{\pi}{2}(t-2)\right)$$

where $P(t)$ is the number of foxes t years after 2024.

a. Find the period and amplitude of this function. (2 marks)

b. Find the maximum and minimum number of foxes in the forest. (2 marks)

c. After how many months is the population of foxes a maximum in the first 5 years? (2 marks)

Foxes are declared a vulnerable species if their population drops below 35.

d. Find the percentage of time when the foxes are declared as vulnerable species. (3 marks)

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