

ACTIVITY NO. - 4

Subject	MATHEMATICS
Class	XII
Chapter/Unit	Continuity and differentiability
Topic	Exponential and logarithmic function
Time	40 min
Nature of Activity	Individual

What will I learn (Learning Outcome)?

To sketch the graphs of a^x and $\log_a x$, $a > 0$, $a \neq 1$ and to look at that they are mirror images of each other.

Skills: Creativity, Accuracy, Precision Visualization, Psychomotor Coordination, Perceiving, Analysing, Correlating

What I have to do?

Understand Exponents and logarithms, then exponential functions and logarithmic function

What do I require?

Hardboard, thick white paper geometrical instruments, pencil, , pins eraser thin thread, sketch pens, adhesive , a plane mirror, squared paper.

What do I need to know?

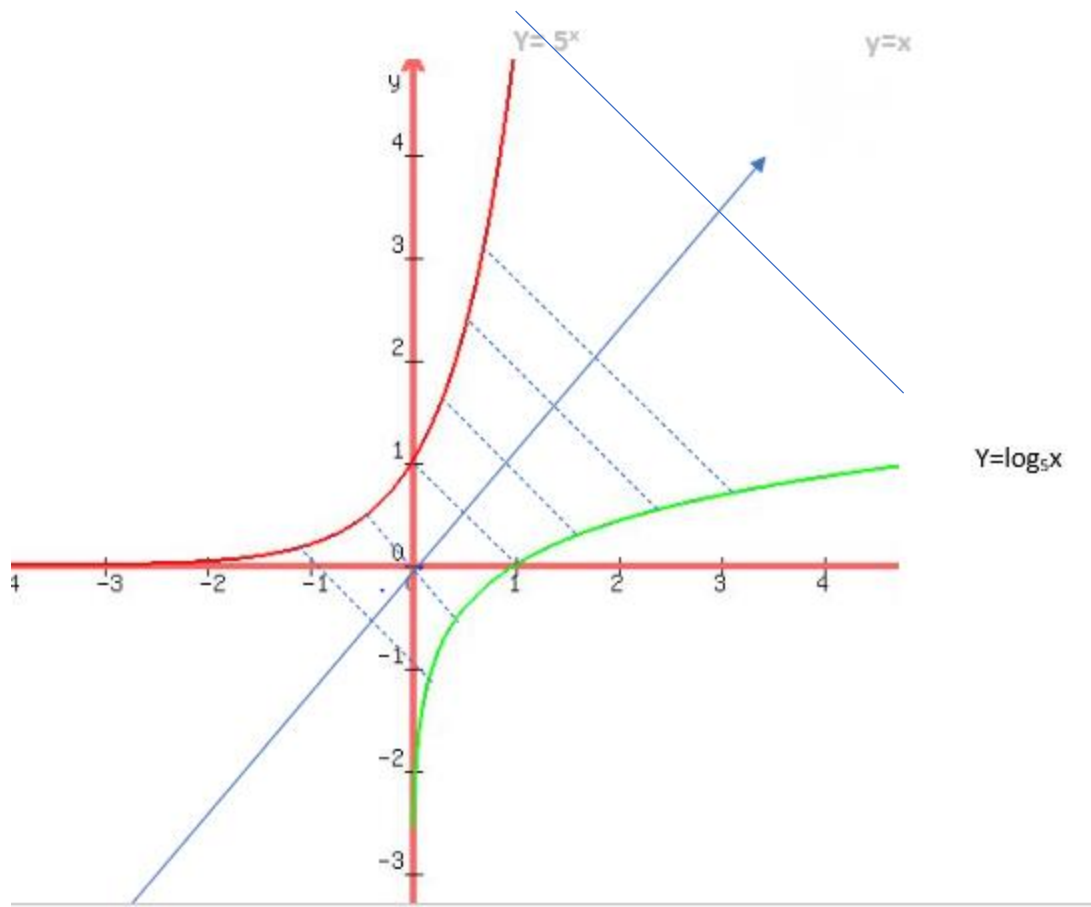
Cartesian system, Exponential functions and logarithmic function,

➤ Teacher's Activity

Teacher will explain logarithms, exponential and then logarithmic function.

1. Teacher will guide the students to take the drawing board, fix a thick paper sheet of convenient size $20 \text{ cm} \times 20 \text{ cm}$ (say) with adhesive
2. On the sheet, take two perpendicular lines XOX' and YOY' , depicting coordinate axes.
3. Mark graduations on the two axes as shown in the Fig. 4.
4. Find some ordered pairs satisfying $y = a^x$ and $y = \log_a x$. Plot these points corresponding to the ordered pairs and join them by free hand curves in both the cases. Fix thin thread along these curves using drawing pins.

FIG. 4



How will I proceed?

➤ **Student's Activity**

1. Student will Plot these points by taking (say) $a=5$ so the graph of $y=5^x$ and can find the corresponding ordered pairs and join them by free hand curves in both the cases. Fix thin threads along these curves using drawing pins.
2. Draw the graph of $y = x$, and fix a thread along the graph, using drawing pins as shown in Fig 4

What have I observed?

S. No	From the fig. 4.	Observation
<u>1</u>	Image of ordered pair (1, 5) on the graph of $y = 5^x$ in $y = x$ is	-----
<u>2</u>	It lies on the graph of $y =$	-----
<u>3</u>	Image of the point (5, 1) on the graph $y = \log_5 x$ in $y = x$ is	-----
<u>4</u>	It lies on the graph of $y =$	-----
<u>5</u>	Image of ordered pair $(-1, \frac{1}{5})$ on the graph of $y = 5^x$ in $y = x$ is	-----
<u>6</u>	Image of ordered pair $(\frac{1}{2}, \sqrt{5},)$ on the graph of $y = 5^x$ in $y = x$ is	-----

What have I learnt?

This activity is beneficial in understanding the concept of (exponential and logarithmic functions) which are mirror images of each other in $y = x$.

What am I curious to learn?

Logarithmic and exponential functions, graph of $2^x, 10^x$.

Let me evaluate myself

Q1. Is it true that $x = e^{\log x}$ for all real x ?

Q2. Solve the equation (i) $\left(\frac{1}{2}\right)^{2x+1} = 1$

(ii) $x y^m = y x^3$ for m

Q3. Solve $9^x - 3^x - 8 = 0$ [hint $9^x = (3^x)^2$]

Q4. The function $f(x) = e^{|x|}$ is

(a) continuous everywhere but not differentiable at $x = 0$

(b) not continuous at $x = 0$

(c) continuous and differentiable everywhere

(d) none of these.

Q 5. Differentiate $\log [\log (\log x^5)]$
