

# Student Guide

*Achieving Classroom Excellence Act (ACE)*  
**End of Course Project**  
**Algebra I**  
**Tall and Wide**

**Project Overview**

Design and conduct an investigation in order to determine and explain the relationship between a person's height and their arm span. This project will require collecting data from at least 30 people.



## **Directions**

1. Read the Project Task, Task Specifications, and Project Representation sections.
2. Read through each of the 14 Project Steps.
3. Review the scoring criteria to determine where you can receive credit for your work. Discuss this information with your Project Coordinator.
4. With your Project Coordinator, determine a timeline for completing the project and enter target dates for completing each of the CHECK POINTS in the space provided.
5. Be sure to check in with your Project Coordinator at the CHECK POINTS listed in the project.
6. Complete the project steps.
7. Submit the project, including the Student Learning Reflection, for scoring by the due date.

## **Requirements for Submission of the ACE End of Course Project**

For submission, a completed ACE End of Course Project must include:

1. Completed Student Planner and Agreement
2. A description of the results or the product requested in each of the 14 steps of the project
3. Student Learning Reflection as described in the project
4. Completed Project Submission Form as required for authenticity of the work

## Tall and Wide

### **Project Task**

Design and conduct an investigation in order to determine and explain the relationship between a person's height and their arm span. This project will require collecting data from at least 30 people.

### **Task Specifications**

You will select 30 or more individuals and accurately measure their heights. Half of these people should be male and half should be female. You will also measure the length of each person's arm span. You will need to design methods for collecting accurate and consistent data. Once the data is collected, you will need to analyze the data in order to answer the questions in the Project Steps.

### **Project Representation**

Representation of work may come in a variety of forms, including multi-media presentations, constructed objects, artistic expression, written documents, and verbal expression. Creativity is encouraged!

### **Project Steps**

1. Determine if you will use the metric system or the standard system of measurement. Defend your selection.
2. Describe the design of the experiment and provide a rationale for the methods you will use to ensure that your measurements of height and arm span are accurate.
3. Select a sample of at least 30 individuals, half of which are male and half of which are female. Describe and defend your sample selection.

CHECK POINT      DATE \_\_\_\_\_      Student Initials \_\_\_\_      Coordinator Initials \_\_\_\_

4. Collect and record data. Submit a table of your data, showing all individuals' heights and arm spans, separating males and females.

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5. Create two scatterplots (one for males and one for females), where each scatterplot includes all individuals' heights and their arm span lengths.
  - Label the independent and dependent variables.
  - Use appropriate scales.
  - Include descriptive titles.
6. Explain any relationships you notice in the data.

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7. Determine the linear model/equation for each scatterplot of data. Explain how you arrived at those two equations, justifying the steps for each.
8. Solve this system of equations algebraically.
9. Explain the meaning of each equation in terms of the context of the situation. Include the meaning of each variable, slope, and y-intercept.
10. Graph both equations on one coordinate plane.

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11. Answer the following questions using correct unit labels:
  - Based on your linear equations, at what height would a girl's arm span and a boy's arm span be equal?
  - Based on your linear equations, if a boy was 5' 6" tall, what would you predict his arm span to be? Based on your data, if a girl was 5' 6" tall, what would you predict her arm span to be?
  - Based on your linear equations, if a boy's arm span is 175 cm, what would you predict his height to be? Based on your data, if a girl's arm span is 175 cm, what would you predict her height to be?
12. Discuss a reasonable domain and range for this experiment.
13. In addition to the identified variables, what other factors might affect your findings? Explain whether or not you believe any of these factors affected your results.
14. If someone repeated your experiment, would you expect them to get similar or different results? Justify your answer.

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## Student Learning Reflection

The Student Learning Reflection will be completed in the presence of your Project Coordinator or another certified educator selected by your Project Coordinator. Discuss with your Project Coordinator when and where you should complete your reflection as well as what format you would like your reflection to take. For example, you may choose to write your reflection as if you were writing in a journal, or you may prefer to present your reflection verbally, through a multi-media presentation, or through some other format.

Using a method of your choice, explain how this project has contributed to your learning and ability to apply Algebra I skills to the real world. Use the questions below to guide your reflection. You may also reflect on additional topics not listed in the questions. Not all of the questions need to be addressed; however, your reflection illustrates the depth of your learning and needs to be thorough enough for you and your audience to draw an accurate picture.

- What process did you use for planning your project and sticking to your plan?
- What did you learn about data collection methods?
- How could you improve your selection process to get a better data sample?
- How well does this project represent your knowledge and understanding of Algebra I?
- How well does this project represent your best effort, demonstration of high-quality work, individuality, and creativity?
- If you were to repeat this project, what would you have done differently? Why?
- What were your greatest challenges while completing this project?
- What additional resources would have been helpful in completing this project?

