For H2 Math classes, text us at +65 8812 7221

A-Level Math - Graphing

Important things to note!

When drawing a graph, we have to label the following features:

- Stationary Points
- Intercepts

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• Asymptotes

Parametric Equation:

• Using GC, click [MODE], then change [FUNCTION] to [PARAMETRIC].

H2 MATH

(h, k)

a < 0

Click [WINDOW] to set the range of values of T because by default, Tmin=0 and Tmax.

Piecewise Function:

$$F(x) = \begin{cases} g(x), 0 < x \le 2\\ h(x), 2 < x \le 4 \end{cases}$$

- Using GC, click [Y=] and select [MATH], then click [B:piecewise], choose the number of pieces.
- To type inequality, click [2nd] [Math].

Piecewise Periodic Function:

 $f(x) = \begin{cases} g(x), 0 < x \le 2\\ h(x), 2 < x \le 4 \end{cases}$

where f(x) = f(x + 4),

4 is the period of the graph where the graph repeats itself fully in intervals of 4.

Rational Function Graphing (Graphs of Fractions)

General rule: Always check if the rational function is an improper fraction, if so, perform long division.

Vertical Asymptote: Solution of the denominator Horizontal Asymptote: Constant outside of the fraction. Oblique Asymptote: Function outside of the fraction.

Example: $y = \frac{ax+b}{cx+d}$ -> After long division, y = p + - $\overline{x-r}$ Vertical Asymptote: x = rHorizontal Asymptote: y = p

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Example:
$ax^2 + bx + c$
y =
ax + e
-> After long division,
k
y = px + q +
x-r
Vertical Asymptote: $x = r$
Oblique Asymptote: $y = nx + a$
Oblique Asymptote. $y = px + q$
$y = px + q + \frac{\kappa}{x - r}$ Vertical Asymptote: $x = r$ Oblique Asymptote: $y = px + q$

Conics



Translation of a units in the negative x direction. Replace x with (x + a)y = f(x + a)Translation of a units in the positive y direction. Replace y with (y - a)y - a = f(x)Translation of a units in the negative y direction. Replace y with (y + a)y + a = f(x)

General rule: Use the replacement to transform the given equation to the desired equation

Replacement

Replace x with (x - a)

Replace x with $\frac{x}{-}$

Replace y with -

Replace x with (-x)

Replace y with (-y)

New equation

y = f(x - a)

 $y = f\left(\frac{x}{x}\right)$

 $\frac{y}{-} = f(x)$

y = f(-x)

-y = f(x)

Replacing $y = f(x)$ with y	$f = f(\mathbf{x})$
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Transformation

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Step 1: Remove the part of the graph on the left of the -axis.

Step 2: Retain the part on the right of the -axis and then reflect it about the -axis on the left side.



Replacing y = f(x) with y = |f(x)|Step 1: Sketch the graph

Step 2: Flip any part of the graph that is below the -axis up.

Replacing
$$y = f(x)$$
 with $y = \frac{1}{f(x)}$

Effect on coordinates

x-coordinates increase by a

units.

units.

y-coordinates increase by a units.

y-coordinates decrease by a units

x-coordinates multiply by a.

y-coordinates multiply by a.

x-coordinates change sign.

y-coordinates change sign.

General rule: When we change from y = f(x) into $y = \frac{1}{f(x)}$, points change from (a, b) to $\left(a, \frac{1}{b}\right)$.

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ep 1. Indicate all asymptotes and	Step 2. Indicate turning point	1.5		
y = f(x)	$y = \frac{1}{f(x)}$	y = f(x)		
Vertical asymptote $x = k$	x-intercept (k, 0).	Minimum point (a, b)		
		Maximum point $(a, \frac{1}{b})$		
x-intercept (k, 0).	Vertical asymptote $x = k$	Step 3: Sketch from left to right, for	oll	
Horizontal asymptote $y = k$	Horizontal asymptote $y = \frac{1}{k}$.	y = f(x)		
Oblique asymptote $y = ax + b$	ue asymptote $y = ax + b$ Horizontal asymptote $y = 0$.			
		f(x) is decreasing,		

nd x-intercepts.	
f'(x) = f'(x)	
ercept (k, 0)	

x = k	x-intercept (x, v)	
Vertical asymptote $x = k$	Vertical asymptote $x = k$	
Horizontal asymptote $y = k$	Horizontal asymptote $y = 0$	
Oblique asymptote y = ax + b	Horizontal asymptote $y = a$	

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Step 2: Sketch from left to right, one section at a time, taking note that:

y = f(x)	y = f'(x)
Graphing has a positive gradient	Graph is above x-axis
Graph has a negative gradient	Graph is below x-axis

y = f(x)Stationary point x-coordinates decrease by a

Deduced Graphs

Replacing y = f(x) with y = f'(x).

General rule: When we change from y = f(x) into y = f'(x), points change from (a,b) to (a,f'(a)).

Step 1: Indicate all asymptotes a

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macro

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Step	۷.	indicate	uming	points

y = f(x)		$y = \frac{1}{f(x)}$
Minimum point (a, b)		Maximum point $(a, \frac{1}{b})$
Maximum point $(a, \frac{1}{b})$		Minimum point (a, b)
Step 3: Sketch from left to right, following these rules:		
y = f(x)	$y = \frac{1}{f(x)}$	
f(x) is increasing.	$\frac{1}{f(x)}$ is decreasing.	
f(x) is decreasing,	$\frac{1}{f(r)}$ is increasing.	



Consider the graph of y = f(x) and assume that a > 0.

Transformation

Translation of a units in the positive x direction.

Stretching/Scaling by factor a parallel to x-axis.

Stretching/Scaling by factor a parallel to y-axis.

Reflection about the y-axis.

Reflection about the x-axis.