4 In-Class Resources for Lesson 4

JACTUS GROWTH

One way that exponential growth has been contextualized for students is through stories of Jactus plants. Here are some example tasks based on the SPARQ curriculum materials, led by Amy Ellis, who created the Jactus idea.

Plants-R-Us, a unique plant store, is asking you to investigate a new plant they have recently discovered, the Jactus plant. It grows faster than any plant they have ever seen!

Some gardeners at the plant factory measured the heights of different varieties after different weeks and gave us this data.

(a) **The Flowering Jactus**:

Weeks	0	1	2	3	4	9
Height (inches)	$\frac{1}{2}$	1	2	4	8	256

(b) **The Tropical Jactus**:

Time passed (Weeks)	*Height (Inches)*
4	25.6
6	409.6
8	6553.6
10	104857.6
15	107374182.4
18	6871947673.6

The gardeners want us to help answer:

How fast do the plants grow?

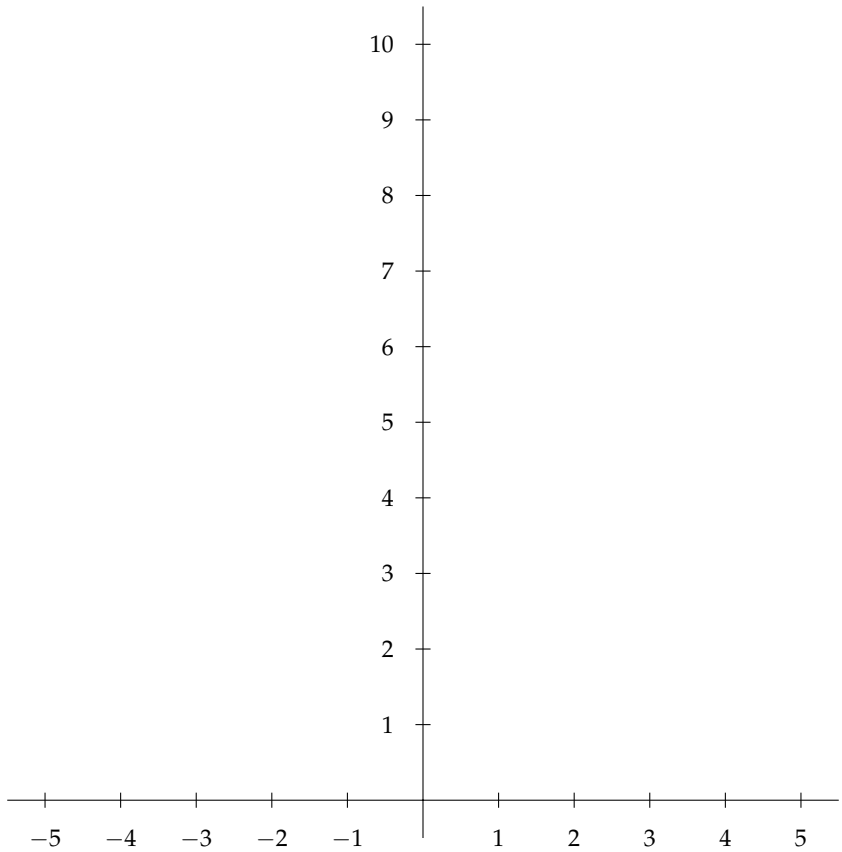
Explore how the plants change from one week to the next using operations you know, for instance, subtraction and division. What patterns do you notice?

Exploring the property of Constant Change Factors

A function $f : \mathbb{R} \to \mathbb{R}$ is such that $f(0) = 3$ and $f(1) = 3.75$.

Furthermore, f has Constant Change Factors in their output variables.

What are all possibilities for the graph of f? Plot them.



Equations of Functions with Constant Growth Factor

Find equations for the growth of the Flowering Jactus, the Tropical Jactus, and f from the task above.

The data for the Flowering Jactus and Tropical Jactus are given below for reference.

The Flowering Jactus:

Weeks	0	1	2	3	4	9
Height (inches)	$\frac{1}{2}$	1	2	4	8	256

The Tropical Jactus:

Time passed (Weeks)	*Height (Inches)*
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Special functions with constant change factor

Find all functions f such that they have constant change factors and $f(0) = 1$. What do the graphs of this family look like?