



WORKSHEET TRANSFORMATIONS OF GRAPHS

Instructions:

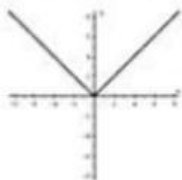
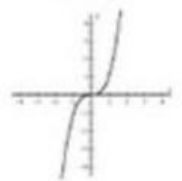
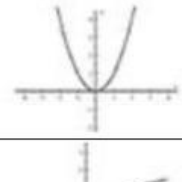
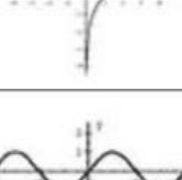
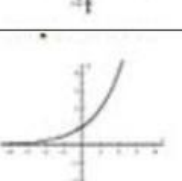
- Work on a pair with your friends (You can do up to three students in a group)
- Write the answer on the box provided
- You can utilize any graphical instruments or sites.

Write down the members of your group here:

- _____
- _____
- _____

Part A

Match each function with the correct graph.

Function	Graph
1. Constant	a. 
2. Linear	b. 
3. Modulus (Absolut Value)	c. 
4. Quadratic	d. 
5. Square Root	e. 
6. Cubic	f. 



7. Reciprocal	g.
8. Logarithmic	h.
9. Exponential	i.
10. Greatest Integer	j.
11. $f(x) = \sin x$	k.
12. $f(x) = \cos x$	l.
13. $f(x) = \tan x$	m.

Example: 1-a (number 1 is matched with graph a on left column)

You may separate each answer with ;

Answer of Part A

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Part B

The function on **Part A** are called as **Parent Function (bahasa: Fungsi Induk)** as they are considered as the simplest forms for each type of function. In this part, you will have to transform one of parent functions including the shifting (translating), stretching, and reflecting.

Suppose the parent function, $f(x) = \ln x$, is transformed, by utilizing any graphical instruments, match the function with correct transformation.

Function		Transformation	
1	$g(x) = (\ln x) + 1$	a	The graph of $f(x)$ /parent function is translated (shifted) left by 2 units
2	$h(x) = (\ln x) - 3$	b	The graph of $f(x)$ /parent function is vertically stretched by a factor of $\frac{1}{2}$. There will now be a half unit between steps instead of 1 unit between steps.
3	$h(x) = \ln(x + 2)$	c	The graph of $f(x)$ /parent function is translated (shifted) left by 2 unit and shifted down by 3 units
4	$i(x) = \ln(x - 1)$	d	The graph of $f(x)$ /parent function is vertically stretched by a factor of 2 and shifted down by 3 units
5	$j(x) = -\ln x$	e	The graph of $f(x)$ /parent function is translated (shifted) down/horizontally by 1 unit
6	$k(x) = \ln(-x)$	f	The graph of $f(x)$ /parent function is reflected over x -axis
7	$l(x) = 2[\ln x]$	g	The graph of $f(x)$ /parent function is translated (shifted) right by 1 unit
8	$m(x) = \frac{1}{2}[\ln x]$	h	The graph of $f(x)$ /parent function is translated (shifted) up/vertically by 1 unit
9	$n(x) = 2[\ln x] - 3$	i	The graph of $f(x)$ /parent function is stretched/compressed by a factor of 2. There will now be 2 units between steps instead of 1 unit between steps.
10	$p(x) = [\ln(x + 2)] - 3$	j	The graph of $f(x)$ /parent function is reflected over y -axis

Example: 1-a (number 1 is matched with graph a on left column),

You may separate each answer with ;

Answer of Part B

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PART C

In this part, you have to summarize the rules that apply when transforming functions based on your part B. Suppose $f(x)$ is the parent function, fill in the empty blanks based on the final function.

	Final Function	Transformation(s)
Translation	$g(x) = f(x - h) + k$	$f(x)$ is (1)..... horizontally by (2)..... units and $f(x)$ is (3)..... vertically by (4)..... units
Reflection	$h(x) = -f(x)$	$f(x)$ is (5)..... by (6)..... axis
	$p(x) = f(-x)$	$f(x)$ is (7)..... by (8)..... axis
Dilation	$q(x) = cf(x)$	$f(x)$ is (9)..... vertically by a factor of (10)..... units
	$t(x) = f(kx)$	$f(x)$ is (11)..... horizontally by a factor of (12)..... units

Example: (1) reflected

You may separate each answer with ;

Answer of Part C

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Part C- Plus

Suppose the parent function is $f(x) = \sin x$, describe the transformation happens for

- $g(x) = \sin 2x$
- $h(x) = 2 \sin x$
- $p(x) = 2 \sin(x + 3)$
- $q(x) = \sin(2x - 1) + 6$

Answer:

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PART D

In this part, you have to solve the IB past papers related to transformation of functions.