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## Project Scoring Rubric

PROJECT STEP	STANDARD COMPONENT	SCORING CRITERIA
1. Determine if you will use the metric system or the standard system of measurement. Defend your selection.	Process Standards	0 – No justification or inappropriate reason 1 – Gives a valid reason to support his/her choice
2. Describe the design of the experiment and provide a rationale for the methods you will use to ensure that your measurements of height, vertical reach, and horizontal leap are accurate.	Process Standards	0 – No explanation or inappropriate explanation 1 – Explains the design of the experiment including the need for accuracy 2 – Explains the design of the experiment including the need for consistency and accuracy
3. Select a sample of at least 30 individuals, half of which are male and half of which are female. Describe and defend your sample selection.	Process Standards	0 – Did not choose at least 30 people or did not include an explanation 1 – Chose at least 30 people and gave an explanation of how the sample was selected 2 – Chose at least 30 people using a systematic sampling method and defended the methodology
4. Collect and record data. Submit a table of your data, showing all individuals' heights and arm spans, separating males and females.	Standard 3	0 – No table submitted 1 – A table is submitted with incomplete data or without titles and labels 2 – A complete table is submitted with appropriate titles and labels
5. Create two scatterplots (one for males and one for females), where each scatterplot includes all individuals' heights and their arm span lengths. <ul style="list-style-type: none"> <li>Label the independent and dependent variables.</li> <li>Use appropriate scales.</li> <li>Include descriptive titles.</li> </ul>	Standard 2	0 – Did not label independent and dependent variables on one or both scatterplots 1 – Labeled independent and dependent variables correctly on both scatterplots
	Standard 3	0 – Did not create two scatterplots 2 – Created two scatterplots but not all data points are accurate, scales are inappropriate, and/or descriptive titles are missing 4 – Created two scatterplots with accurate data points, appropriate scales, and descriptive titles

6. Explain any relationships you notice in the data.	Process Standards & Standard 3	0 – Does not explain relationships in the data or provides an explanation of relationship that does not exist 1 – Provides an explanation of relationships in the data
7. Determine the linear model/equation for each scatterplot of data. Explain how you arrived at those two equations, justifying the steps for each.	Standard 1, Standard 2, & Standard 3	0 – Did not determine two accurate linear models/equations. 1 – Determined two accurate linear models/equations but did not provide any explanation. 2 – Determined two accurate linear models/equations and explained how equations were determined. 3 – Determined two accurate linear models/equations, explained how equations were determined, and provided justification for each step. 4 – Determined two accurate linear models/equations, and provided a in-depth explanation and justification for each step.
8. Solve this system of equations algebraically.	Standard 2	0 – Did not solve the system of equations accurately. 1 – Solved the system of equations accurately.
9. Explain the meaning of each equation in terms of the context of the situation. Include the meaning of each variable, slope, and y-intercept.	Standard 1 & Standard 2	0 – Does not explain 3 – States the meaning of each variable, slope, and y-intercept. 6 – Clearly articulates the meaning of each variable, slope, and y-intercept in context.
10. Graph both equations on one coordinate plane.	Standard 2	0 – Did not graph both equations accurately on one coordinate plane 1 – Graphs both equations accurately on one coordinate plane 2 – Graphs both equations accurately on one coordinate plane, including labels, identified equations, clearly distinguished lines, and/or additional analysis

<p>11. Answer the following questions using correct unit labels:</p> <ul style="list-style-type: none"> <li>• Based on your linear equations, at what height would a girl’s arm span and a boy’s arm span be equal?</li> <li>• Based on your linear equations, if a boy was 5’ 6” tall, what would you predict his arm span to be? Based on your data, if a girl was 5’ 6” tall, what would you predict her arm span to be?</li> <li>• Based on your linear equations, if a boy’s arm span is 175 cm, what would you predict his height to be? Based on your data, if a girl’s arm span is 175 cm, what would you predict her height to be?</li> </ul>	<p>Standard 1, Standard 2, &amp; Standard 3</p>	<p>0 – Does not answer the questions correctly or answers 1 questions correctly without unit labels  1 – Answers 1 question correctly with correct unit label or answers 2 questions correctly without unit labels  2 – Answers 2 questions correctly with correct unit labels or answers 3 questions correctly without unit labels  3 – Answers 3 questions correctly with correct unit labels</p>
<p>12. Discuss a reasonable domain and range for this experiment.</p>	<p>Standard 2</p>	<p>0 – Does not provide a mathematically reasonable domain and/or range  1 – Provides a mathematically reasonable domain and range  2 – Provides a mathematically reasonable domain and range and explains within the context of the situation</p>
<p>13. In addition to the identified variables, what other factors might affect your findings? Explain whether or not you believe any of these factors affected your results.</p>	<p>Process Standards &amp; Standard 3</p>	<p>0 – No factors given  1 – Lists additional factors but does not provide a logical explanation of how these may or may not have affected the student’s results  2 – Lists additional factors with a logical explanation of how these may or may not have affected the student’s results  3 – Lists additional factors with an in-depth explanation of how these may or may not have affected the student’s results</p>

14. If someone repeated your experiment, would you expect them to get similar or different results? Justify your answer.	Process Standards & Standard 3	0 – No justification given 1 – Logical justification provided 2 – In-depth justification provided
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