



**VARC**  
Value-Added Research Center

# Student Growth and Value-Added Systems: Moving Beyond NCLB

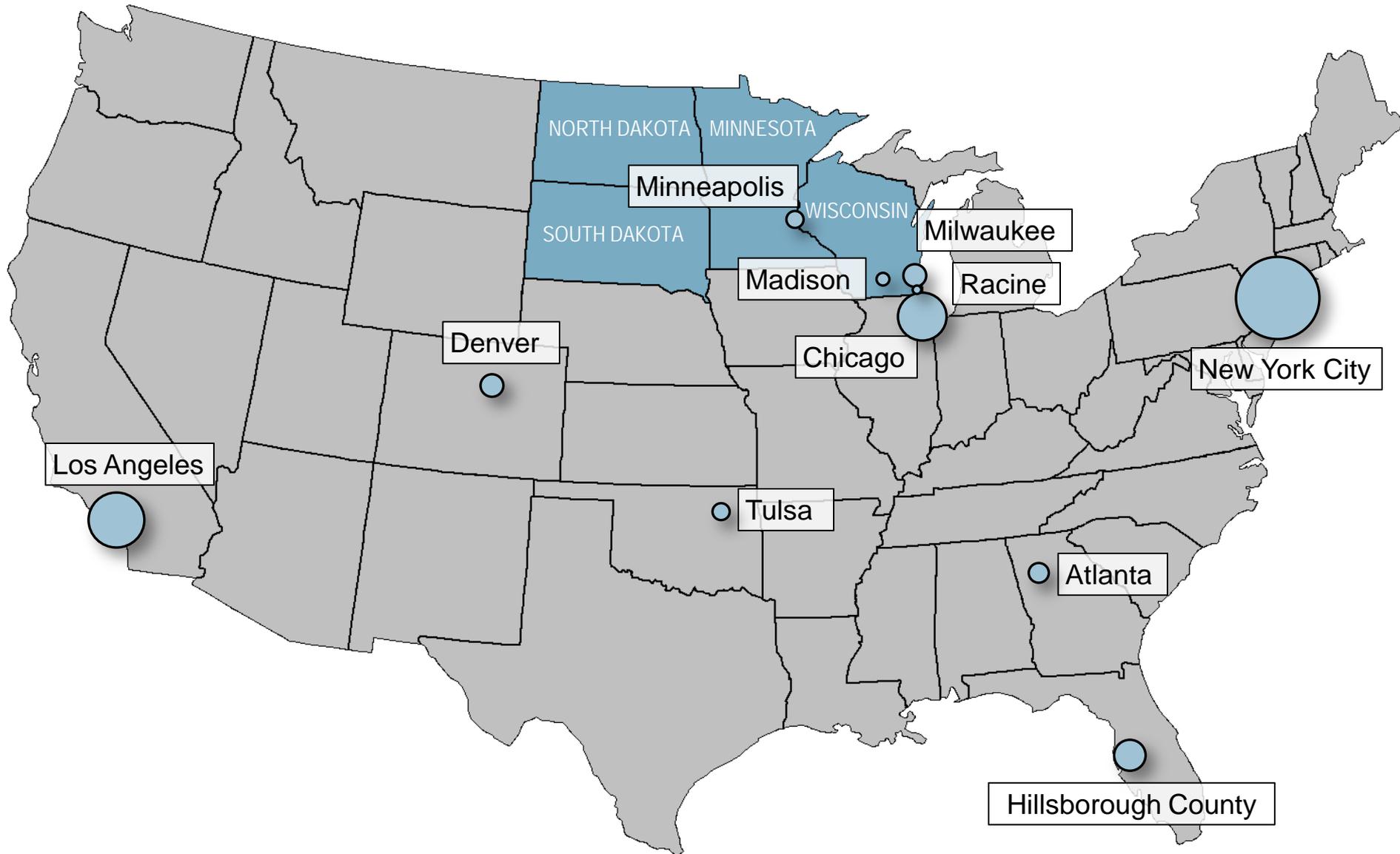
Dr. Robert Meyer

Research Professor and Director,  
Value-Added Research Center (VARC)  
University of Wisconsin-Madison

July 28, 2011

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# Districts and States working with VARC



# VARC Value-Added Partners

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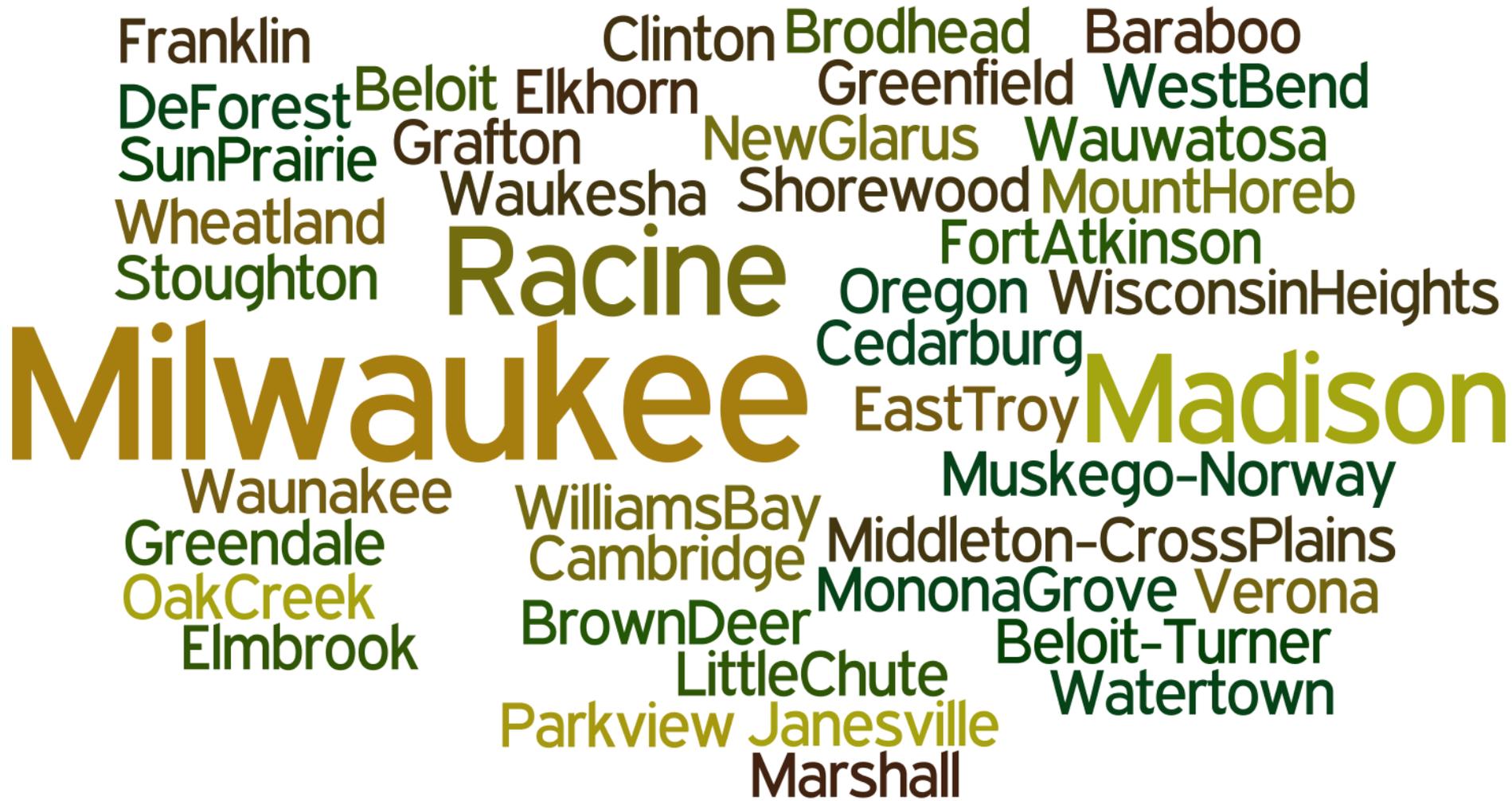
- Design of Wisconsin State Value-Added System (1989)
- Minneapolis (1992)
- Milwaukee (1996)
- Chicago (2006)
- Department of Education: Teacher Incentive Fund (TIF) (2006 and 2010) (33 states)
- New York City (2008)
- Madison (2008)
- Wisconsin Value-Added System (2009)
- Milwaukee Area Public and Private Schools (2009)
- Racine (2009)
- Minnesota, North Dakota & South Dakota: Teacher Education Institutions and Districts (2009)
- Hillsborough County , FL (2010)
- Atlanta (2010)
- Los Angeles (2010)
- Tulsa (2010)
- Denver (2011)

# Statewide Value-Added Initiative

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- Three Cohorts of Districts
  - Trainings of 40 districts
- Using statewide WKCE database
  - Provided by DPI under data release agreement
- Statewide Meeting – May 2010 and May 2011
- MAP Value-Added Project
  - Racine – Pilot Completed in 2010

# Statewide Value-Added Initiative



A word cloud of Wisconsin counties, with 'Milwaukee' and 'Madison' being the largest words. The words are arranged in a roughly rectangular shape, with 'Milwaukee' on the left and 'Madison' on the right. The colors of the words range from dark green to gold.

Franklin Clinton Brodhead Baraboo  
DeForest Beloit Elkhorn Greenfield West Bend  
Sun Prairie Grafton New Glarus Wauwatosa  
Wheatland Waukesha Shorewood Mount Horeb  
Stoughton Racine Fort Atkinson  
Oregon Wisconsin Heights  
Cedarburg  
East Troy Madison  
Muskego-Norway  
Waunakee Williams Bay Middleton-Cross Plains  
Greendale Cambridge Monona Grove Verona  
Oak Creek Brown Deer Beloit-Turner  
Elmbrook Little Chute Watertown  
Parkview Janesville  
Marshall

# Statewide Value-Added Initiative

<b>Value-Added Pioneers</b>	<b>Cohort 1 – November/ December 2009</b>	<b>Cohort 2 – January/ February 2010</b>	<b>Cohort 3 – February 2010</b>
<b>Milwaukee (1996)</b>	Beloit Turner	Baraboo	Brown Deer
<b>Madison (2008)</b>	DeForest	Beloit	Cedarburg
<b>Racine (2009)</b>	Fort Atkinson	Brodhead	Elmbrook
	Marshall	Cambridge	Franklin
<b>CESA 2 (2009)</b>	Middleton	Clinton	Grafton
<b>CESA Network (2010)</b>	Oregon	East Troy	Greendale
	Parkview	Elkhorn	Greenfield
	Stoughton	Janesville	Monona Grove
	Sun Prairie	Little Chute	Muskego-Norway
	Verona	Mount Horeb	New Glarus
	Waunakee	West Bend	Oak Creek
		WI Heights	Waukesha
		Williams Bay	Wauwatosa

# Statewide Value-Added Initiative



# Attainment and Gain

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- Attainment – a “point in time” measure of student proficiency
  - compares the measured proficiency rate with a predefined proficiency goal.
- Gain – measures average gain in student scores from one year to the next

# Growth

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- Growth – measures average gain in student scores from one year to the next
  - accounts for the prior knowledge of students.

# Value-Added

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- Value-Added – measures average gain in student scores from one year to the next
  - accounts for the prior knowledge of students.
  - accounts for student demographic characteristics.
  - accounts for test measurement error.

# Student Attainment, Growth, and Classroom Productivity: Unified Framework

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1. Student attainment
2. Student Growth (Context: Prior achievement)
3. Classroom productivity (Context: Growth external to classroom)
4. Teacher effectiveness (Context: Productivity factors external to teacher)

# Issues in Building a VA System

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- Data Requirements and Data Quality
- Value-Added Model and Indicator Design
- Evaluating Instructional Practices, Programs and Policies
- Alignment with School, District, and State Policies and Practices, Including Performance Incentives
- Embed within a Framework of Data-Informed Decision-Making and Performance Management (PM)
- Professional Development to Support Understanding and Application of Value-Added and Data-Informed Decision-Making

# Technical Dimensions of a High-Quality Value-Added System

- The quality and appropriateness of the **student outcomes**; outcomes need to be curriculum sensitive – capable of measuring the contributions of teachers, programs, and policies.
- The availability and **quality of longitudinal data** on students, teachers, and schools; accurate linkage of students, classrooms/courses, and teachers.
- The **design** of the value-added model; develop models that yield productivity estimates with low mean squared error (**MSE**) (statistical error + bias).
- The **volume** of data (number of students and magnitude of reference group).
- The degree to which the student outcomes (and other variables) are **resistant to manipulation or distorted measurement**.

