

# Inspect

## CCR Performance Task

**Math Grade 8: Extended Performance Task  
Starting a Summer Business**



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- shows the relationship between specific skills and higher-order thinking
- includes authentic, permissioned texts of appropriate complexity
- and documents student progress using DOK and learning progressions

**Help for teachers addressing the instructional shifts** with content that elicits evidence of learning from each response

# CCR Performance Tasks

## **Math Grade 8: Extended Performance Task Starting a Summer Business**

Student Test Booklet

**Name:**

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Name: \_\_\_\_\_

## **Math Grade 8: Extended Math Performance Task: Starting a Summer Business**

Complete all the tasks in the test booklet.

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School's out for summer! Now what? It's time to find something to do with all that extra time. You wouldn't mind earning some money while keeping busy, so you decide to start a business of your own. Before you begin, you want to have a plan so you can be sure you make the most of your time.

You will need to do a lot of work well before you collect your first dollar. You must look at how much money you will need just to get your business up and running. You should also decide how much time you want to spend working and for how much money. You can then organize all your thoughts into a simple business plan to help keep you on track this summer.

### **Part A: Choose a Business**

Selecting what type of business you would like to run should be first on your to-do list. It's a good idea to come up with a couple of ideas and look a little deeper into each before committing to your final project. In this section you will look at two possible businesses and evaluate each based on its start-up costs. The first business to examine will be a dog-walking business and the second will be one of your choosing from the following list: babysitting, lawn mowing, car washing, and party cookie baking.

Start-up costs are the initial expenses necessary to get a business started. There are a few costs involved in starting a business from scratch that can often be overlooked.

Research what it takes to start a dog-walking business. Determine the items you will need to start this type of business, and write down the cost of each. Make sure you include everything you will need to be successful on your first day of work.

Take notes on the graphic organizer provided below. You will use your notes to answer questions in this section.

1. Which websites did you use to find your information?



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## **Math Grade 8: Extended Math Performance Task: Starting a Summer Business**

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### **Support Worksheet for Part A: Question 3**

Which items did you decide to buy to start your business? Decide how many of each type of item you will need in order to start your business. Use the table below to list out the items and costs.

<b>Item</b>	<b># Needed</b>	<b>Cost Per Item</b>	<b>Total Cost</b>

Some of the items you purchase at the start of your business can be used over and over again without the need to replace them. Others, however, may need to be replaced with each new client. Use the table below to show which items you would need to replace.

<b>Item</b>	<b>Cost Per Unit</b>	<b>Cost Per Use</b>

Name: \_\_\_\_\_

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What is the total cost per client for each consumable item? Explain how you determined the cost per use for each consumable item.

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What is your total start-up cost? Show your work.

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Name: \_\_\_\_\_

## **Math Grade 8: Extended Math Performance Task: Starting a Summer Business**

Now it's time to take a look at your second business option. Follow the same steps you did in evaluating the dog-walking business.

4. What type of business are you looking into?

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Research what it takes to start your particular business. Determine the items you will need to start this type of business, and write down the cost of each. Make sure you include everything you will need to be successful on your first day of work.

5. Which websites did you use to find your information?

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6. What items do you need to begin your business? How much does each item cost? (Look into at least 3 different places to compare costs.) Fill in the table below.

<b>Item</b>	<b>Cost at Store #1</b>	<b>Cost at Store #2</b>	<b>Cost at Store #3</b>



Name: \_\_\_\_\_

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### **Support Worksheet for Part A: Question 7**

Which items did you decide to buy to start your business? Decide how many of each type of item you will need in order to start your business. Use the table below to list out the items and costs.

<b>Item</b>	<b># Needed</b>	<b>Cost Per Item</b>	<b>Total Cost</b>

Some of the items you purchase at the start of your business can be used over and over again without the need to replace them. Others, however, may need to be replaced with each new client. Use the table below to show which items you would need to replace.

<b>Item</b>	<b>Cost Per Unit</b>	<b>Cost Per Use</b>

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What is the total cost per client for each consumable item? Explain how you determined the cost per use for each consumable item.

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What is your total start-up cost? Show your work.

Name: \_\_\_\_\_

## **Math Grade 8: Extended Math Performance Task: Starting a Summer Business**

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Equations can be very useful when you are not sure what your total number of clients or hours will be. By doing a little bit of work ahead of time you can create an equation that can be used with any number of future clients.

8. Create an equation that summarizes your start-up costs for the dog-walking business. Explain how you created this equation and how you will use it in your business planning.

9. Create an equation that summarizes your start-up costs for the other business you chose. Explain how you created this equation and how you will use it in your business planning.

Name: \_\_\_\_\_

## **Math Grade 8: Extended Math Performance Task: Starting a Summer Business**

### **Support Worksheet for Part A: Question 8**

Write an equation that represents all of the costs associated with running a dog-walking business. Make sure to define the variables and show your work.

