**Subject area/course**: Mathematics

**Grade level/band**: 8

**Task source**: New Hampshire Task Bank; Author: Deborah Dyer

**Printing Yearbooks**

**TEACHER'S GUIDE**

1. **Task overview**:

Students will choose the best option for a yearbook under the given conditions. They will analyze pricing from different yearbook companies and narrow their choices to three. They will create models and use these to solve the task algebraically and graphically. They will create a presentation explaining the best option they selected from the choices. Students’ explanation should contain their criteria as to why it is the best option, and mathematical computations and representations that justify their choice.

1. **Aligned standards:**
2. **Primary Common Core State Standards**

CCSS.G8.EE.8.c Analyze and solve pairs of simultaneous linear equations. Solve real-world and mathematical problems leading to linear equations in two variables. For example, given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair.

CCSS.G8.F.4 Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.

CCSS.Math.Practice.MP2 Reason abstractly and quantitatively.

CCSS.Math.Practice.MP4 Model with mathematics.

CCSS.Math.Practice.MP6 Attend to precision.

1. **Secondary Common Core State Standards (optional)**

CCSS.G8.EE.8b Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. For example, 3x + 2y = 5 and 3x + 2y = 6 have no solution because 3x + 2y cannot simultaneously be 5 and 6.

1. **Critical abilities**

*Analysis of information* - Integrate and synthesize multiple sources of information (e.g., texts, experiments, simulations) presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to address a question, make informed decisions, understand a process, phenomenon, or concept, and solve problems while evaluating the credibility and accuracy of each source and noting any discrepancies among the data.

*Communication in many forms* - Use oral and written communication skills to learn, evaluate, and express ideas for a range of tasks, purposes, and audiences. Develop and strengthen writing as needed by planning, revising, editing, and rewriting while considering the audience.

*Use of technology* - Present information, findings, and supporting evidence, making strategic use of digital media and visual displays to enhance understanding. Use technology, including the Internet, to research, produce, publish, and update individual or shared products in response to ongoing feedback, including new arguments or information.

*Interpersonal interaction and collaboration* - Develop a range of interpersonal skills, including the ability to work with others, to participate effectively in a range of conversations and collaborations.

*Modeling, design & problem solving* - Use quantitative reasoning to solve problems arising in everyday life, society, and the workplace, e.g., to plan a school event or analyze a problem in the community, to solve a design problem or to examine relationships among quantities of interest. Plan solution pathways, monitoring and evaluating progress and changing course if necessary, and find relevant external resources, such as experimental and modeling tools, to solve problems. Interpret and evaluate results in the context of the situation and improve the model or design as needed.

1. **Other standards**

*New Hampshire Competencies*

6. Creating Equations. Students will demonstrate the ability to create and use algebraic models to connect mathematical concepts and properties when solving real-world problems.

7. Reasoning with Equations and Inequalities. Students will demonstrate the ability to explain and justify reasoning when solving equations, inequalities, and systems of equations.

1. **Time/schedule requirements:**

This task will take approximately 90-180 minutes to complete.

1. **Materials/resources:**
* Calculators
* Graph paper
* Rulers
* Chromebook/iPad/laptop (if available)
1. **Prior knowledge:**
* writing and graphing linear equations
* representing real-world linear relationships with tables, graphs, and equations
* solving systems of linear equations
* use internet to search information
1. **Connection to curriculum:**

Not provided.

1. **Teacher instructions:**

**Day 1: 30 – 45 minutes**

**Brainstorm Ideas**

1. Teacher gives overview of the task. State the goals, the purpose and the design of the final output. Teacher hands out rubric and explain the expectations for the task they are about to perform.
2. Teacher shows a sample yearbook from last year or previous years.
3. *Prompts: What do you like about last year’s yearbook or the previous years’ yearbook?*
	1. *What are some of the similarities/differences of these yearbooks?*
	2. *How would you like your yearbook to look? Why?*
4. Teacher hands out “Day 1 Brainstorm Sheet” to each student and asks students to write at least two things they like to have in their yearbook. Use “1 - 2 – 4 Strategy” to give students opportunity to discuss their ideas about what they like to have in their yearbook.

***1 – 2 – 4 Strategy***

1 – Students work individually to think and reflect about the prompt (list at least two things you want to have in your yearbook).

2 – Students will work with a partner to compare their list and come up with at least three common ideas they have. If they do not have any common ideas, partners need to come up with three ideas they agree on.

4 – Students will form groups of four and repeat the process of identifying three common ideas they want to have in their yearbook.

Teacher facilitates discussion regarding students’ ideas about their yearbook. Make notes on a chart paper of common themes/ideas that showed during their brainstorming activity. Inform students that the ideas they generated as a class about what they like to have in their yearbook can be used as evidence when justifying their option of choosing the best yearbook printer company.

**Day 2: 60 – 90 minutes**

**Research and Analyze Information**

 If students have access to the Internet in class, then give the sheet that records what they can find online. Otherwise, use the sheet with given information to analyze.

1. Teacher revisits the goals of the mathematical task. Teacher reminds students to use the ideas generated the previous session as a guide when they consider possible companies to print their yearbook.
2. Teacher will hand out the task and rubric to each student. [5 minutes]
3. Teacher will lead a class discussion using the questions listed on the performance task, allowing students to brainstorm and share ideas on how to solve the problem. [10-15 minutes]
4. Teacher will provide additional materials to students (graph paper, rulers, calculators, graphic organizers, chart paper, etc.) [5 minutes]
5. Students will work with a partner on completing the task. [45 - 70 minutes]

**Day 3: 30 - 45 minutes**

**Put it Together**

1. Teacher revisits the goals of the mathematical task. Teacher reminds students of completing all necessary information needed to finalize the final output.
2. Students can use PowerPoint presentation or the like if they have access to technology.
3. Students use chart paper to show mathematical calculations and graphs.
4. Students may use the attached graphic organizer to summarize their work and guide their presentation.
5. **Student support:**
* Extended time
* Problem read aloud
* Increased font size
* Provide graphic organizer for table, equations, and graph
* Provide calculators
* Worked samples from previous work
* List of vocabulary needed for this unit
* Provide sentence starters/frames
* Use actual samples of yearbook
* Show online yearbook pricing and yearbook samples
1. **Extensions or variations:**
* Final output can be an advertisement made on 1-sheet of paper showing:
	+ Comparison of 3 yearbook companies
	+ Evidence gathered from students’ ideas
	+ Mathematical calculations and representations
	+ Justification as to why a yearbook club or 8th graders (if scenario is changed) choose that yearbook company
1. **Scoring:**

Student work can be scored using the Printing Yearbooks Performance Task Rubric.