# Online Reporting Tool

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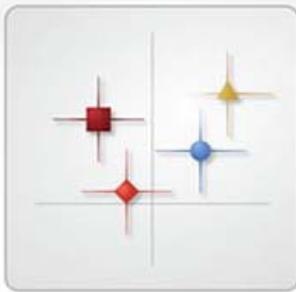
- School Value-Added Report
  - School specific data
  - Grade level value-added
- Comparison Value-Added Reports
  - Compare a school to other schools in the district, CESA, or state
  - Also allows for grade level comparisons
- Tabular Data available for School Report and Comparison Reports

# Online Reporting Tool

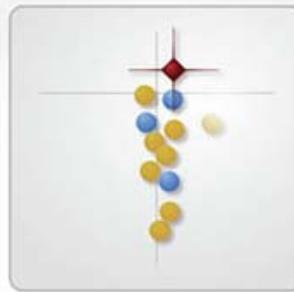
CHANGE PASSWORD | LOGOUT



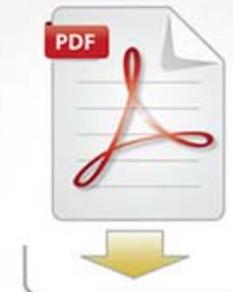
Welcome to the Value Added Reporting System. This system includes presentations of both **WKCE** and **MAP** value-added and attainment data (where applicable)



**GENERATE**  
a school report



**COMPARE**  
the performance of schools across  
a district or CESA

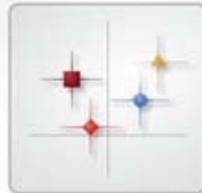
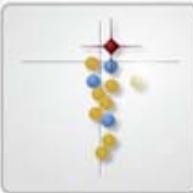
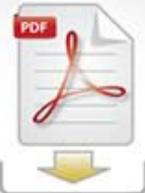


**DOWNLOAD**  
a school report as a PDF

# Online Reporting Tool

CHANGE PASSWORD | LOGOUT 

  
Welcome to the Value Added Reporting System. This system includes presentations of both WKCE and MAP value-added and attainment data (where applicable)

 **GENERATE**       **COMPARE**       **DOWNLOAD**

**Log On**

**Account Information**

Username:

Password:

Remember me?

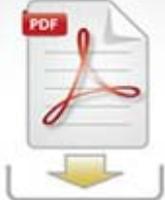
**Different levels of data access for district staff / principals / teachers**

# Online Reporting Tool

CHANGE PASSWORD | LOGOUT 

## WISCONSIN VALUE ADDED

Welcome to the Value Added Reporting System. This system includes presentations of both WKCE and MAP value-added and attainment data (where applicable)

 **GENERATE**  **COMPARE**  **DOWNLOAD**

### School Value Added

The charts below compare your school's student growth (value-added) in reading and mathematics to student attainment (percentage of students who meet or exceed the WKCE proficiency cutoff). Value-added scores are read along the bottom, and attainment is read along the left-hand side.

School: **Meir Elementary** Test: **WKCE** Year: **2008 - 2009** Grade Level: **School Avg** [Print Graph](#)

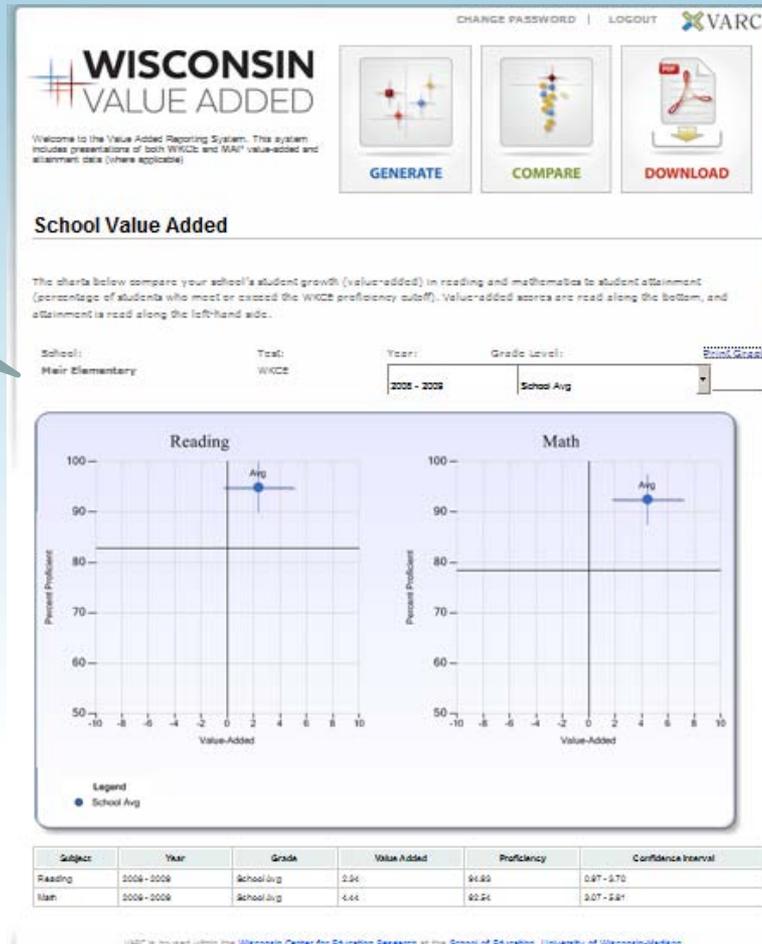
MAP data also possible given data availability.

Time period selection

School average or grade level

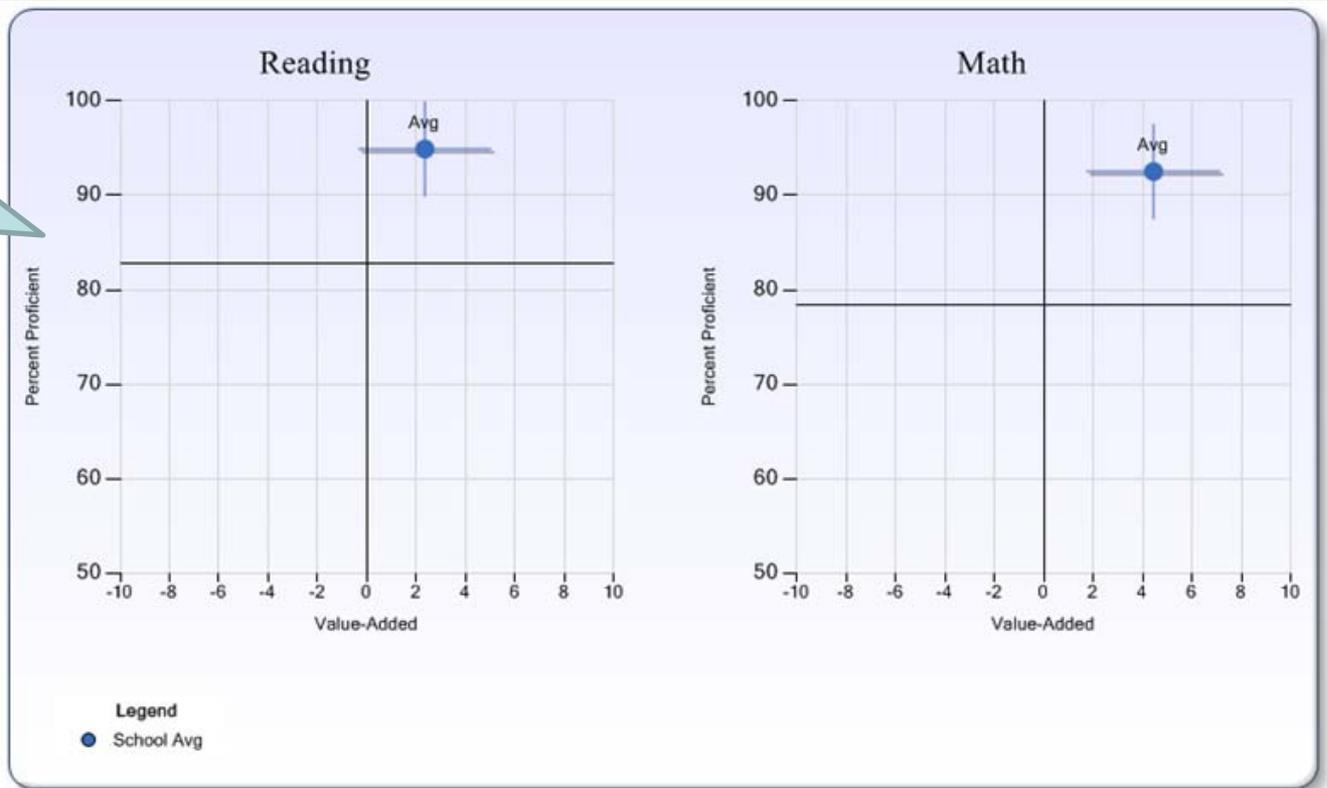
# Online Reporting Tool

School-level  
Quadrant  
Analysis



# Online Reporting Tool

Graphical representation  
(Value-Added and Attainment)

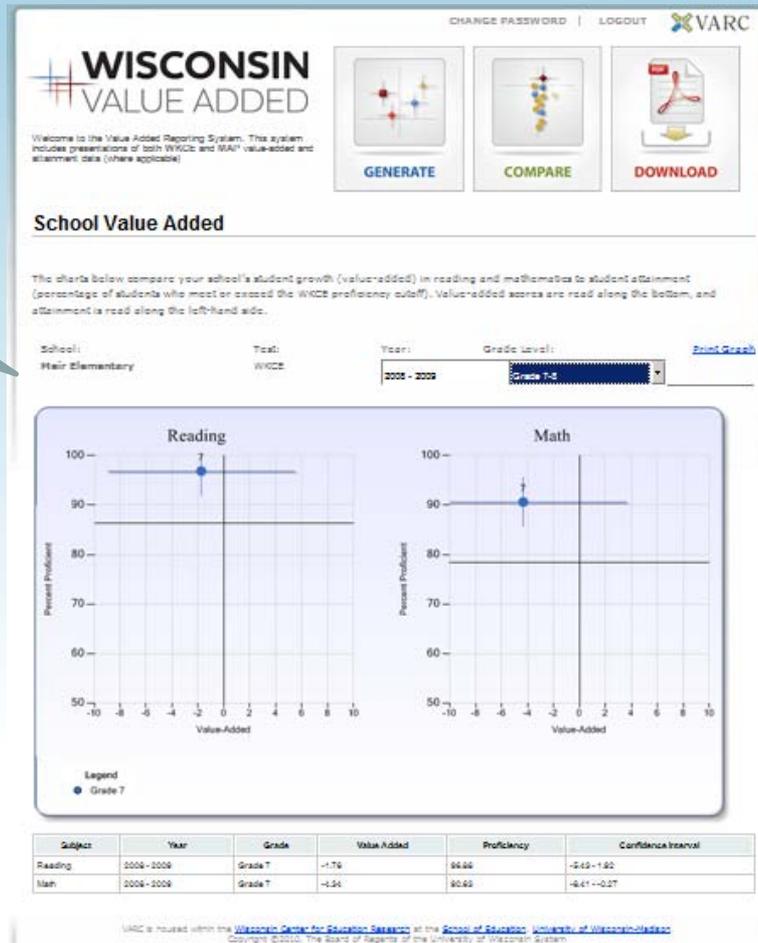


Tabular representation

Subject	Year	Grade	Value Added	Proficiency	Confidence Interval
Reading	2008 - 2009	School Avg	2.34	94.93	0.97 - 3.70
Math	2008 - 2009	School Avg	4.44	92.54	3.07 - 5.81

# Online Reporting Tool

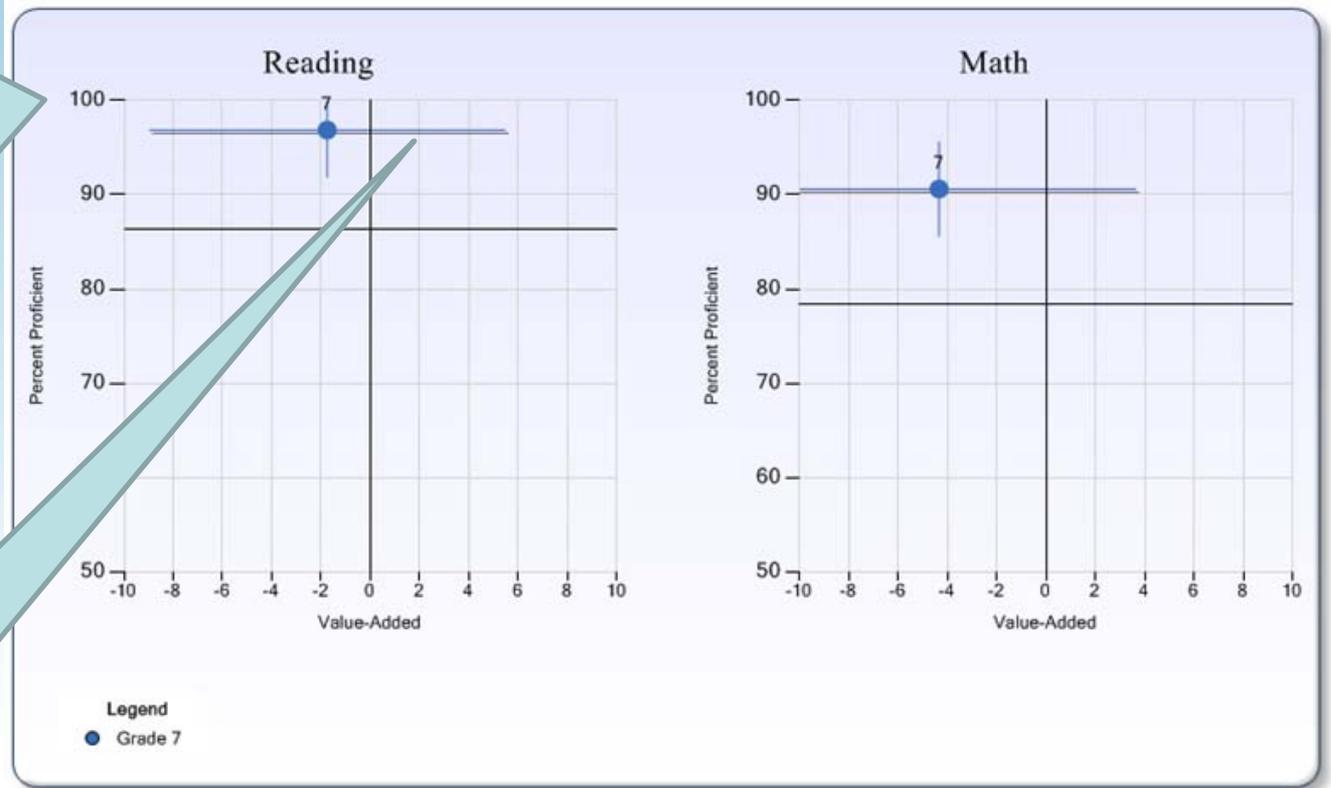
Grade-level  
Quadrant  
Analysis



# Online Reporting Tool

Grade-level results give a more complete picture of the school (areas of strength and need for improvement)