Are there any of your costs that are constant? Are there any that are dependent on another variable?

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Describe a scenario in which the use of this equation would make running your business easier.

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Name: \_\_\_\_\_

**Math Grade 8: Extended Math Performance Task: Starting a Summer Business**

**Support Worksheet for Part A: Question 9**

Write an equation that represents all of the costs associated with the other business you chose. Make sure to define the variables and show your work.

Are there any of your costs that are constant? Are there any that are dependent on another variable?

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Describe a scenario in which the use of this equation would make running your business easier.

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Name: \_\_\_\_\_

## **Math Grade 8: Extended Math Performance Task: Starting a Summer Business**

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### **Part B: Name Your Price**

This may be the first time you are going into business, but it is likely that it is not the first time this particular business has been done. It's a good idea to see what others in your field are doing.

11. Research three businesses that are doing something similar to what you'd like to do this summer. Take notes on the graphic organizer provided. You will use your notes to answer questions in this section.

<b>Company Name</b>	<b>Service</b>	<b>Pricing Options</b>

Now that you have decided on your perfect summer job and have taken a look at the competition, it's time to decide how much you want to charge your customers and what services you want to provide. By examining the information you've collected so far you can decide how much profit (what's left over after you pay for everything you need for the business) you are looking to make.

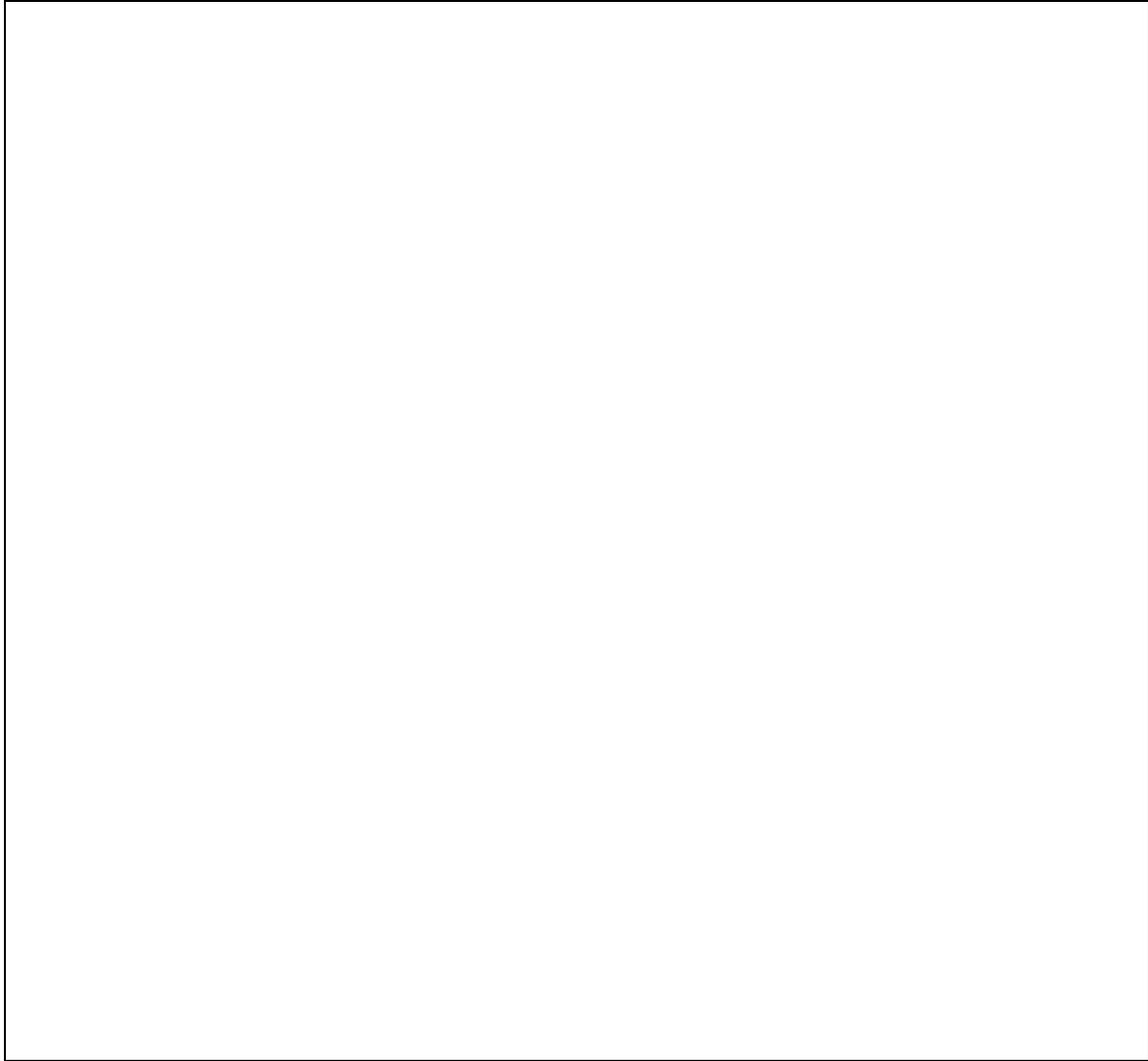
12. Decide how much you will charge your customers for your service.