Solve only those that relate to transformation of graphs.

1. Paper 1 /2022

Consider $f(x) = 4 \sin x + 2.5$ and $g(x) = 4 \sin\left(x - \frac{3\pi}{2}\right) + 2.5 + q$, where $x \in \mathbb{R}$ and $q > 0$.

The graph of g is obtained by two transformations of the graph of f .

(a) Describe these two transformations.

[2]

The y -intercept of the graph of g is at $(0, r)$.

(b) Given that $g(x) \geq 7$, find the smallest value of r .

[5]

Answer:

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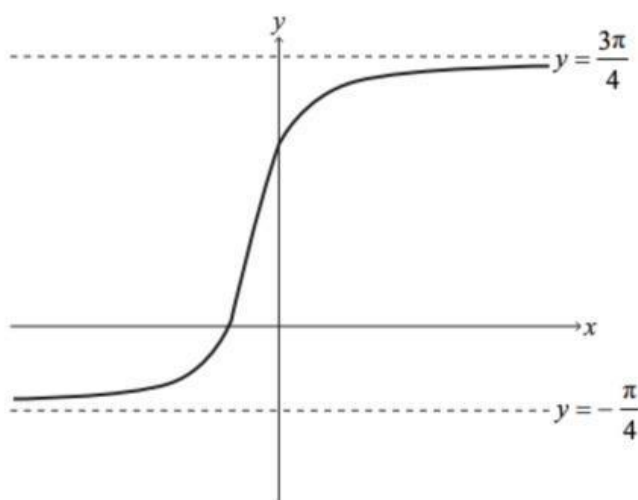
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2. Paper 1/2021

[Maximum mark: 19]

The following diagram shows the graph of $y = \arctan(2x+1) + \frac{\pi}{4}$ for $x \in \mathbb{R}$, with asymptotes at $y = -\frac{\pi}{4}$ and $y = \frac{3\pi}{4}$.



(a) Describe a sequence of transformations that transforms the graph of $y = \arctan x$ to the graph of $y = \arctan(2x+1) + \frac{\pi}{4}$ for $x \in \mathbb{R}$.

[3]



Answer:

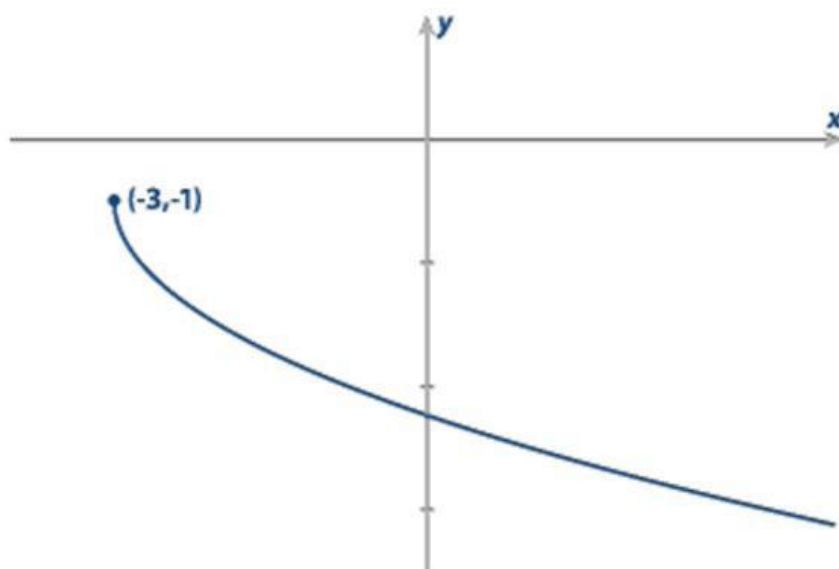
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3. The following diagram shows the graph of $y = -1 - \sqrt{x + 3}$ for $x \geq -3$.



Function f is defined by $f(x) = -1 - \sqrt{x + 3}$ for $x \geq -3$

- Describe a sequence of transformations that transform the graphs of $g(x) = \sqrt{x}$ for $x \geq 0$ to the graph of $f(x) = -1 - \sqrt{x + 3}$ for $x \geq -3$ [3]
- State the range of f [1]
- Find an expression of $f^{-1}(x)$, stating its domain [5]

Answer:

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**SMA PRADITA
DIRGANTARA**



**Cambridge Assessment
International Education**
Cambridge International School

Answer:

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