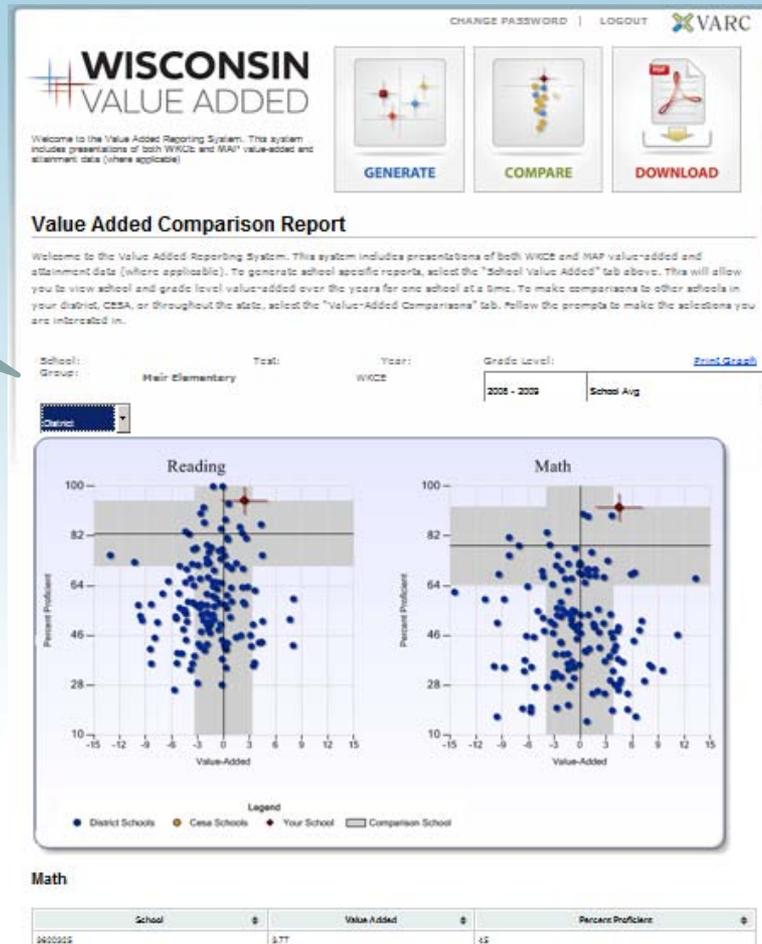
The trade off is larger confidence intervals, due to fewer student observations.



Subject	Year	Grade	Value Added	Proficiency	Confidence Interval
Reading	2008 - 2009	Grade 7	-1.76	96.88	-5.43 - 1.92
Math	2008 - 2009	Grade 7	-4.34	90.63	-8.41 - -0.27

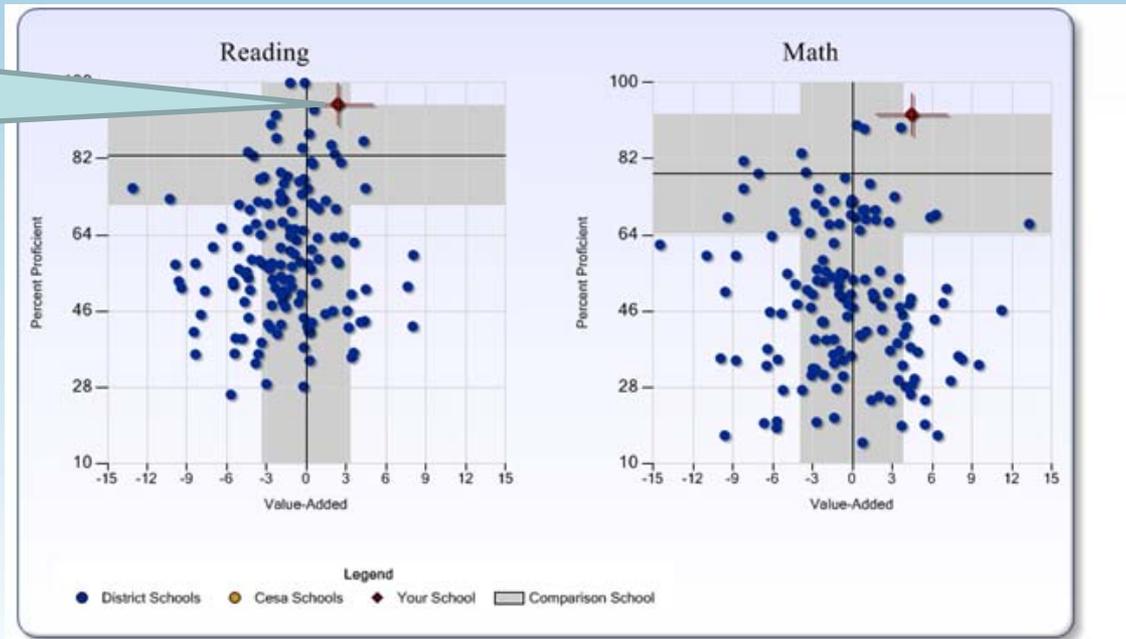
# Online Reporting Tool

Your school compared to all schools in the district



# Online Reporting Tool

Put your school in context with other schools in the district



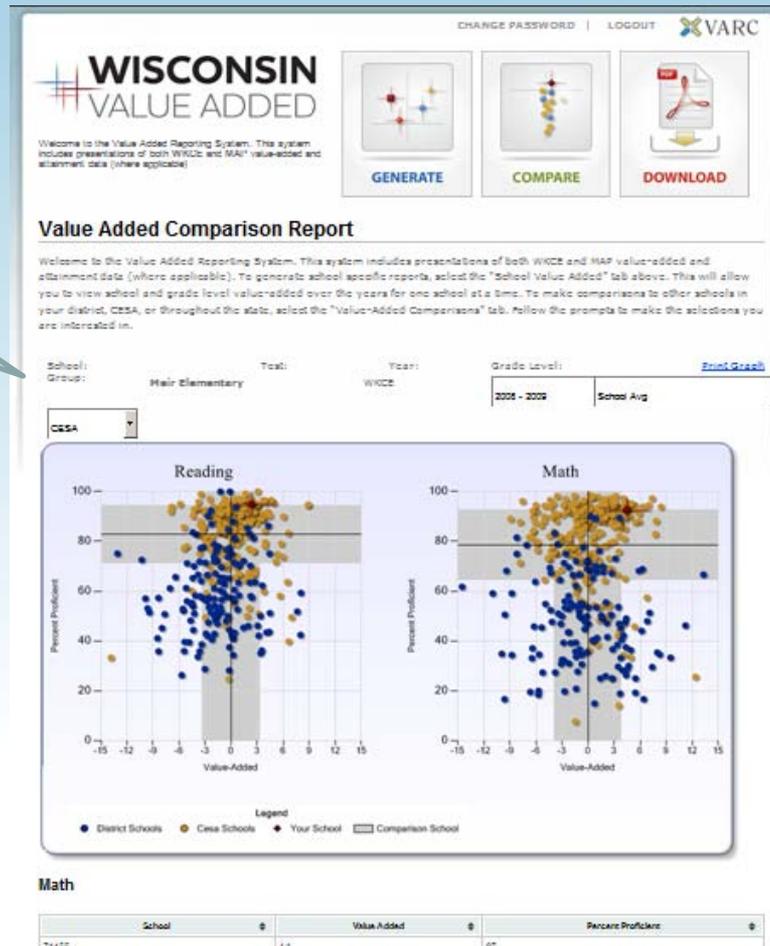
Find schools serving similar student populations and strategize together to improve student learning.

Math

School	Value Added	Percent Proficient
3620325	3.77	45
3620519	-0.78	49
3619346	-0.58	78
3620227	-0.62	55
3619230	3.76	33
3619701	-2.72	20