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13. Create a visual representation to show when the business will begin to make a profit (algebraically, graphically, numerically in tables, and/or by verbal description).



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### **Support Worksheet for Part B: Questions 12 and 13**

Using the equation you created to help with pricing in Part A and the start-up fee you calculated, how much money would you need to charge your first customer to break even? Explain how you know.

It would not be necessary (or practical) to charge your first customer this much money to cover the cost of your start-up. Based on the information you gathered from your competition, determine how much would be a reasonable price to charge your customers. Explain how you determined your price point.

How much work would you need to perform at the price you set in Question 3 or 7 (depending on which business you chose) to break even? Show how you know.

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Now that you know how much time and money it will take to break even, create a way to show when the business will begin to make a profit. Why is this the best way to show this?

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You now know how much you will be charging your customers, so it's time to take a look at how many hours you want to work this summer.

14. Describe your financial goal for this business. Decide how much money you want to earn. Determine how much work you will need to do to reach your goal.

15. Create a tentative work schedule to help you achieve your financial goal for this business (maximum amount to work in a week in order to earn the maximum amount of money). Explain how you managed your time.

Name: \_\_\_\_\_

**Math Grade 8: Extended Math Performance Task: Starting a Summer Business**

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16. What is the total amount of money you can expect to make based on your tentative schedule? How did you calculate your total earnings?



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Write an equation that represents your monthly gross earnings.

Write an equation that represents your monthly net earnings.

Using the equation you created for your start-up costs, how much will you need to make each month to break even? Show your work.

Name: \_\_\_\_\_

## **Math Grade 8: Extended Math Performance Task: Starting a Summer Business**

### **Part C: Plan the Business**

Outline a plan that details the information you have gathered in preparing to start your own business. The questions below should help you write a final business plan you can easily refer to at any time during the life of your business.

Company name: \_\_\_\_\_

Owner: \_\_\_\_\_

Describe the services and/or products your business will provide.

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What are the unique features of your specific business? What sets you apart from the competition? You can include details showing what you provide above and beyond what is regularly expected.

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Name: \_\_\_\_\_

## **Math Grade 8: Extended Math Performance Task: Starting a Summer Business**

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How much money will it take to begin to see a profit? Use the calculations you made when deciding when you would break even and how you showed when the business will see a profit.

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What are your financial goals for your business?

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Describe your potential customers. How old are they? Where do they live? What are their distinguishing characteristics (have a dog, children, large lawn, etc.)? Be as specific as possible.

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Name: \_\_\_\_\_

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How do you plan to market your business to potential customers (flyers, email, word of mouth)? Describe your plan of action.

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# CCR Performance Tasks

## **Math Grade 8: Extended Performance Task Starting a Summer Business**

Teacher Guide

## Task Specifications

<b>Content Area</b>	Mathematics
<b>Title</b>	Starting a Summer Business
<b>Grade Level</b>	Grade 8
<b>Problem Type</b>	Extended Performance Task
<b>Standards for Mathematical Practices</b>	<p><b>Mathematical Practice 1 (MP.1):</b> Make sense of problems and persevere in solving them. Mathematically proficient students:</p> <ul style="list-style-type: none"> <li>• Explain to themselves the meaning of a problem and look for entry points to its solution.</li> <li>• Analyze givens, constraints, relationships, and goals.</li> <li>• Make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt.</li> <li>• Consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution.</li> <li>• Monitor and evaluate their progress and change course if necessary.</li> <li>• Explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends.</li> <li>• Check their answers to problems using a different method, and they continually ask themselves, “Does this make sense?”</li> <li>• Understand the approaches of others to solving complex problems and identify correspondences between different approaches.</li> </ul> <p><b>Mathematical Practice 4 (MP.4):</b> Model with mathematics. Mathematically proficient students:</p> <ul style="list-style-type: none"> <li>• Apply the mathematics they know to solve problems arising in everyday life, society, and the workplace.</li> <li>• Apply what they know and are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later.</li> <li>• Identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts, and formulas.</li> <li>• Analyze relationships mathematically to draw conclusions.</li> <li>• Interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.</li> </ul> <p><b>Mathematical Practice 6 (MP.6):</b> Attend to precision. Mathematically proficient students:</p> <ul style="list-style-type: none"> <li>• Communicate precisely to others.</li> <li>• Use clear definitions in discussion with others and in their own reasoning.</li> <li>• State the meaning of symbols they choose, including using the equal sign consistently and appropriately.</li> <li>• Are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem.</li> <li>• Calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context.</li> </ul>

