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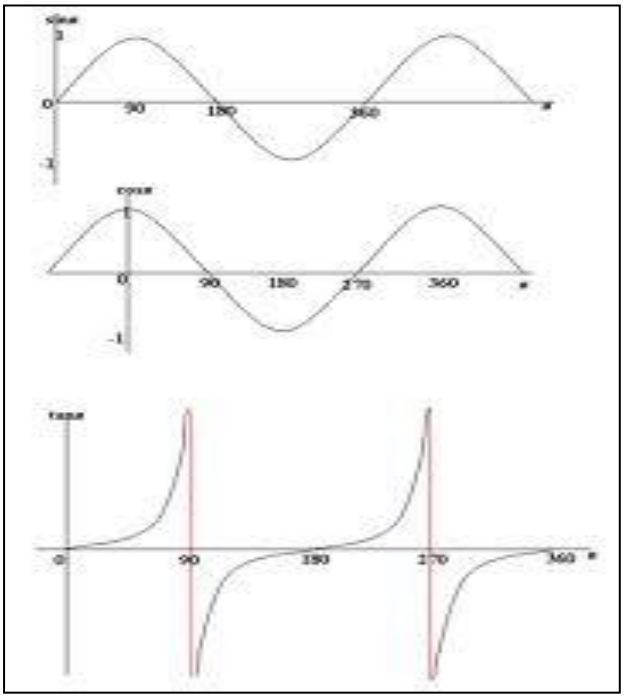
SESSION 8: HYPERBOLA, EXPONENTIAL AND TRIG GRAPHS

Key Concepts

In this session we will focus on summarising what you need to know about:

- Hyperbola
- Exponential graphs
- Trigonometry graphs

X-planation



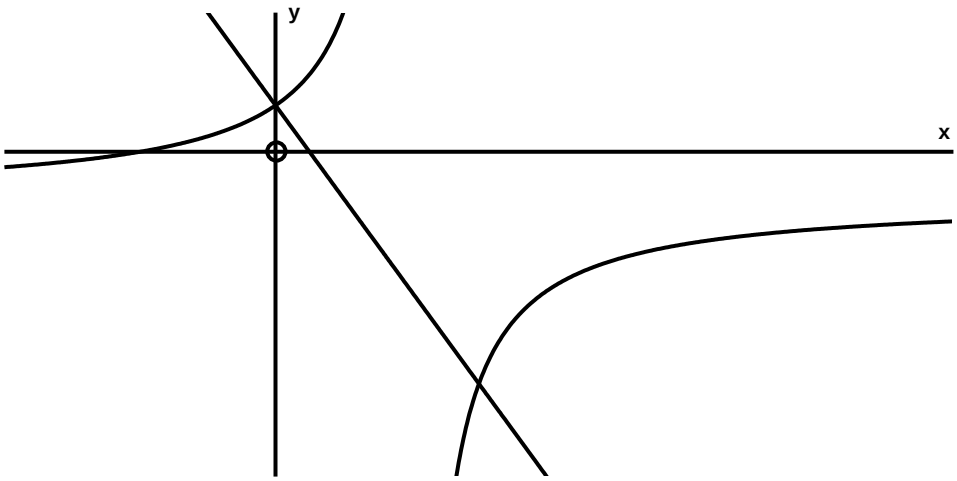
$y = sinx$
$period\ 360°$
Amplitude 1
$y = cosx$
$period\ 360°$
Amplitude 1
$y = tanx$
$period\ 180°$
Amplitude ∞

X-ample Questions

Question 1

The figure shows the graphs $f(x) = -\frac{4}{x-2} - 1$ and $g(x) = mx + k$

The two graphs intersect at points A and C.
The graph of *f* cuts the *x*-axis at point B



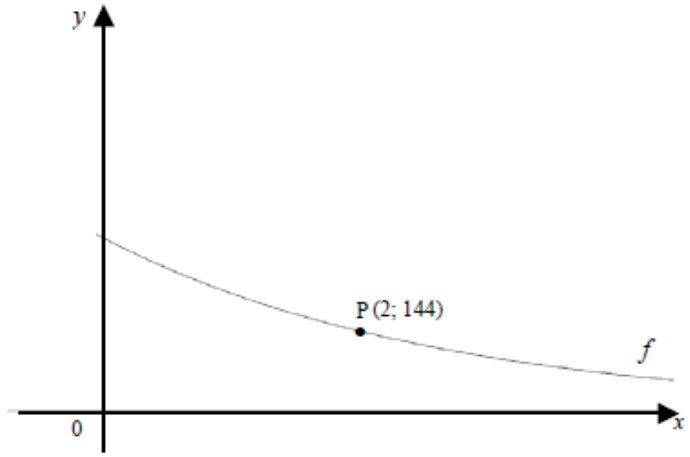
Calculate:

1) The asymptotes of the hyperbola. (2)
2) The co-ordinates of the points A and B. (4)
3) The values of *m* and *k* (3)

Question 2

The following graph is a graph of $f(x)=a\cdot b^x$ and $a\neq 0$.

P$(2;144)$ is a point on *f*.