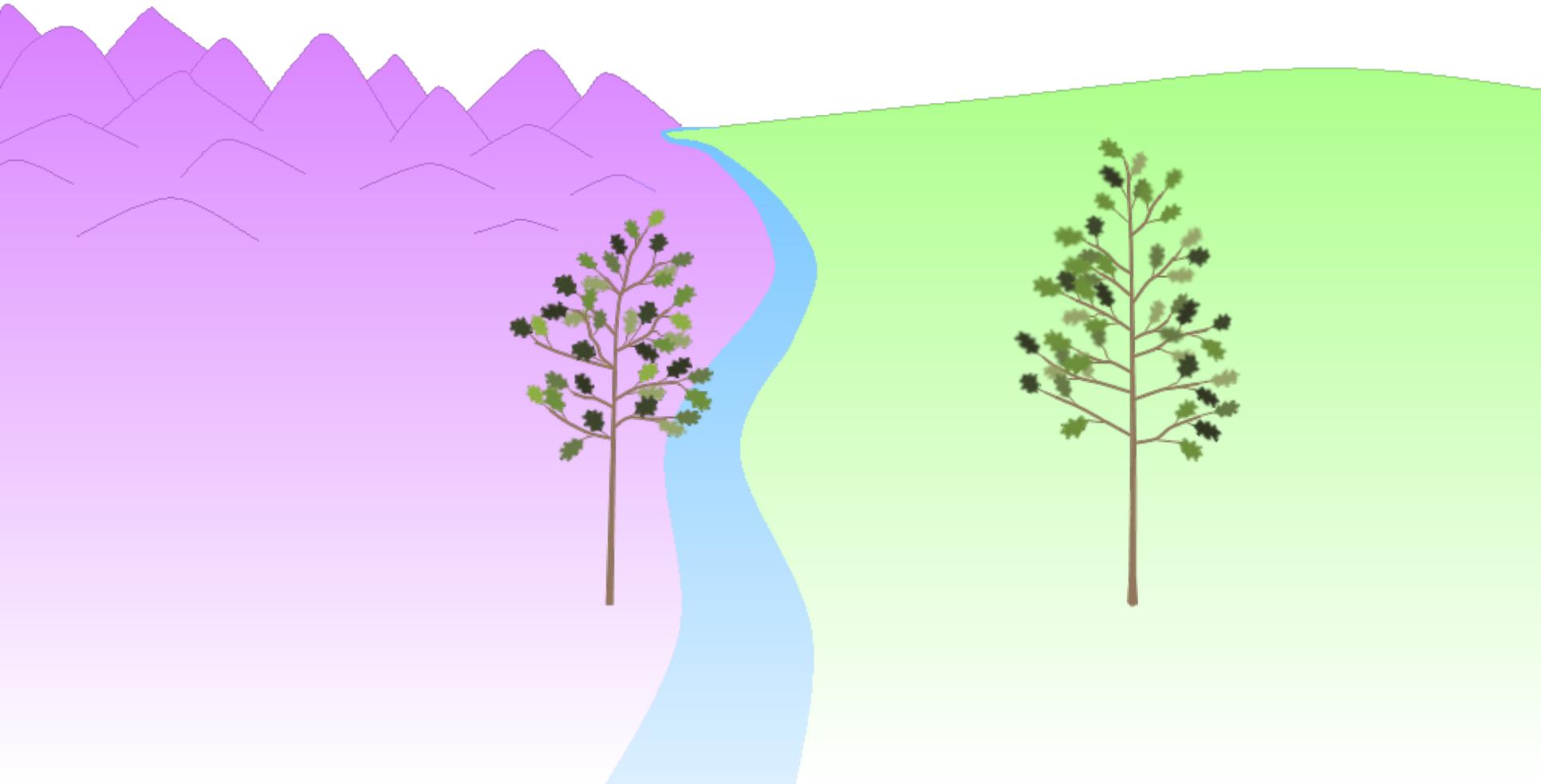
# Online Reporting Tool

Your school compared to all schools in the CESA

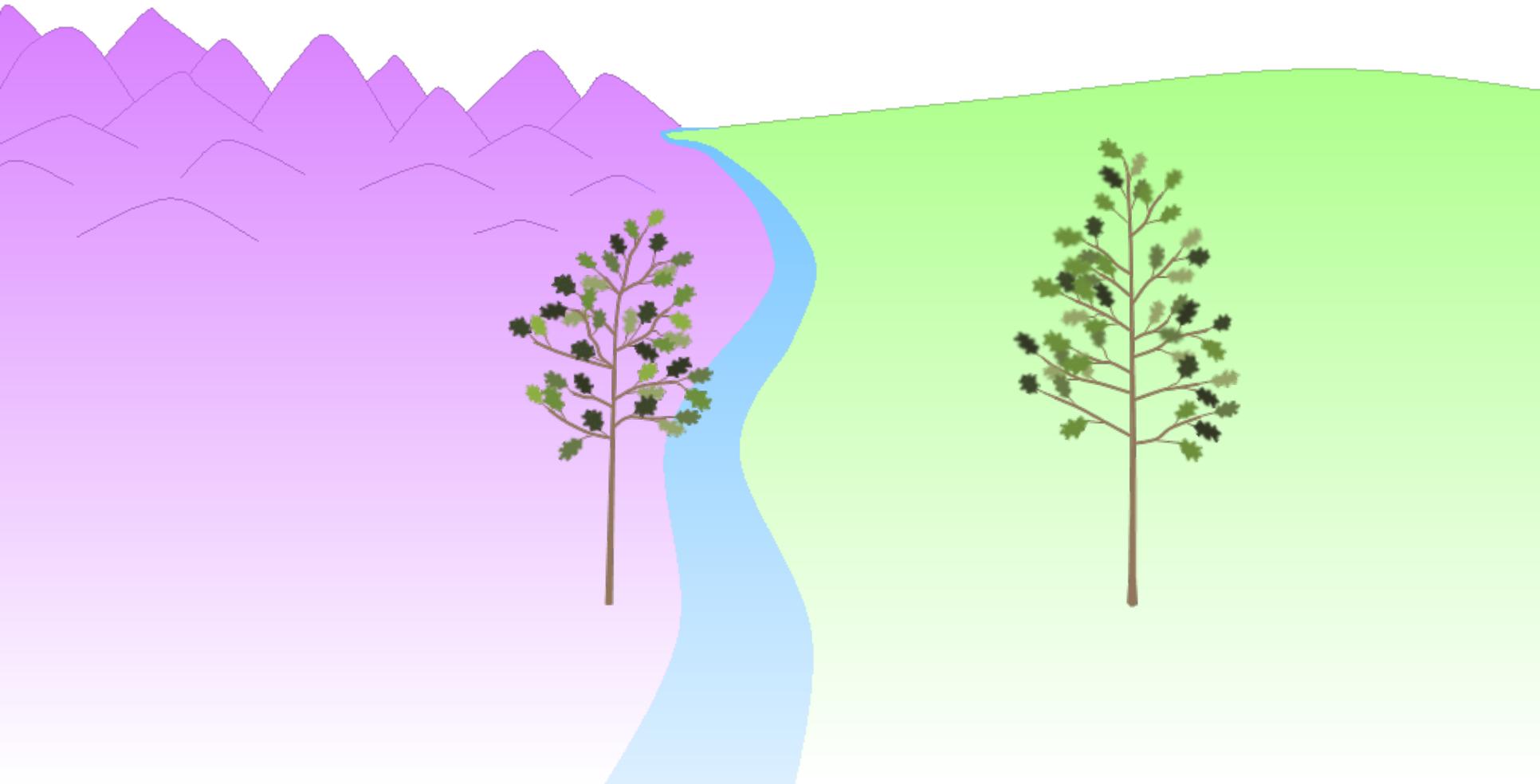


# The Oak Tree Analogy

An animated version of this presentation is available online at <http://varc.wceruw.org/tutorials/Oak/index.htm>

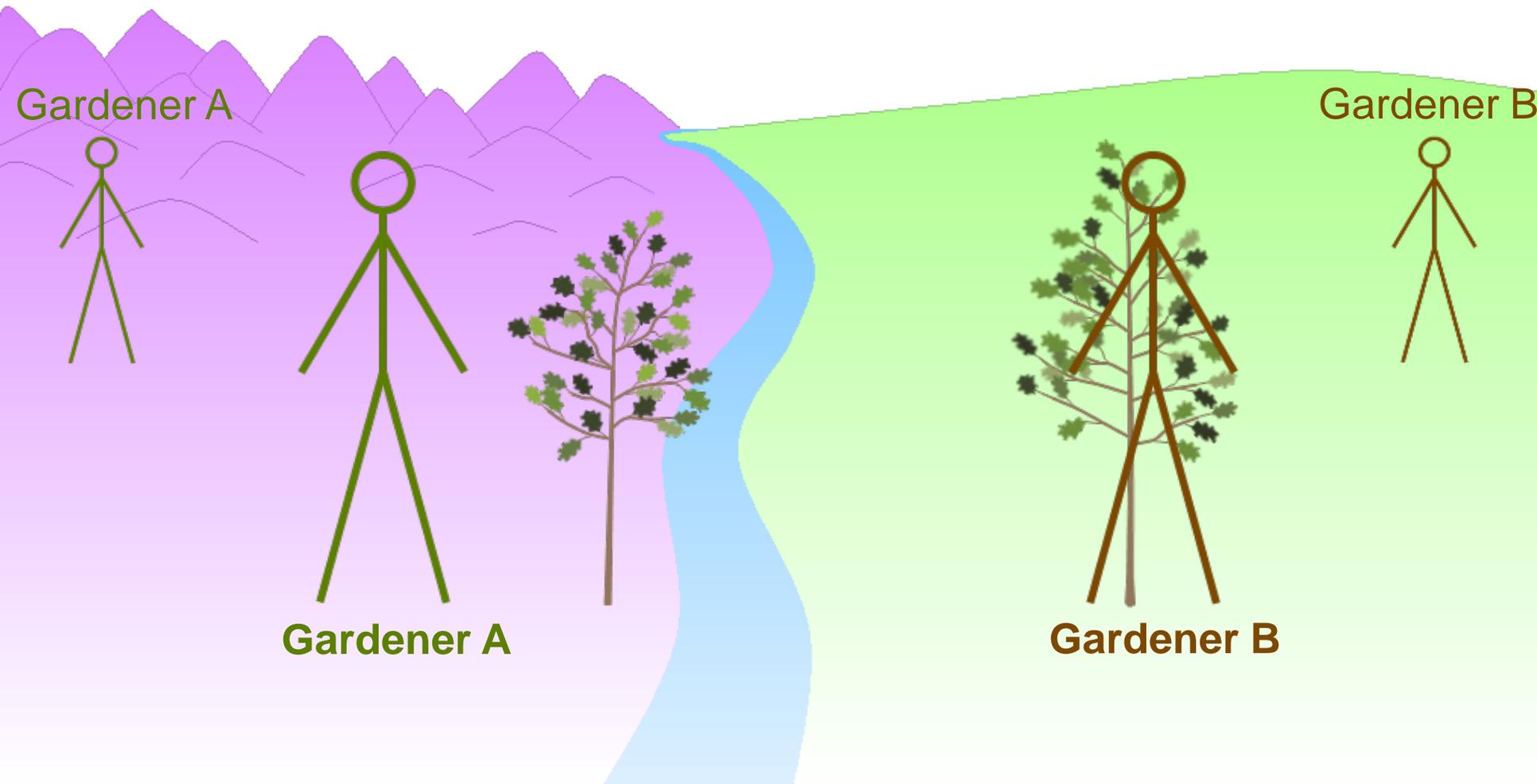


# The Oak Tree Analogy



## Explaining the concept of value added by evaluating the performance of two gardeners

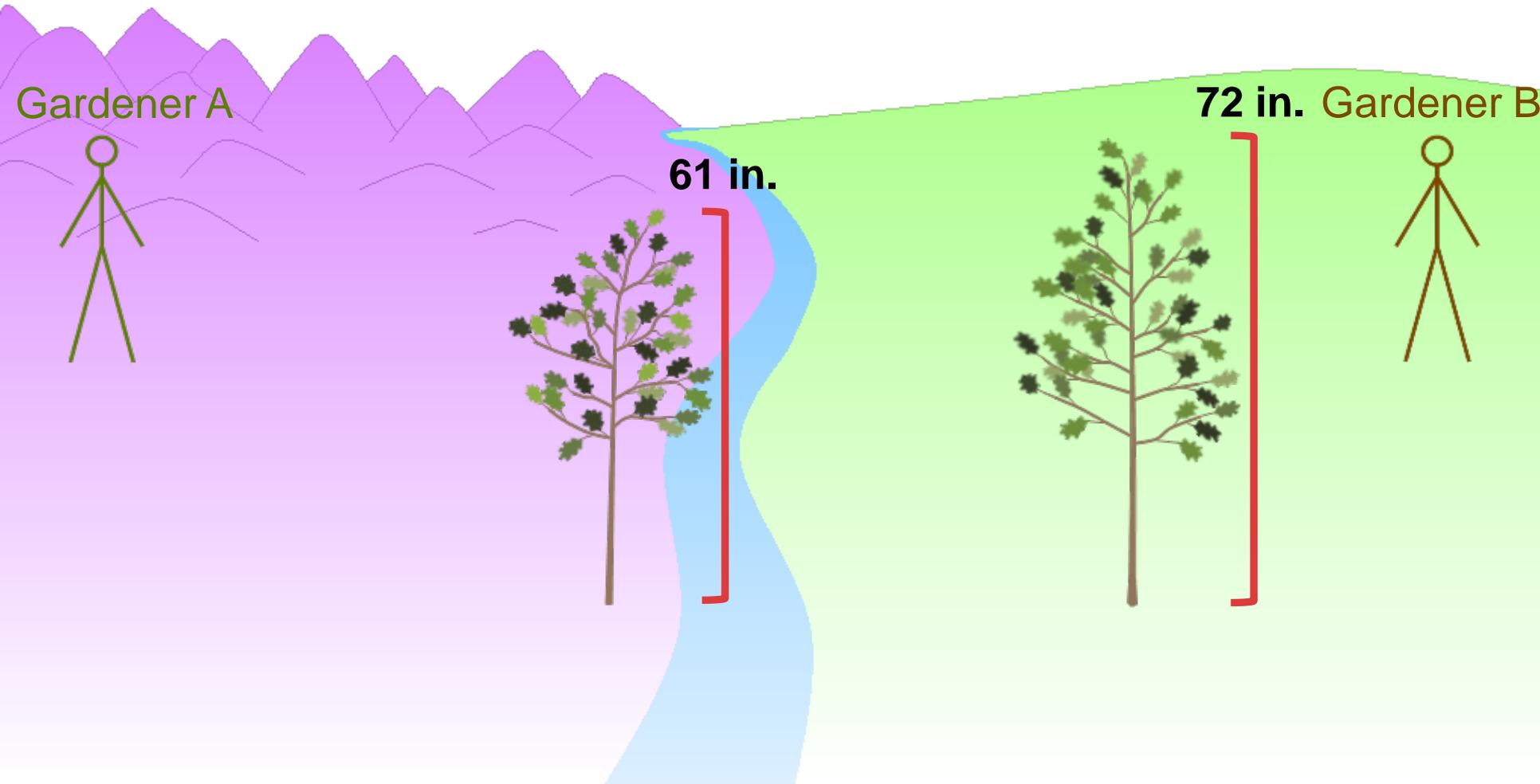
- For the past year, these gardeners have been tending to their oak trees trying to maximize the height of the trees.
- Each gardener used a variety of strategies to help their own tree grow... which of these two gardeners was more successful with their strategies?



To measure the performance of the gardeners, we will measure the height of the trees today (1 year after they began tending to the trees).