## Math Grade 8: Extended Performance Task: Starting a Summer Business

<b>Common Core State Standards</b>	<p><b>8.EE.8b</b> Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection.</p> <p><b>8.EE.8c</b> Solve real-world and mathematical problems leading to two linear equations in two variables.</p> <p><b>8.F.2</b> Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal description).</p> <p><b>8.F.3</b> Interpret the equation <math>y = mx + b</math> as defining a linear function, whose graph is a straight line; give examples of functions that are not linear.</p>
<b>CCSS Literacy in Writing-Grade 6-8</b>	<p><b>WHST.6-8.5</b> With some guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on how well purpose and audience have been addressed.</p> <p><b>WHST.6-8.2</b> Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.</p>
<b>SBAC Assessment Claims</b>	<p><b>Claim 4: Modeling and Data Analysis</b>—Students can analyze complex, real-world scenarios and can construct and use mathematical models to interpret and solve problems.</p>
<b>PARCC Assessment Claims</b>	<p><b>Sub-Claim D: Highlighted Practice MP.4 with Connections to Content (modeling/application)</b>—The student solves real-world problems with a degree of difficulty appropriate to the grade/course by applying knowledge and skills articulated in the standards for the current grade/course (or for more complex problems, knowledge and skills articulated in the standards for previous grades/courses), engaging particularly in the Modeling practice.</p>
<b>Depth of Knowledge</b>	<p><b>Level 4: Extended Strategic Thinking</b>—Curricular elements assigned to the level demand extended use of higher order thinking processes such as synthesis, reflection, assessment and adjustment of plans over time. Students are engaged in conducting investigations to solve real-world problems with unpredictable outcomes. Employing and sustaining strategic thinking processes over a longer period of time to solve the problem is a key feature of curricular objectives that are assigned to this level. Key strategic thinking processes that denote this particular level include: synthesize, reflect, conduct, and manage.</p>
<b>Task Overview</b>	<p>In this task you will be asked to create your own summer business. You will research start-up costs for both a dog-walking business and a business of your choosing. You will look into your competition and set your price based on your research. You will determine your financial goal for this business and create a schedule to ensure you meet this goal. You will conclude by creating a business plan outlining the information you've gathered throughout the task as well as information about your potential customers and marketing. An extension activity is available that will help you to develop a marketing plan, surveying your peers to discover interest in your products/services.</p>

### Student Task

School's out for summer! Now what? It's time to find something to do with all that extra time. You wouldn't mind earning some money while keeping busy, so you decide to start a business of your own. Before you begin, you want to have a plan so you can be sure you make the most of your time.

You will need to do a lot of work well before you collect your first dollar. You must look at how much money you will need just to get your business up and running. You should also decide how much time you want to spend working and for how much money. You can then organize all your thoughts into a simple business plan to help keep you on track this summer.

#### **Part A: Choose a Business**

Selecting what type of business you would like to run should be first on your to-do list. It's a good idea to come up with a couple ideas and look a little deeper into each before committing to your final project. In this section you will look at two possible businesses and evaluate each based on their start-up costs. The first business to examine will be a dog-walking business and the second will be one of your choosing from the following list: babysitting, lawn mowing, car washing, and party cookie baking.

Start-up costs are the initial expenses necessary to get a business started. There are a few costs involved in starting a business from scratch that can often be overlooked.

Research what it takes to start a dog walking business. Determine the items you will need to start this type of business, and write down the cost of each. Make sure you include everything you will need to be successful on your first day of work.

1. Which websites did you use to find your information?
2. What items do you need to begin a dog-walking business? How much does each item cost? (Look into at least 3 different places to compare costs.) Fill in the table below.
3. Now that you have this information you are ready to calculate your start-up costs. How much money will you need to bring your services to your first customer? Explain how you determined your total start-up cost. Include a description of the items you decided you need and why.

Now it's time to take a look at your second business option. Follow the same steps you did in evaluating the dog-walking business.

4. What type of business are you looking into?

Research what it takes to start your particular business. Determine the items you will need to start this type of business, and write down the cost of each. Make sure you include everything you will need to be successful on your first day of work.

5. Which websites did you use to find your information?
6. What items do you need to begin your business? How much does each item cost? (Look into at least 3 different places to compare costs.) Fill in the table below.
7. Now that you have this information you are ready to calculate your start-up costs. How much money will you need to bring your services to your first customer? Explain how you determined your total start-up cost.