1) If $b=\frac{3}{4}$, calculate the value of *a*. (2)
2) Hence write down the equation of *f*. (1)
3) Describe the transformation of the curve of *f* to *h* if $h(x)=f(x+789)$. (2)

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Question 3:

(a) Draw neat sketch graphs of the functions $f(x)=\cos 3x$ and $g(x)=3\cos x$ on the same set of axes for $x\in[0°;360°]$. (6)

(b) Hence determine the values of *x* for which:

(1) $g(x)\geq f(x)$ (2)

(2) $g(x)>f(x)$ (2)

(3) $f(x)>g(x)$ (1)

(c) Write down the values of *x* for which: $\frac{1}{3}\cos 3x-\cos x=0$ (3)

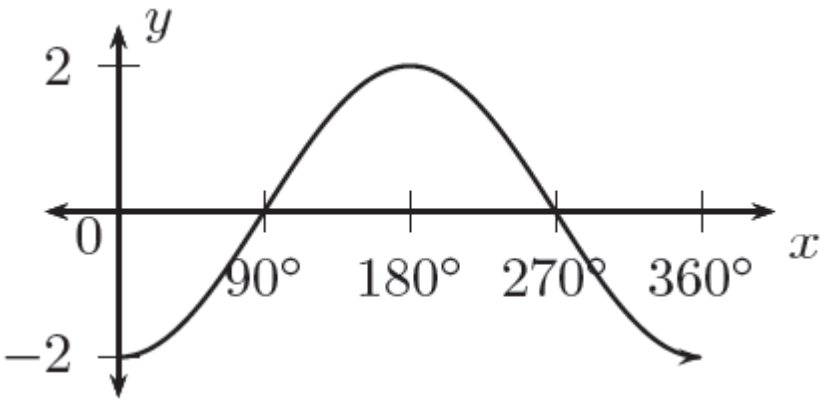
Question 4

(a) Draw neat sketch graphs of $f(x)=\cos(x-30°)$ and $g(x)=\sin(x+30°)$ on the same set of axes for $x\in[-120°;210°]$. Indicate the intercepts with the axes as well as the coordinates of the endpoints of the graphs. (8)

(b) Hence solve $f(x)=g(x)$ algebraically. (6)

X-ercises

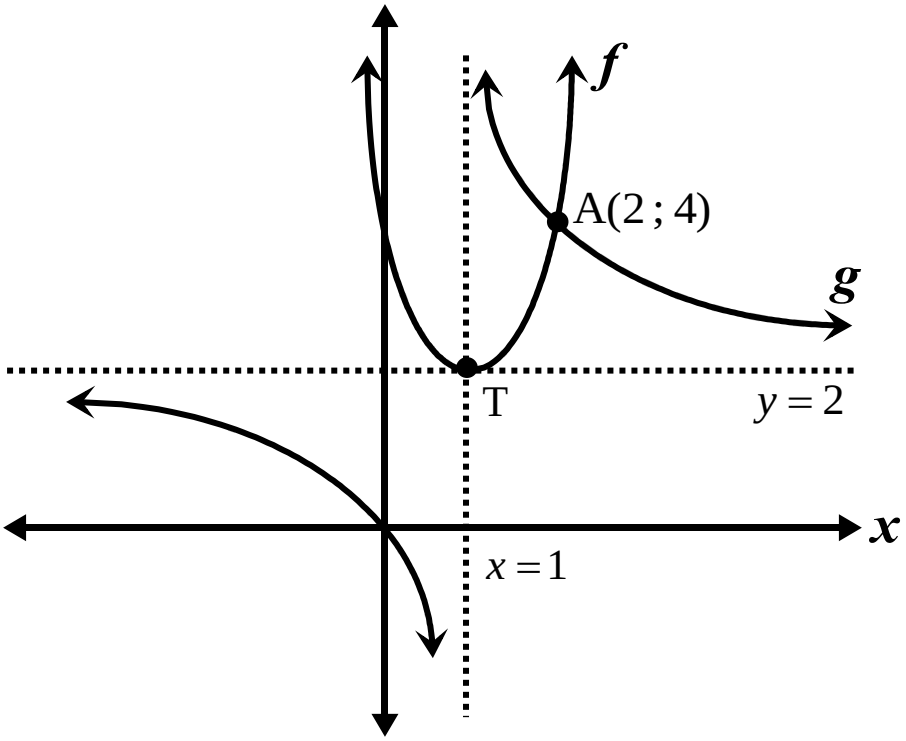
1. Study the following trigonometric function and determine the equation



2. In the diagram, the graphs of the following functions have been sketched:

$f(x) = a(x+p)^2 + q$ and $g(x) = \frac{a}{x+p} + q$

The two graphs intersect at $A(2;4)$ and the turning point of the parabola lies at the point of intersection of the asymptotes of the hyperbola. The line $x = 1$ is the axis of symmetry of the parabola.



a. Determine the equation of $f(x)$ in the form $y = a(x+p)^2 + q$ (3)

b Determine the equation of $g(x)$ in the form $y = \frac{a}{x+p} + q$ (3)

c Write down the range for the graph of *f*. (1)

d If the graph of *f* is shifted 1 unit left and 2 units downwards, write down the equation of the new graph formed. (2)

e Write down the values of *x* for which $g(x) \leq 0$ (2)