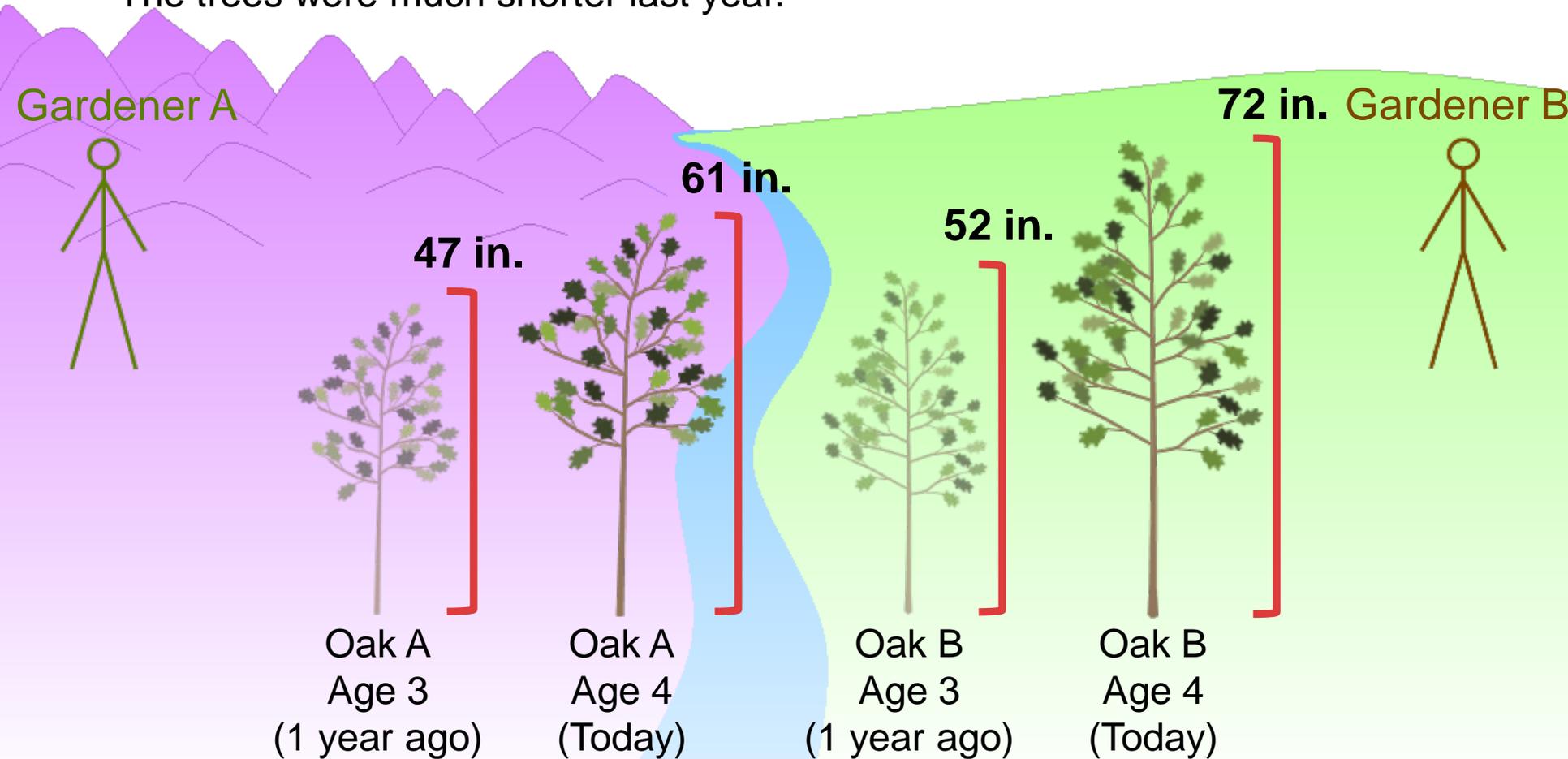
- Using this method, **Gardener B** is the better gardener.

This method is analogous to using an **Achievement Model**.



# ... but this **achievement** result does not tell the whole story.

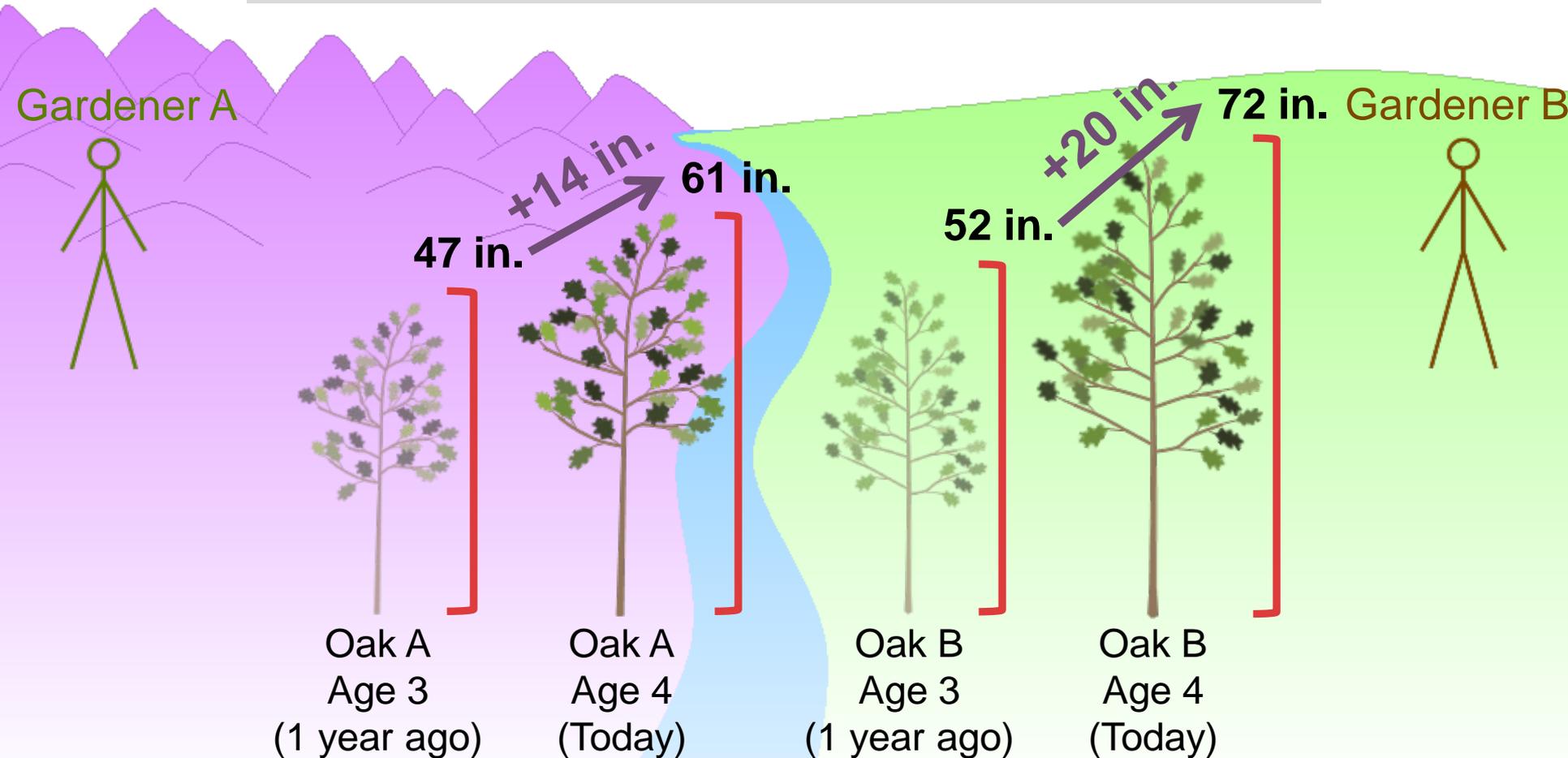
- These trees are 4 years old.
- We need to find the starting height for each tree in order to more fairly evaluate each gardener's performance during the past year.
- The trees were much shorter last year.



# We can compare the height of the trees one year ago to the height today.

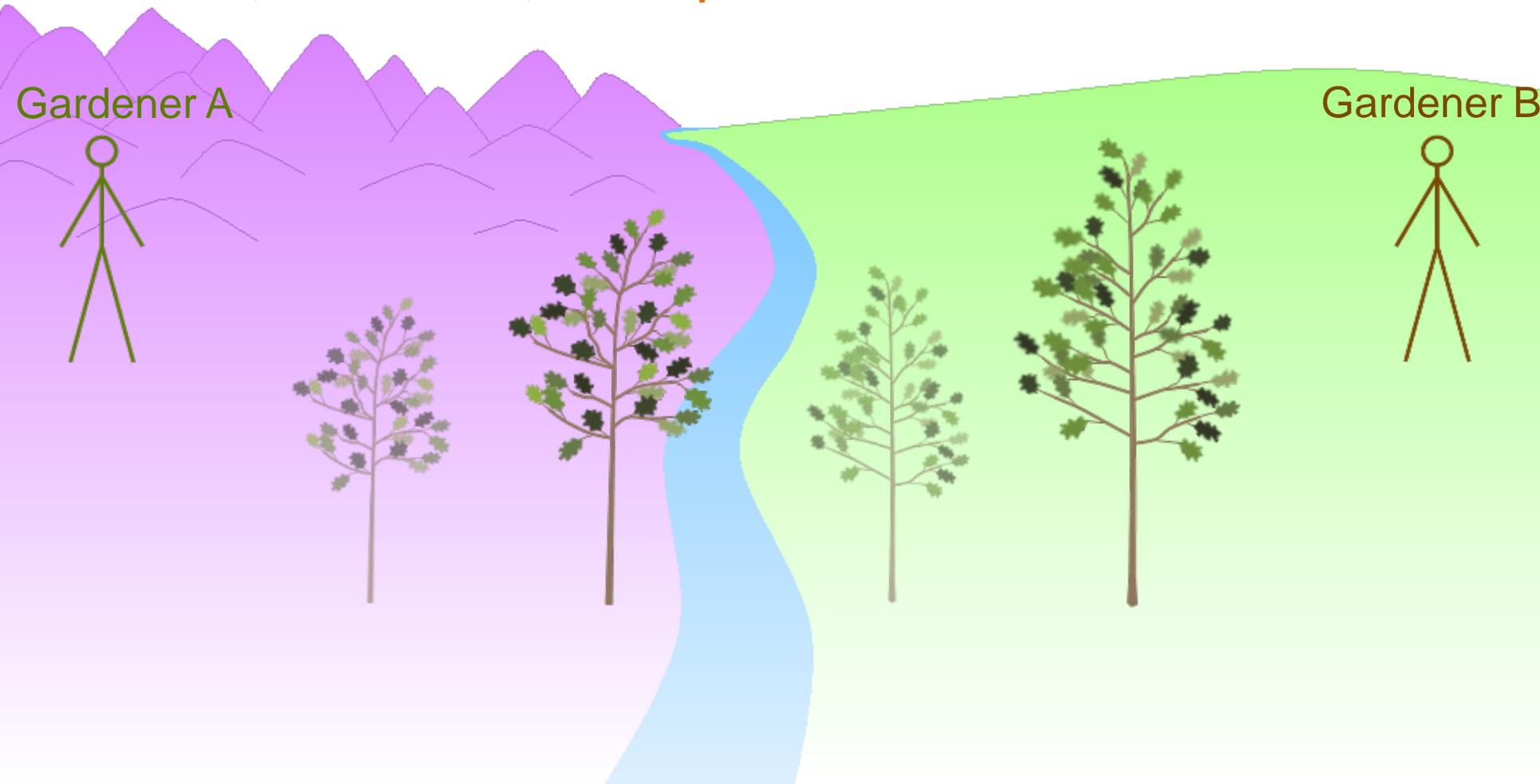
- By finding the difference between these heights, we can determine how many inches the trees grew during the year of gardener's care.
- Oak B had more growth this year, so **Gardener B** is the better gardener.

This is analogous to a **Simple Growth Model**, also called **Gain**.

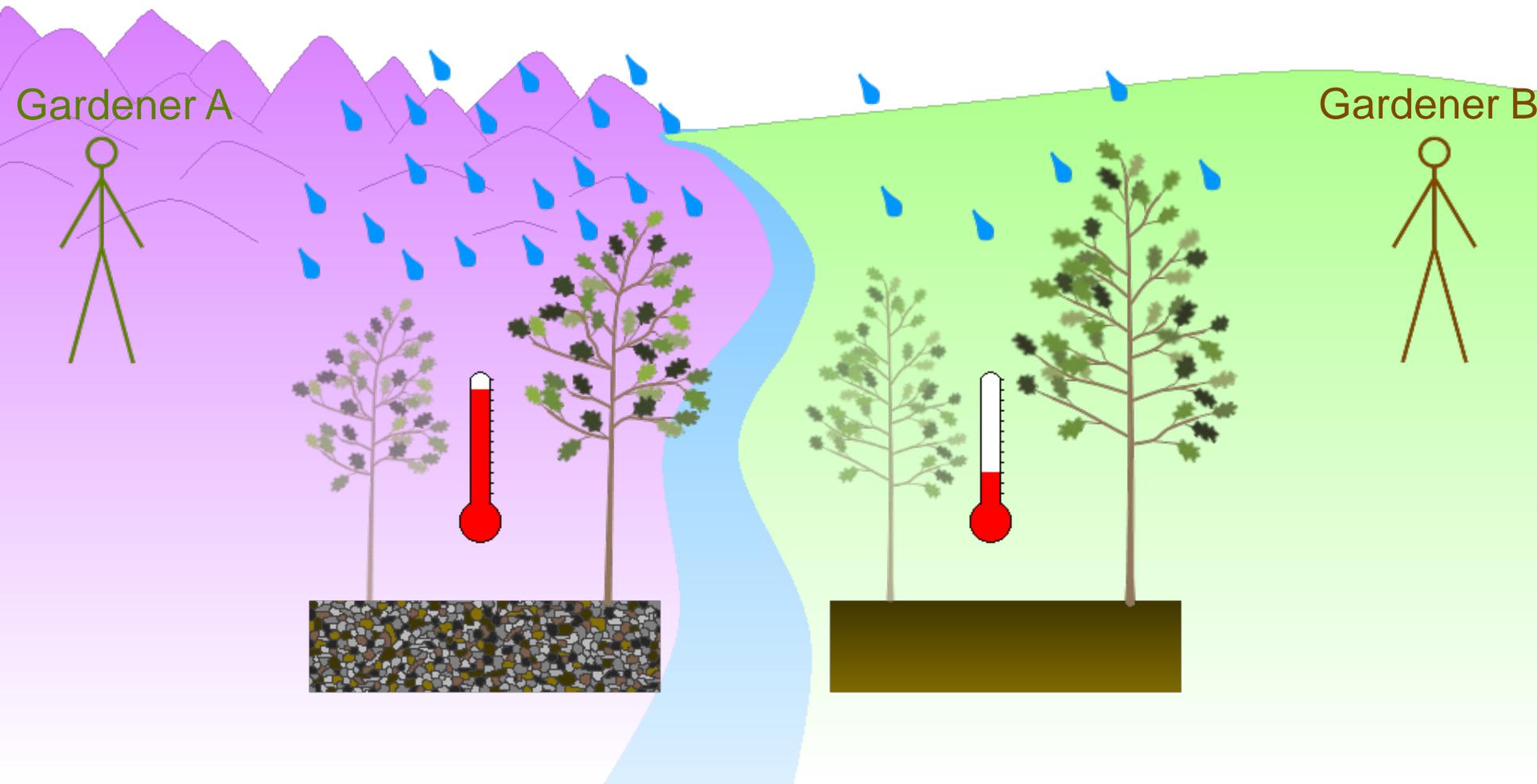


... but this **simple growth** result does not tell the whole story either.