Equations can be very useful when you are not sure what your total number of clients or hours will be. By doing a little bit of work ahead of time you can create an equation that can be used with any number of future clients.

## **Math Grade 8: Extended Performance Task: Starting a Summer Business**

8. Create an equation that summarizes your start-up costs for the dog-walking business. Explain how you created this equation and how you will use it in your business planning.
9. Create an equation that summarizes your start-up costs for the other business you chose. Explain how you created this equation and how you will use it in your business planning.
10. You have now closely examined what it takes to start two different types of businesses. Take a moment to look over the information you have gathered. Based on this information, what business would you like to pursue for summer employment? Explain how you came to this decision.

### **Part B: Name Your Price**

This may be the first time you are going into business, but it is likely that it is not the first time this particular business has been done. It's a good idea to see what others in your field are doing.

11. Research three businesses that are doing something similar to what you'd like to do this summer. Take notes on the graphic organizer provided. You will use your notes to answer questions in this section.

Now that you have decided on your perfect summer job and have taken a look at the competition it's time to decide how much you want to charge your customers and what services you want to provide. By examining the information you've collected so far you can decide how much profit (what's left over after you pay for everything you need for the business) you are looking to make.

12. Decide how much you will charge your customers for your service.

13. Create a visual representation to show when the business will begin to make a profit (algebraically, graphically, numerically in tables, and/or by verbal description).

You now know how much you will be charging your customers, so it's time to take a look at how many hours you want to work this summer.

14. Describe your financial goal for this business. Decide how much money you want to earn. Determine how much work you will need to do to reach your goal.

15. Create a tentative work schedule to help you achieve your financial goal for this business (maximum amount to work in a week in order to earn the maximum amount of money). Explain how you managed your time.

16. What is the total amount of money you can expect to make based on your tentative schedule? How did you calculate your total earnings?

### **Part C: Plan the Business**

Outline a plan that details the information you have gathered in preparing to start your own business. The questions below should help you write a final business plan you can easily refer to at any time during the life of your business.

Company name: \_\_\_\_\_

Owner: \_\_\_\_\_

Describe the services and/or products your business will provide.

What are the unique features of your specific business? What sets you apart from the competition? You can include details showing what you provide above and beyond what is regularly expected.

## **Math Grade 8: Extended Performance Task: Starting a Summer Business**

How much money will it take to begin to see a profit? Use the calculations you made when deciding when you would break even and how you showed when the business will see a profit.

What are your financial goals for your business?

Describe your potential customers. How old are they? Where do they live? What are their distinguishing characteristics (have a dog, children, large lawn, etc.)? Be as specific as possible.

How do you plan to market your business to potential customers (flyers, email, word of mouth)? Describe your plan of action.

### **Part C (optional): Verify the Plan**

In this section, you will need to partner with another student. Exchange your plan with your partner.

Review your partner's outline for their plan to make sure it is correct and complete. Prepare detailed notes for your partner. Clearly show the parts of the outline that you think are good, creative, or well communicated. Also clearly show which parts are not clear enough, not detailed enough, or contain mistakes. Below are some questions to ask.

- a. Does the outline specify all of the costs involved in starting a business?
- b. Is the price of the service reasonable?
- c. Will the plan result in attaining the financial goals that are set?
- d. Do you have any questions about the plan? Did they forget anything?

### **Part C (optional): Adjust Your Plan**

In this section, you will need to continue to work with your partner from the previous section in Part C. Give back your partner's plan and your review of their plan. Work with each other to make any adjustments that need to be made in order for you both to have a successful business plan.

Make any new adjustments that are needed to the outline of your plan so that you reach your business plan's financial goal. Use the response box below to rewrite and adjust any changes that need to be made to your original outline from the first section in Part C. Feel free to work with your partner to make sure your plan includes all of the details needed to show that your business will be successful.

### **Part D: Your Final Business Plan**

Writing a business plan is a great idea for people wanting to start a business. It's a way to get all of the hard work you've done in the planning stages down in one place. It is a document you can easily refer to at any time during the life of your business. Your business plan should contain detailed information about 1) the name of the company and description of the services/products you will provide, 2) unique features of your specific business, 3) how much money it will take to begin to see a profit, 4) your financial goals for the company, 5) your potential customers, and 6) how you plan to market your business to potential customers. The plan should be written clearly and contain correct information.

17. Write a plan that details how you will reach your financial goal for your business. Along with the information listed above, include at least one interesting fact, idea, or conclusion that will make your business a success.

## Math Grade 8: Extended Performance Task: Starting a Summer Business

### Teacher Instructions

This performance task is designed to assess student understanding of a variety of content and mathematical practice standards. Students are challenged to solve a real-world problem involving mathematical operations and rates. They obtain information about a business and develop a written plan based on their research to solve a problem. The plan should clearly and correctly lay out the steps that the student will need to organize to ensure its success. The task was designed with the understanding that all classrooms and students are different. Some students may need an extension activity, some may need to reduce the number of days planned for this task, and some may need to omit or simplify certain parts depending on what time during the school year this task is given.

