

# ALGEBRA/ DATA ANALYSIS

## Collecting, Organizing, and Analyzing Data

Project Code: A-c.0

### HOMework SAMPLING AND SIMULATION

Design and conduct an investigation to determine the length of time students at a school spend on homework per week. Using the data from that investigation, design and conduct a simulation to estimate the probability that 5 randomly selected students will all spend at least 4 hours on homework per week.



# PROJECT MONITOR GUIDE

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Student Name

Sample Draft  
2008



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The Project Monitor Guide provides specific directions and additional resource information about the project and is to be used to assist students while they work on Bridge Plan projects. The Project Monitor Guide has been designed to assist the staff member in the facilitation of a student's project.

The Project Monitor is an important part of the Bridge Plan for Academic Validation. The Project Monitor becomes the advisor for the project. In the case of a student with an IEP or ELL Plan, the Project Monitor must also make sure that all accommodations are met during the completion of the project.

The Project Monitor's role is to make sure the student understands the scope of the project, where and how to secure any necessary materials, and suggest possible resources. The Project Monitor will review a student's progress at the indicated Check Points in the Project Monitor Guide and may adjust the student's completion timeline as necessary. The Project Monitor can facilitate the student's work, advise the student on content knowledge or where to secure content resources, but must not complete any of the student's Academic Validation Project Package.

Once the student has completed all the project modules for the HSA content area, he/she will submit a single, completed project package to the Project Monitor, which should include the Bridge Plan Project Package Submission Form, to be reviewed by the Review Panel. The Project Monitor will then forward the Project Package to the school coordinator. At this point the Project Monitor's work is complete unless the student is working on projects in other HSA content areas.

### Preparation Information for the Monitor

- This project requires students to design and administer a survey to other students in their school. If the school system requires permission before a survey can be administered to students, the Project Monitor should assist the student in obtaining the appropriate permission.
- The student completing the project will be instructed to obtain the Homework Survey about length of time spent on homework from the Project Monitor. The Homework Survey is part of the Additional Resources included in this file.
- There are several **CHECK POINTS** throughout the project. At these points, the student is directed to check in with the Project Monitor so that he/she can assess if the student is moving through the project at an appropriate pace. The **CHECK POINTS** in this guide are followed by a space to set a target date to help pace the student.
- The Additional Resources lists units in the HSA Algebra/Data Analysis online course that you may direct the student to if they are having difficulty with any of the concepts addressed in this project.



### Project Task

Design and conduct an investigation to determine the length of time students at a school spend on homework per week. Using the data from that investigation, design and conduct a simulation to estimate the probability that 5 randomly selected students will all spend at least 4 hours on homework per week.

Submit the completed project to your Project Monitor by the agreed upon date.

### Directions

1. Read the scenario.
2. Read through the project steps.
3. Review the scoring categories to determine where you can receive credit for your work. Discuss this information with the Project Monitor.
4. With your Project Monitor, 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 Monitor at the **CHECK POINTS** listed in the project.
6. Complete the project steps.
7. Submit the project for scoring by the due date.

### Requirements

When submitting your project, you must include:

1. A description of the results or the product of each of the 14 steps of the project.
2. A blank copy of the survey you used.
3. The completed survey from each student that participated in the survey.

### Additional Resources

- Homework Survey about length of time spent on homework (*see page 4*)
- If a student is struggling with the concepts addressed in this project the following link to the HSA Algebra/Data Analysis online course may be helpful:
  - Go to [MSDE.MDk12online.org](http://MSDE.MDk12online.org)
    - Enter in the following information:  
**User Name:** algebra  
**Password:** student
  - Go to Unit 8: Probability through Data



**Homework Survey about length of time spent on homework**

**Note:** Modify the survey below to meet the needs of your investigation by:

- a. Modifying the “Amount of time spent on homework per week” column. The table may need to include hours greater than 14. A preliminary survey of students you plan to survey may be helpful to determine if the number of hours needs to be increased. If you do so, add additional hours in increments of 2.
- b. Modifying the “Information about you” to describe the students you are planning to survey. See the “Sample Response” below for an investigation using 9th and 10th grade student.

**Directions**

Select **ONE** of the times listed below that is the closest approximation of how much time you spend on homework for per **WEEK**.

<b>Amount of time spent on homework per week</b>	<b>Check one</b>
0 hrs	
2 hrs.	
4 hrs.	
6 hrs.	
8 hrs.	
10 hrs.	
12 hrs.	
14 hrs.	

Information about you (check \_\_\_\_\_ that describes you):

**Sample Response**

Information about you (check the grade that describes you):

Grade: \_\_\_\_\_9th      \_\_\_\_\_ 10th



### Scenario

The amount of time students spend on homework varies among students even within one school. The use of a survey with an appropriate sample of the students of a school can provide data to see how widely the amount of time spent on homework varies among the students of that school.