- We do not yet know how much of this growth was due to the strategies used by the gardeners themselves.
- This is an “apples to oranges” comparison.
- For our oak tree example, three environmental factors we will examine are:  
**Rainfall**, **Soil Richness**, and **Temperature**.

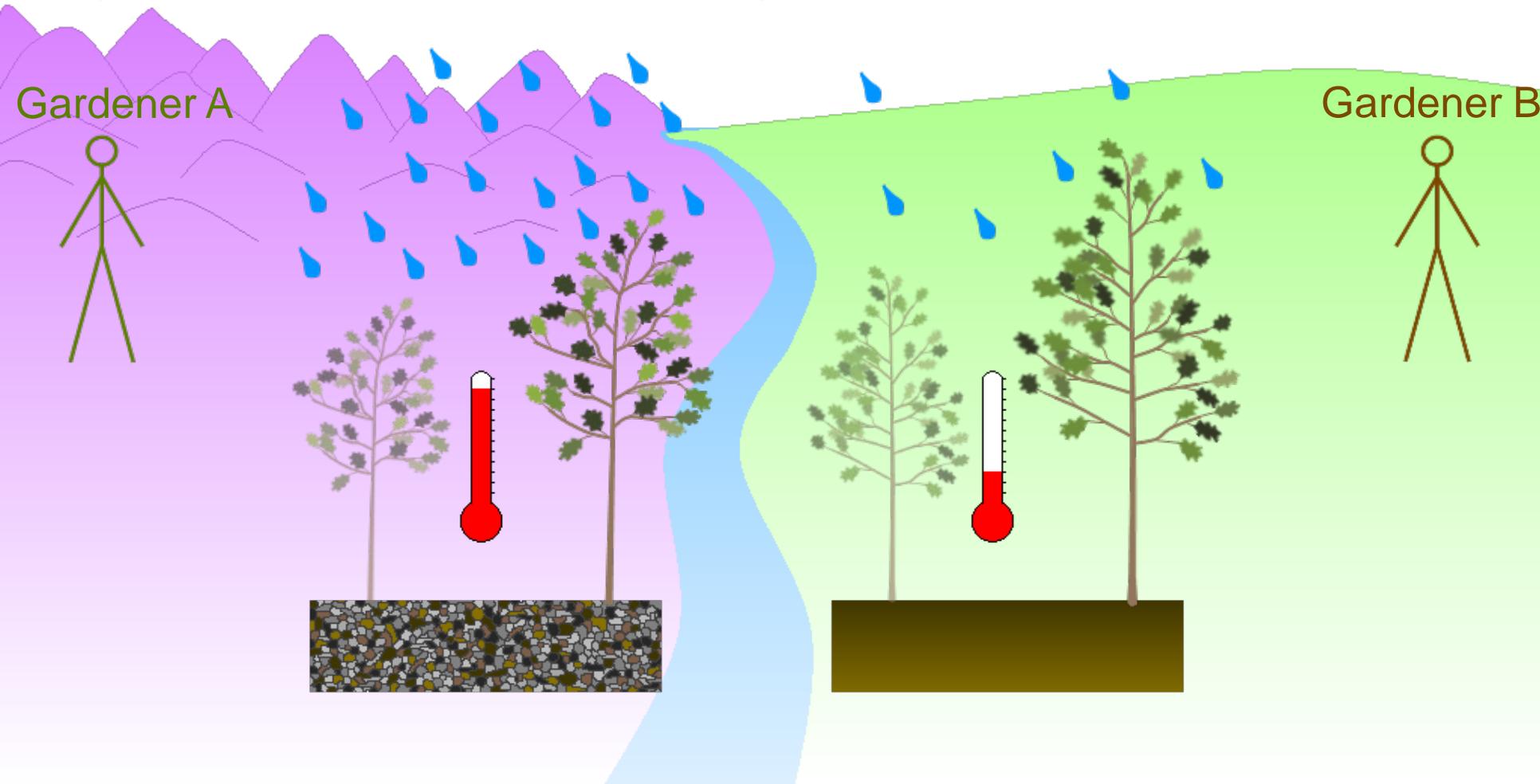


External condition	Oak Tree A	Oak Tree B
Rainfall amount	High	Low
Soil richness	Low	High
Temperature	High	Low

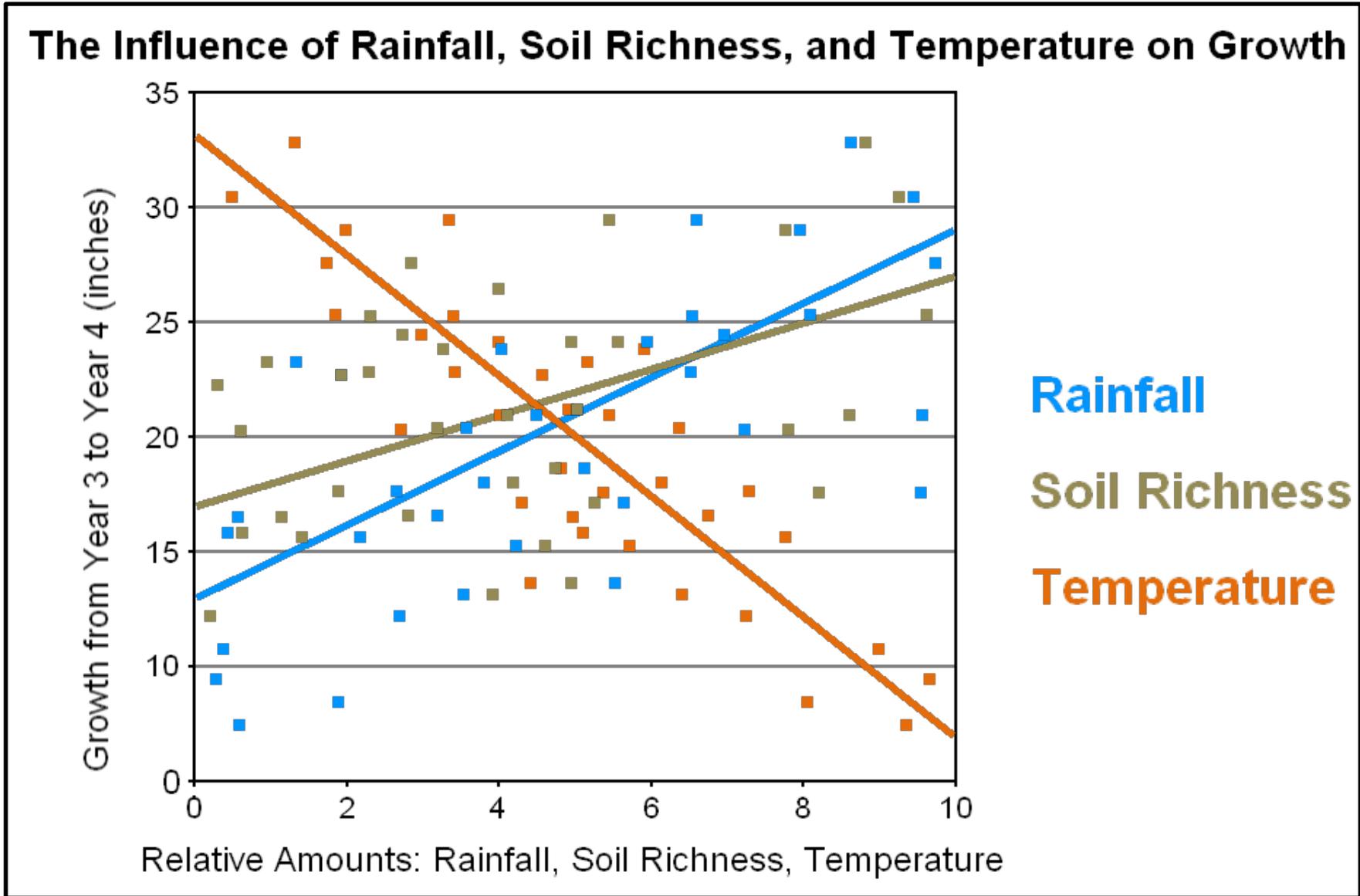


**We can use this information to calculate a predicted height for each tree today if it was being cared for by an average gardener in the area...**

- We examine all oaks in the region to find an average height improvement for trees.
- We adjust this prediction for the effect of each tree's environmental conditions.
- We compare the actual height of the trees to their predicted heights to determine if the gardener's effect was above or below average.



In order to find the impact of **rainfall**, **soil richness**, and **temperature**, we will plot the growth of each individual oak in the region compared to its environmental conditions.



Now that we have identified growth trends for each of these environmental factors, we need to convert them into a form usable for our predictions.

<b>Rainfall</b>	<b>Low</b>	<b>Medium</b>	<b>High</b>
<b>Growth in inches relative to the average</b>	<b>-5</b>	<b>-2</b>	<b>+3</b>

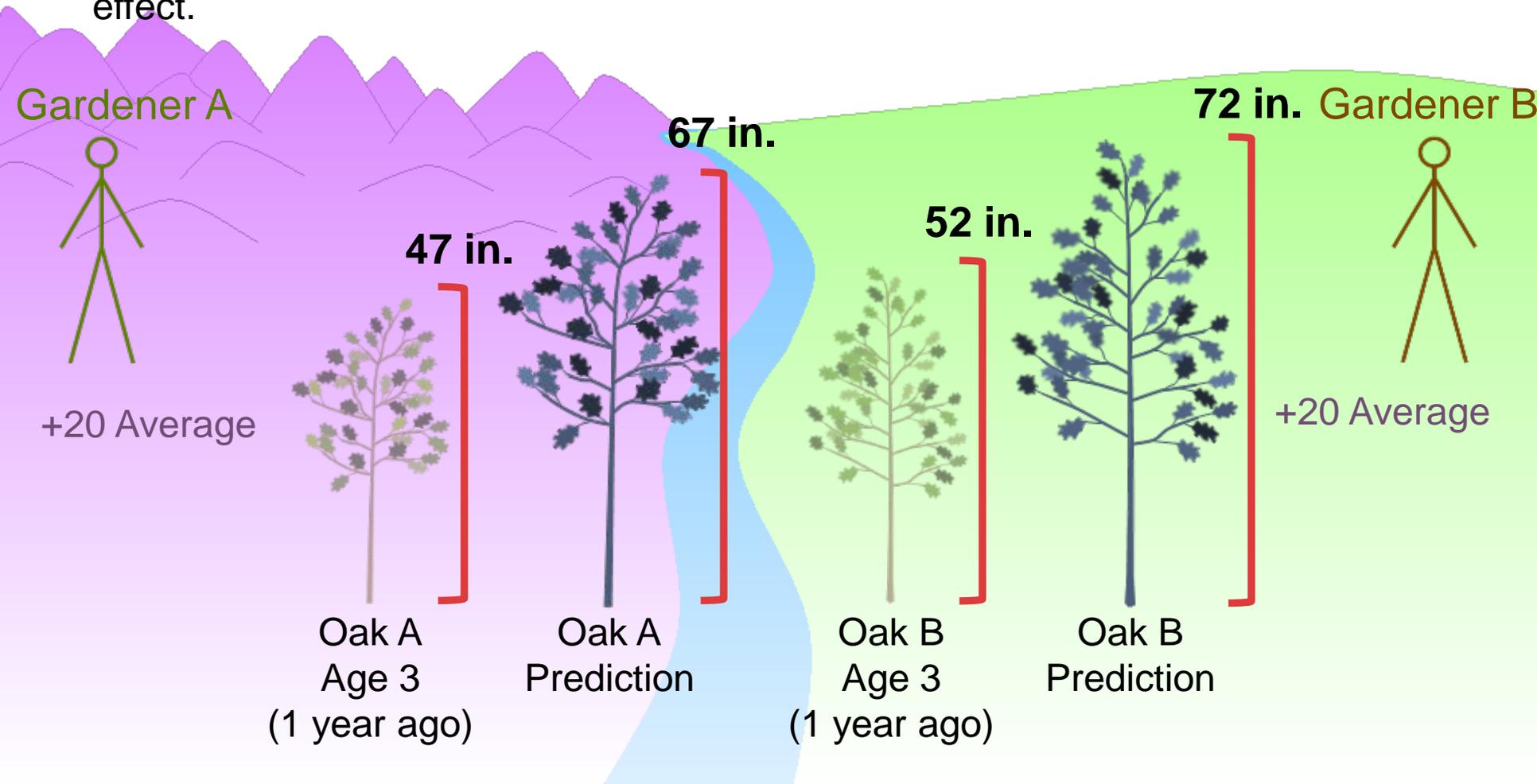
<b>Soil Richness</b>	<b>Low</b>	<b>Medium</b>	<b>High</b>
<b>Growth in inches relative to the average</b>	<b>-3</b>	<b>-1</b>	<b>+2</b>

<b>Temperature</b>	<b>Low</b>	<b>Medium</b>	<b>High</b>
<b>Growth in inches relative to the average</b>	<b>+5</b>	<b>-3</b>	<b>-8</b>

Now we can go back to **Oak A** and **Oak B** to adjust for their growing conditions.