#### Test Definition File

Item	Correct Answer	Practice Standard	Common Core Standard
1	See scoring rubric	Mathematical Practice 1, 4, and 6	8.EE.8b, 8.EE.8c, 8.F.2, 8.F.3
			<b>CCSS ELA-Literacy Standards</b>
			WHST.6–8.5, WHST.6–8.2

SBAC Claims	PARCC sub-claims
4	D

Before the task:

- The concept of profit should be introduced. Profit can be defined as follows: Profit = Revenue - Expenses. Some real-life examples should be given and explained. For example, if Emily spends \$200 to plant a garden and sells the vegetables she grows for \$800, she makes a profit of \$600.
- The concept of consumable items should be defined and discussed.
- The concept of a business plan should be defined and discussed.

#### Vocabulary:

Start-up cost  
Revenue  
Profit  
Consumable item  
Business plan

#### Setting the Context:

**Teacher:** “Has anyone ever operated a lemonade stand? What was the reason you sold lemonade?”

[Let students respond after each question. Additional/alternative examples of appropriate money-earning ventures can be discussed, as appropriate.]

**Teacher:** “What would you need before you could begin selling lemonade?”

[Let students respond. Guide the discussion to consider various costs for making and selling a product or service, and reinforce that supplies at home still have a cost associated.]

## **Math Grade 8: Extended Performance Task: Starting a Summer Business**

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**Teacher:** “How would you determine the price of a cup of lemonade?” [Let students respond. Guide the discussion to consider how pricing might follow from the cost discussion above.] Give an introduction to the task. A suggested introduction is below. Some of the information may need to be repeated each day.

**Teacher:** “You will be given a situation that involves putting together a plan for a summer business. You will determine what business you would like to run, based on calculations of start-up costs, the number of hours you would like to work, and the amount of profit you would like to earn. You will research two types of businesses to pick from: one will be a dog-walking business, and the second will be one you may choose from a list provided.”

### **Timeline:**

There are two different options to choose.

**Option 1:** This option should take 3 days (or 3 hours with the assumption that math lessons/activities take up an hour during the school day).

**Day 1:** The students should complete Part A.\*

**Day 2:** The students should complete Part B and Part C: Plan the Business.

**Day 3:** The students should complete Part D.

\*Part A contains a research aspect. Students may need extra time to complete this part if researching takes longer than planned. This time could either be given as outside work (homework) or an extra day could be added to the timeline.

**Option 2:** This option should take 4 days (or 4 hours with the assumption that math lessons/activities take up an hour during the school day).

**Day 1:** The students should complete Part A.\*

**Day 2:** The students should complete Part B.

**Day 3:** The students should complete Part C.\*\*

**Day 4:** The students should complete Part D.

\*Part A contains a research aspect. Students may need extra time to complete this part if researching takes longer than planned. This time could either be given as outside work (homework) or an extra day could be added to the timeline.

\*\* Part C contains group work that may take longer than expected. You may need to plan for an extra day if needed.

### **Other suggestions:**

- A calculator is optional and up to the discretion of the classroom teacher. This task can be completed without calculators.
- In Part A, Question 1 the following links can be provided to research start-up costs for dog walking:
  - [www.petsmart.com](http://www.petsmart.com)
  - [www.petco.com](http://www.petco.com)
  - [www.amazon.com](http://www.amazon.com)
- For students to understand all that is involved in start-up costs, it is possible to allow them to experiment with an online ordering process (stopping just before the payment screen is shown). This will illustrate that there are add-on costs involved in buying supplies (shipping charge and tax). However, much of what the student could buy for this business can be found in stores.
- It is also possible to provide students with printed price sheets for a number of pet supply stores, plus a mockup order form (showing tax and shipping requirements),

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- if the Internet is not readily available to students or will otherwise not be used for this task.
- In Part A, it may be necessary to set the context before students begin their work on determining overall start-up costs. The issue of consumable items may need to be discussed. You can talk about dog treats and how this item may need to be purchased over and over. You may also want to talk to the students about how different size dogs may need/require different size treats. The students should keep all of this in mind when thinking about their start-up costs.
  - In Part B, Question 13 the students may use any mathematical representation that appropriately shows their plans. Mathematical representation could be a graph, chart, table, equations with defined variables, or a combination of these. The students should be allowed to use a separate sheet of paper or graph paper to show these representations. Make sure they attach these to this task.
  - Within the task, there are optional support worksheets for students to use that may help to organize their thoughts and guide any students who may be struggling with mathematical means of representing profit.