### Project Steps

#### Sampling Part of the Project

Ask your Project Monitor for a copy of the Homework Survey about length of time spent on homework. Using the Homework Survey, design and conduct an investigation to determine the length of time students at your school spend on homework per week. The investigation should compare data from at least 2 groups of students. The 2 groups should have no students in common. (For example: students from the 9th grade versus 10th grade, OR male students versus female students)

1. Describe the 2 groups that you will use in your investigation and modify the Homework Survey so that the students identify which group they are from.
2. Design the investigation to include a method to select a simple random sample of at least 30 students from each of the groups you choose. Describe this method and justify that it will provide a simple random sample of students.

**CHECK POINT**      **Date** \_\_\_\_\_      **Student/Monitor Initials** \_\_\_\_/\_\_\_\_

3. Select the sample of students.
4. Administer the survey to each member of the sample.

**CHECK POINT**      **Date** \_\_\_\_\_      **Student/Monitor Initials** \_\_\_\_/\_\_\_\_

5. Display the results in an appropriate data display.
6. Analyze the data for each group of students using measures of central tendency and variability. Use mathematics to explain how you determined the measures of central tendency and variability.



7. Estimate the length of time each group of students spends on homework per week. Use mathematics to justify your estimate.
8. Make a comparison of the time each group spends on homework per week and justify your comparison using measures of central tendency and variability.

**CHECK POINT**      Date \_\_\_\_\_      **Student/Monitor Initials** \_\_\_\_/\_\_\_\_

### **Simulation Part of the Project**

Using the data from one of the groups, design and conduct a simulation to estimate the probability that 5 randomly selected members of that group will all spend at least 4 hours on homework per week.

Include in your simulation:

9. The data of the group of students you are using for the simulation. For this group, calculate the probability that you are using in the simulation. Explain how you calculated this probability.
10. A tool that models this probability. Describe how the tool models this probability. Justify that this tool is appropriate for this simulation.
11. A description of one trial of the simulation and a justification of one trial. Describe and justify how you will determine if a trial is a success or a failure.
12. The result of the 10 trials.
13. Analysis of the data from the 10 trials. Use mathematics to justify your analysis of the data.
14. An estimation of the probability that 5 randomly selected members of that group will all spend at least 4 hours on homework per week based on the data from the 10 trials. Use mathematics to justify your estimate.

**CHECK POINT**      Date \_\_\_\_\_      **Student/Monitor Initials** \_\_\_\_/\_\_\_\_



**PROJECT SCORING CRITERIA**

**Overview**

In order to satisfactorily complete this project, the student must:

- complete ALL of the project steps, and
- demonstrate understanding of nineteen (19) of the twenty-five (25) competencies.

**Category 1: Sampling**

The student may receive credit for a maximum of twelve (12) competencies in this category.

Step	Progress Check* <input type="checkbox"/>	Competency
		The student:
1	<input type="checkbox"/>	Determines the 2 groups of students to be part of the investigation
2a	<input type="checkbox"/>	Designs a simple random sampling technique as part of the investigation
2b	<input type="checkbox"/>	Uses principles of simple random sampling to justify the technique.
4	<input type="checkbox"/>	Selects the sample and gathers the data
5	<input type="checkbox"/>	Displays the data with an appropriate data display
6a	<input type="checkbox"/>	Calculates the mean for each group
6b	<input type="checkbox"/>	Explains how to determine the mean
6c	<input type="checkbox"/>	Determines the median for each group
6d	<input type="checkbox"/>	Explains how to determine the median
6e	<input type="checkbox"/>	Determines the mode for each group
6f	<input type="checkbox"/>	Explains how to determine the mode
6g	<input type="checkbox"/>	Calculates the range and/or interquartile range for each group
7a	<input type="checkbox"/>	Determines which measure of central tendency is the best representation of the data for each group
7b	<input type="checkbox"/>	Justifies the measure of central tendency used to represent the data for each group
8a	<input type="checkbox"/>	Makes an informed decision about the given situation
8b	<input type="checkbox"/>	Uses the measures of central tendency and variability correctly to compare the two groups of students with a justification

*\* Progress checks do not indicate approval of student work.*



**Category 2: Simulation**

The student may receive credit for a maximum of seven (7) competencies in this category.

**Progress**

Step	Check* <input type="checkbox"/>	Competency
9a	<input type="checkbox"/>	Calculates the experimental probability of an event
9b	<input type="checkbox"/>	Explains how to determine the experimental probability
10a	<input type="checkbox"/>	Selects a tool that models the probability including what a success and failure are
10b		Justifies the selected tool
11a	<input type="checkbox"/>	Defines a trial for the simulation including what a success and a failure are
11b	<input type="checkbox"/>	Justifies the trial design
12	<input type="checkbox"/>	Conducts the prescribed number of trials and records the results.
13	<input type="checkbox"/>	Summarizes the results of the trials and forms an appropriate conclusion
14a	<input type="checkbox"/>	Calculates the experimental probability of an event
14b	<input type="checkbox"/>	Justifies the experimental probability

*\* Progress checks do not indicate approval of student work.*