# To make our initial prediction, we use the average height improvement for all trees

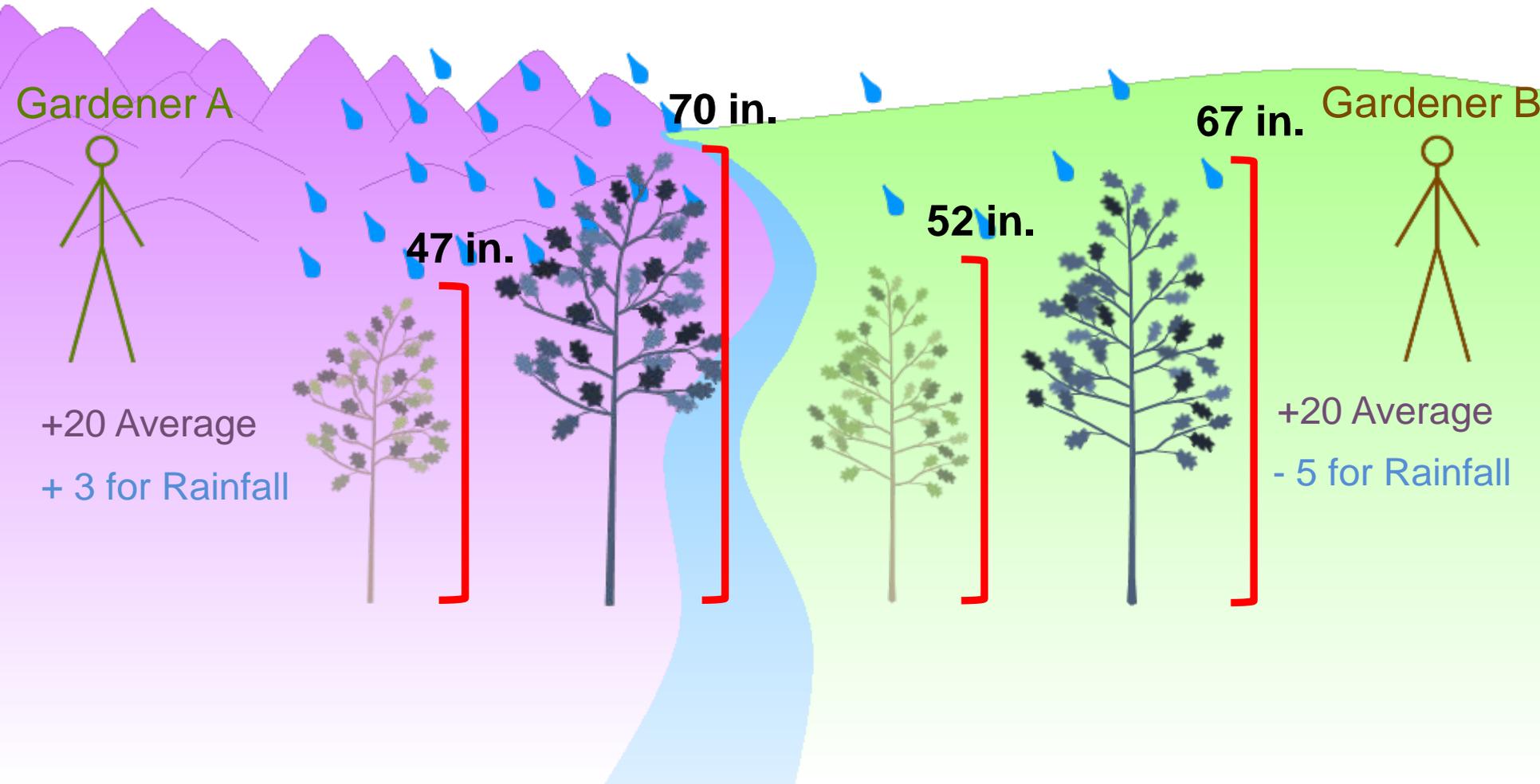
- Based on our data, the average improvement for oak trees in the region was 20 inches during the past year.
- We start with the trees' height at age 3 and add 20 inches for our initial prediction.
- Next, we will refine our prediction based on the growing conditions for each tree. When we are done, we will have an “apples to apples” comparison of the gardeners' effect.



Based on data for all oak trees in the region, we found that high rainfall resulted in 3 inches of extra growth on average.

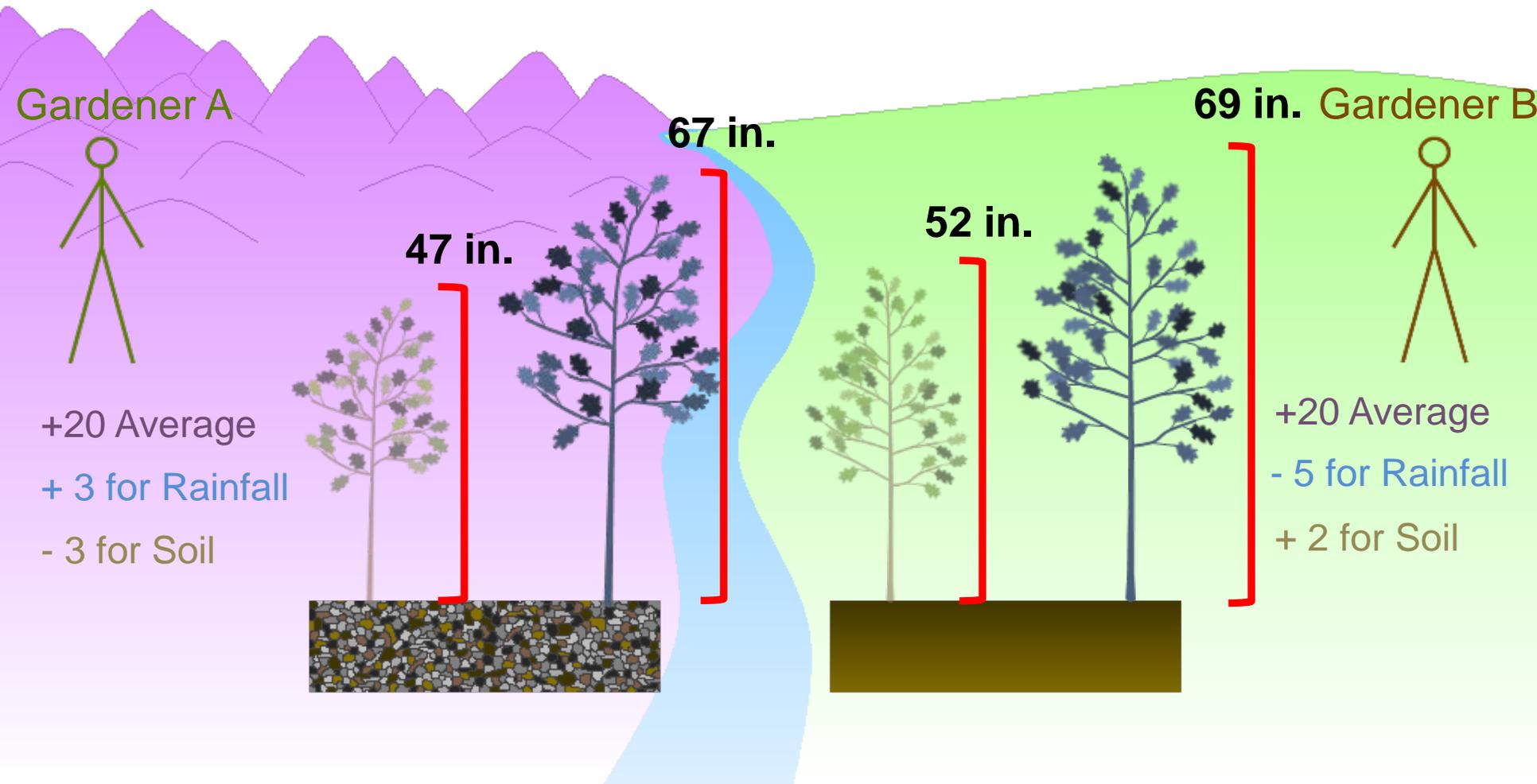
For having high rainfall, Oak A's prediction is adjusted by +3 to compensate.

Similarly, for having low rainfall, Oak B's prediction is adjusted by -5 to compensate.



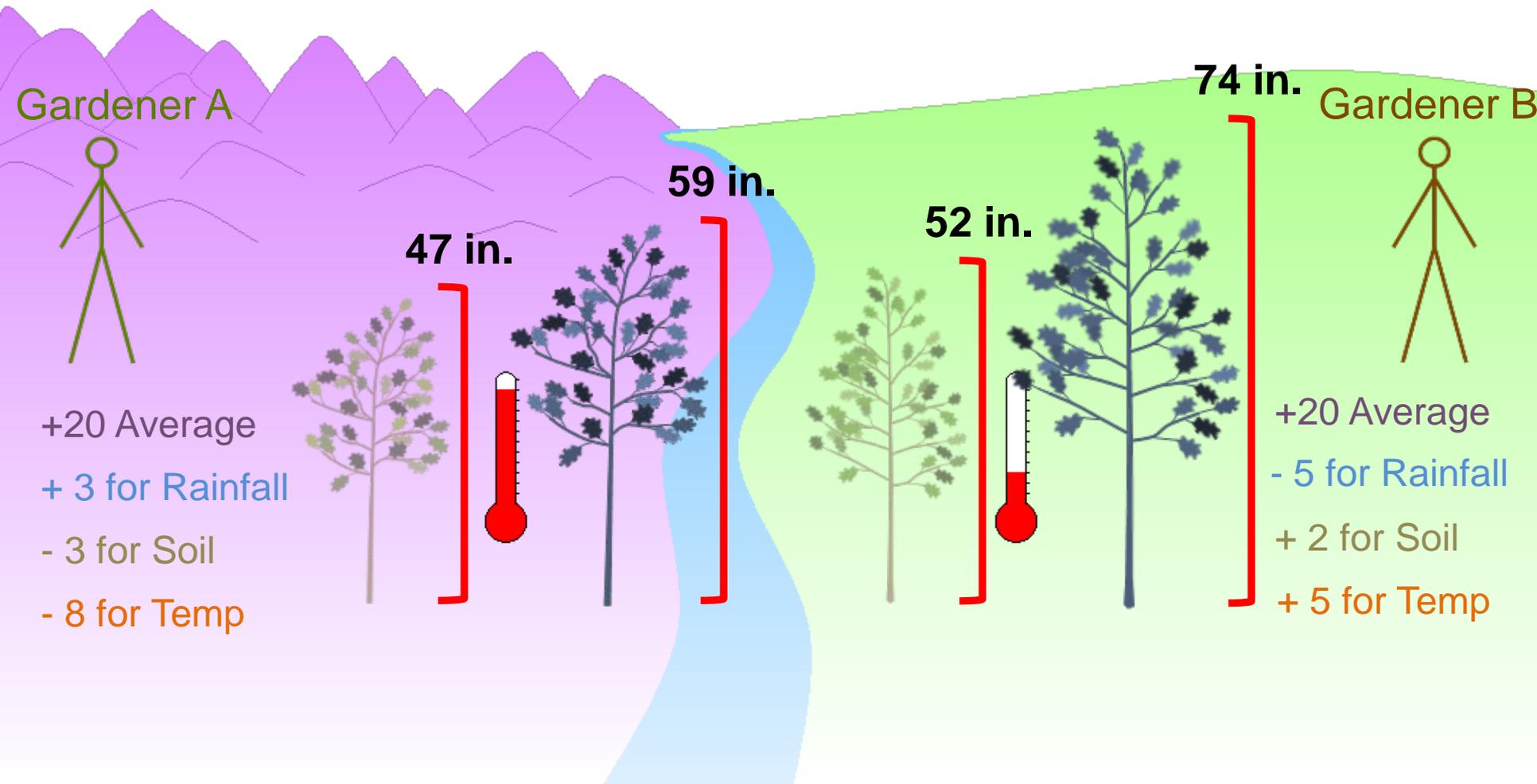
For having poor soil, Oak A's prediction is adjusted by -3.

For having rich soil, Oak B's prediction is adjusted by +2.



For having high temperature, Oak A's prediction is adjusted by -8.