## **Extension Activity**

This activity can be extended to create advertising material for the student's selected business or to conduct research on its potential. For example:

1. Design a flyer that could be used to inform your possible customers about what your business is offering. Here are a few things to consider for your flyer:
  - Describe your product or service. What are its most significant features?
  - Who will this product or service appeal to most?
  - How does your product/service compare to the competition?
  - How much will you charge for your product/service?
2. Create and conduct a survey to ask your peers if they, or their families, would be interested in the product or service your business is offering.
  - Include specific questions about their interest in the product or service.
  - Ask if they feel the cost is reasonable.
  - Record the results of the survey in a two-way table, and draw conclusions from the data (relationships between responses and gender, cost, etc.).

## Scoring Rubric

### Part A

#### 4 Point Response:

The response demonstrates a high level of understanding. The response demonstrates:

- A strong ability to make sense of a real-world problem and develop a solution that meets given requirements;
- A strong ability to calculate accurately with an appropriate degree of precision;
- A strong ability to check work and communicate reasoning in a clear and precise way;
- A strong understanding of how to solve real-world and mathematical problems leading to linear equations with two variables.

A level 4 response should include:

- At least two appropriate websites named for researching dog-walking businesses and a table of supply costs that is appropriate and complete;
- A clear and correct explanation of how to calculate the money needed to start the business;
- A correct table for costs of items that will need to be replaced, filled in with cost per use and total cost per client, and a clear explanation is provided for finding the cost per use;
- In Questions 4-7, the required information: at least two appropriate websites for researching their chosen business and a table of supply costs that is appropriate and complete; a clear and correct explanation of how to calculate the money needed to start the business; the table for costs of items that will need to be replaced, correctly filled in with cost per use and total cost per client; a clear explanation for finding the cost per use;
- The information required to support the summer business chosen, including a clear and complete explanation of why the student chose the type of business selected, with complete details of the work done in previous answers as evidence for this selection.

#### Sample Responses for Part A

Question 1:

I went to the links provided in the teacher instructions (or used the provided information for the dog-walking business). [If students use other websites, the exact links should be listed.]

Question 2:

Item	Cost at Store #1	Cost at Store #2	Cost at Store #3
Leash	\$12.47	\$11.99	\$14.99
Harness	\$21.99	\$9.99	\$11.99
Collar (adjustable for small to medium dogs)	\$12.99	\$8.99	\$7.99
Collapsible Water Bowl	\$4.99	\$5.97	\$7.34
Dog Toy	\$8.99	\$5.99	\$6.28
Treat Pouch	\$8.99	\$9.59	\$15.26
Treats (for all sized dogs) (300)	\$10.99	\$11.99	\$14.19
Dog Waste Bags (240)	\$19.99	\$16.49	\$12.39
Backpack	--	--	\$29.99
Water bottles (24 pack)	--	--	\$3.99

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### Question 3:

I decided I wanted to buy all of my supplies from one place instead of going to many different places. I wanted to choose the place that had the lowest cost for all of the items I needed. Since Store #2 is close by and has most of the supplies that I need, I decided to go with them. I can purchase the backpack and water from a grocery store for about the same amount as shown in the Store #3 column. The total amount needed to buy the items needed to start up my dog-walking business is \$114.98. I need to include tax, which is 9%, so now my total is  $114.98 + 10.35 = \$125.33$ . The total amount of money I will need to bring services to my first customer is \$125.33. Some of the items on my list are consumable products and will need to be replenished once I use them up. Water, treats, and waste bags are all in this category. If I use 1 water bottle for every 2 dogs and then 4 treats and 1 waste bag for each dog I take on 1 walk, then I can find the unit cost to determine the recurring costs. Since a 24-pack of water is 3.99, then each bottle costs \$0.16625. Because I am using 1 bottle for 2 dogs, I will take half of the unit cost to find how much each dog per walk will be. The cost per dog is \$0.08. The container of treats has 300 treats, so the unit cost for 1 treat is \$0.03. This means that each dog per walk will cost \$0.12 if I give 4 treats. The waste bags are in a package of 240, so the unit cost for a bag is \$0.07. This means that I should add \$0.27 ( $0.08+0.12+0.07$ ) per dog so that I will have money to buy more items.

### Questions 4–7:

Answers will vary and will depend on which business the student chooses to research. Use the dog-walking answers for Questions 2 and 3 as a reference for the answers to these questions.

### Question 8:

I created a linear equation in which  $y$  equals my start-up costs,  $m$  equals the amount of money I need to make in an hour, and  $x$  equals the number of hours I need to work. I have a constant consumable cost of 27 cents for each dog that I walk in order to replenish the treats, water, and waste bags. My equation can be written as  $y = mx + 0.27$ . I will use this equation to figure out my break-even amount, which is the amount I need to make in order to pay for the start-up costs. I know that after I reach this break-even amount, I will begin to earn money to save and spend on the things that I want or need.