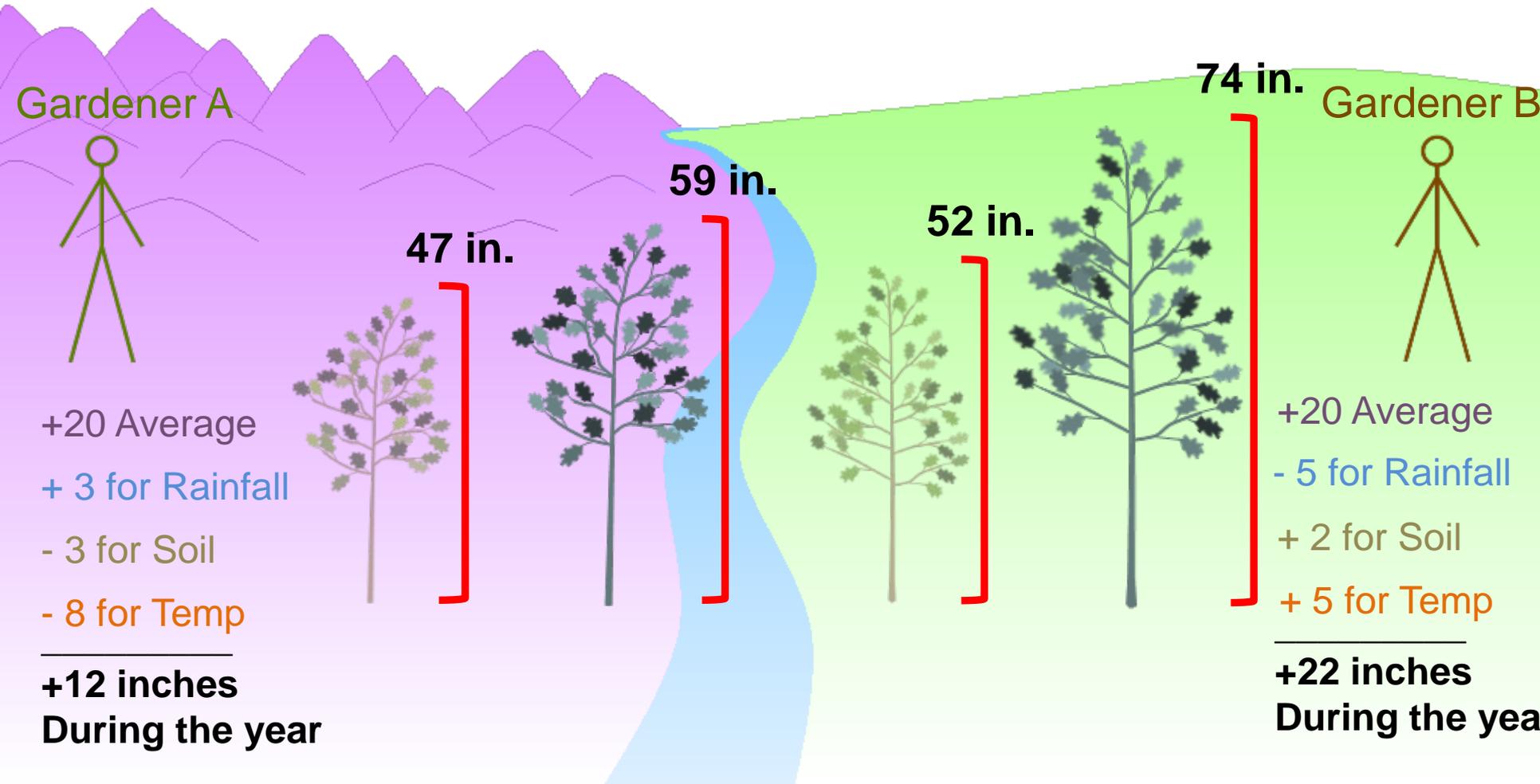
For having low temperature, Oak B's prediction is adjusted by +5.



Now that we have refined our predictions based on the effect of environmental conditions, our gardeners are on a level playing field.

The predicted height for trees in Oak A's conditions is 59 inches.

The predicted height for trees in Oak B's conditions is 74 inches.



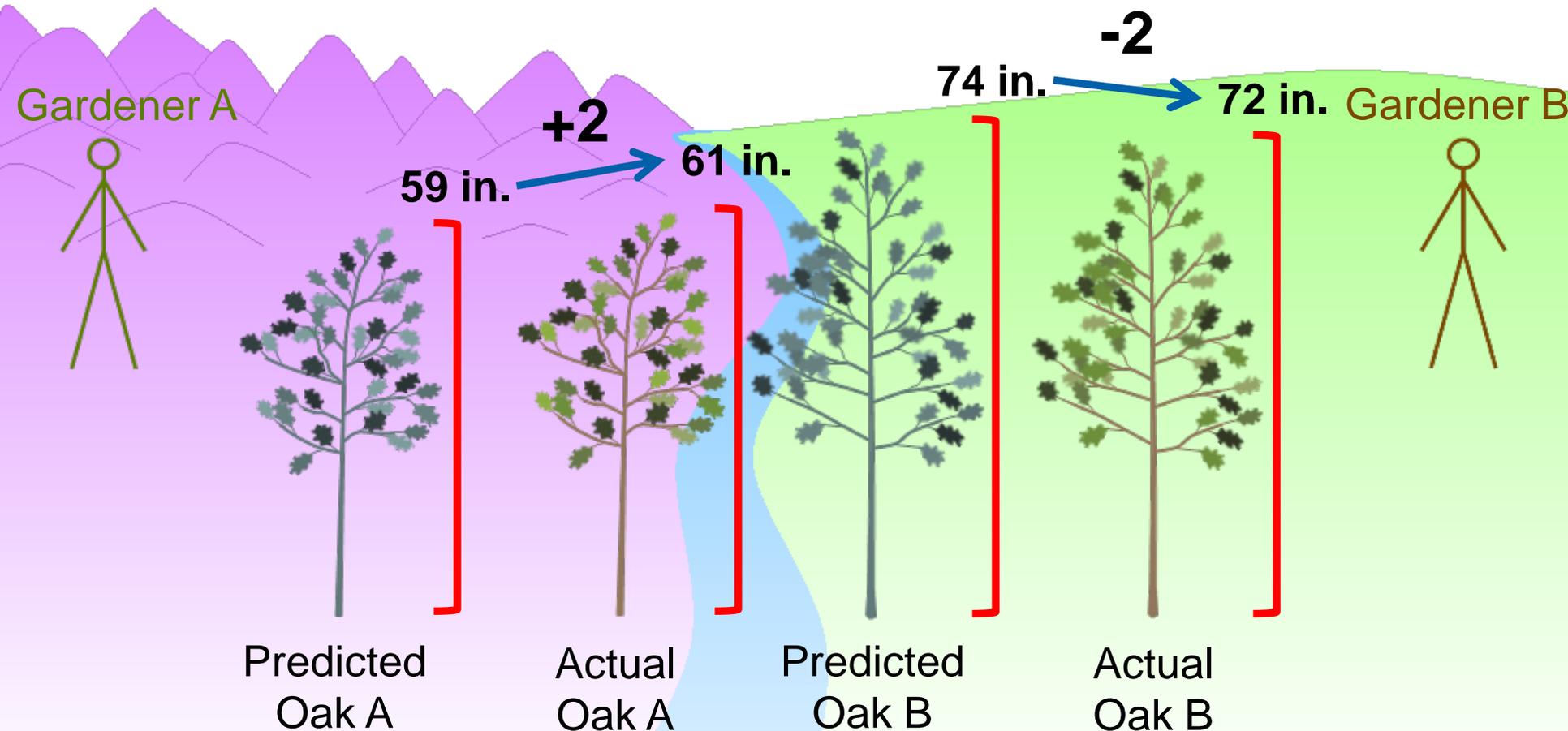
## Finally, we compare the actual height of the trees to our predictions.

Oak A's actual height of 61 inches is 2 inches **more** than we predicted.

We attribute this above-average result to the effect of Gardener A.

Oak B's actual height of 72 inches is 2 inches **less** than we predicted.

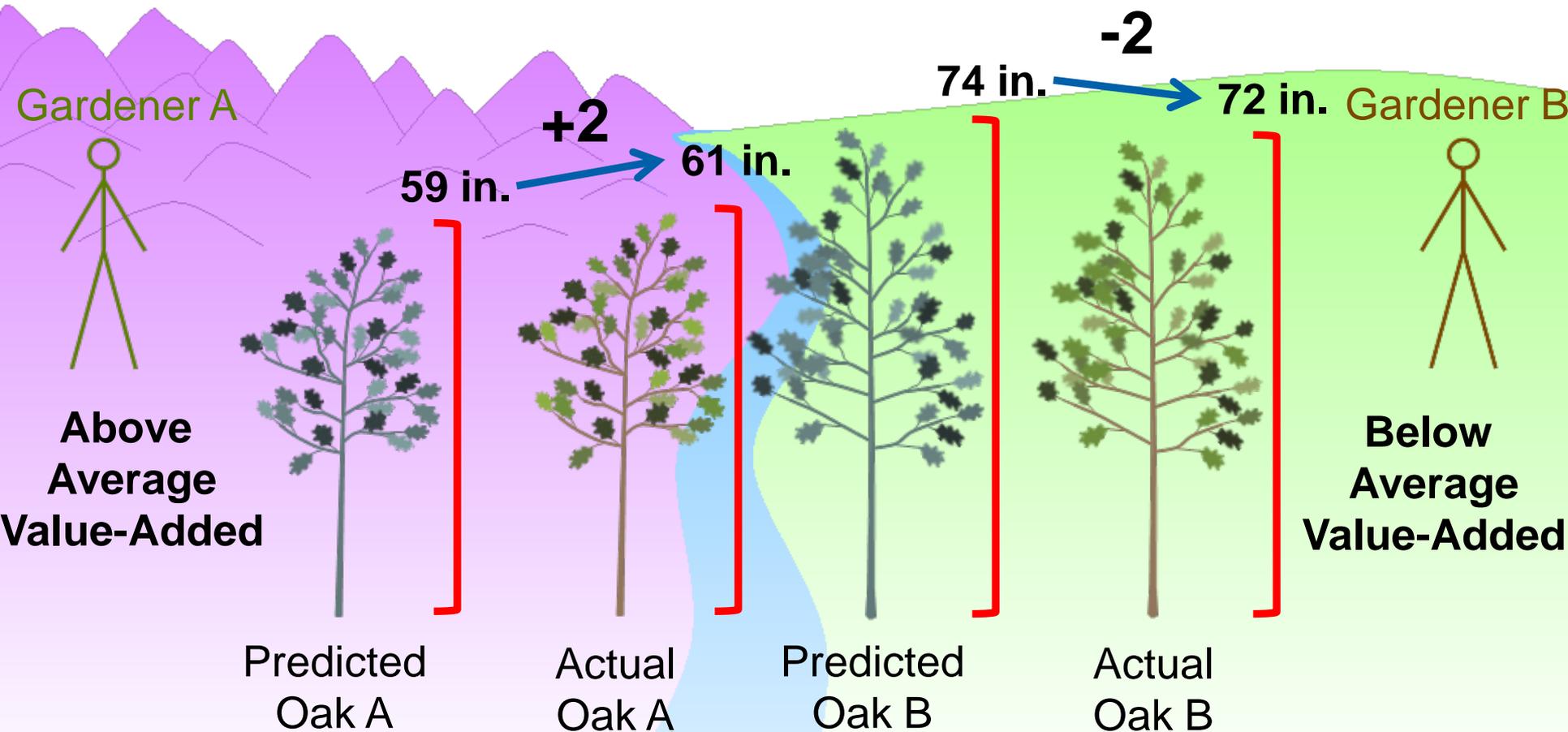
We attribute this below-average result to the effect of Gardener B.



Using this method, **Gardener A** is the superior gardener.

By accounting for last year's height and environmental conditions of the trees during this year, we found the "value" each gardener "added" to the growth of the tree.

This is analogous to a **Value-Added measure**



## How does this analogy relate to value added in the education context?

	<b>Oak Tree Analogy</b>	<b>Value-Added in Education</b>
<b>What are we evaluating?</b>	<ul style="list-style-type: none"> <li>• Gardeners</li> </ul>	<ul style="list-style-type: none"> <li>• Districts</li> <li>• Schools</li> <li>• Grades</li> <li>• Classrooms</li> <li>• Programs and Interventions</li> </ul>
<b>What are we using to measure success?</b>	<ul style="list-style-type: none"> <li>• Relative height improvement in inches</li> </ul>	<ul style="list-style-type: none"> <li>• Relative improvement on standardized test scores</li> </ul>
<b>Sample</b>	<ul style="list-style-type: none"> <li>• Single oak tree</li> </ul>	<ul style="list-style-type: none"> <li>• Groups of students</li> </ul>
<b>Control factors</b>	<ul style="list-style-type: none"> <li>• Rainfall</li> <li>• Soil richness</li> <li>• Temperature</li> </ul>	<ul style="list-style-type: none"> <li>• Students' prior test performance (usually most significant predictor)</li> <li>• Other demographic characteristics such as:               <ul style="list-style-type: none"> <li>• Grade level</li> <li>• Gender</li> <li>• Race / Ethnicity</li> <li>• Low-Income Status</li> <li>• ELL Status</li> <li>• IEP Status</li> <li>• Homelessness</li> <li>• Mobility</li> </ul> </li> </ul>