### Question 9:

Answers will vary and will depend on which business the student chooses to research. Use the dog-walking answer for Question 8 as a reference for the answer to this question.

### Question 10:

I decided to go with starting a dog-walking business because it will cost me less to start than the cookie-baking business. I originally thought I would want to start a party-cookie-baking business, but after the work I did in part A I realized it would require me to buy a lot of materials up front as well as each time I have a new customer. I really just want something easy and cheap to start this summer, so the dog-walking business makes sense.

### **3 Point Response:**

The response demonstrates a strong understanding, but the work is incomplete or contains minor errors.

A level 3 response is characterized by:

- A list of websites and table of supply costs that are incomplete or contain one minor error;
- An explanation for calculating start-up costs that is incomplete or includes supporting calculations with one minor error;
- A pricing model with a minor calculation error;
- A strong understanding of how to use an equation in a real-world scenario, demonstrated by a clear and correct description of when to use the pricing model equation;

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- A strong understanding of how to find start-up costs, demonstrated by a clear and correct explanation of how the money needed to start the company is calculated, but a minor calculation error is made or the explanation is incomplete;
- A strong understanding of decision making, demonstrated by a clear and complete explanation of why the student chose the type of business selected, with some details of the work done in previous answers as evidence for this selection.

### **2 Point Response:**

The response demonstrates a basic but incomplete understanding.

A level 2 response is characterized by:

- A list of websites and table of supply costs that are incomplete or contain two or more minor errors;
- A basic understanding of how to find start-up costs, demonstrated by an explanation of how the money needed to start the company is found, but two or more minor calculation errors or one major calculation or concept error is made;
- A pricing model, but an explanation of how to create the equation for the pricing model contains two or more minor calculation errors or one major calculation error or concept error which leads to an incorrect pricing model;
- A description of a scenario of when to use the equation of the pricing model, but two or more minor concept errors are made;
- A basic understanding of how to find start-up costs, demonstrated by a clear and correct explanation of how the money needed to start the company is calculated, but two or more minor calculation errors are made or the explanation is incomplete;
- A basic understanding of decision making, demonstrated by an explanation of why the student chose the type of business selected, with at least one detail of the work done in Part A as evidence for this selection.

### **1 Point Response:**

The response demonstrates a minimal understanding.

A level 1 response is characterized by:

- A list of websites and table of supply costs that are incomplete or contain two or more minor errors;
- A weak understanding of how to find start-up costs, demonstrated by an explanation of how the money needed to start the company is determined, but two or more major calculation errors are made or the explanation is missing;
- A pricing model which is incorrect because of major concept errors;
- A weak understanding of equations, demonstrated by an explanation of how to create an equation for a pricing model, but two or more major calculation errors are made or the explanation is missing;
- An incomplete description of a scenario to use the equation;
- A weak understanding of decision making, demonstrated by an explanation of why the student chose the type of business selected, but no details of the work done in Part A are given as evidence for this selection.

### **0 Point Response:**

There is no response, or the response is off topic.

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### Part B

#### 4 Point Response:

The response demonstrates a high level of understanding. The response demonstrates:

- A strong ability to make sense of a real-world problem and develop a solution that meets given requirements;
- A strong ability to calculate accurately with an appropriate degree of precision;
- A strong ability to check work and communicate reasoning in a clear and precise way;
- A strong understanding of how to solve real-world and mathematical problems leading to linear equations with two variables.

A level 4 response includes:

- A table with three businesses and their corresponding services and prices completely filled in;
- A clear and correct explanation of how much to charge for services; a clear and correct visual representation that shows when the business will begin to make a profit; a clear and correct explanation or work shown to justify how the price point was found and why the visual representation was selected;
- A clear and complete description of the financial goal for the business, and the number of clients/hours intended to work;
- A clear and complete work schedule, and a clear and correct explanation of how time will be managed;
- The correct total amount of money expected, and a clear and correct explanation of how the total amount of money expected is calculated.

#### Sample Responses for Part B

Question 11:

Company Name	Service	Pricing Options
Mary Ann's Pampered Pets maryannspamperedpets.com	Dog walking	\$18 for 30 min.
Ruff Walking ruffwalking.com	Dog walks	\$16 for 30 min.
The Jogging Dog thejoggingdog.com	Dog run/walks	\$20 for 30 min.

Question 12:

First, I used the pricing model I created in Part A:  $y = mx + 0.27$ . I then plugged 1 into  $x$  (hours worked) and 125.33 into  $y$  (total money made = start-up costs). This tells me how much I would need to charge one customer for one hour if I wanted to break even.

$$125.33 = m(1) + 0.27$$

$$125.06 = m$$

Next, I looked at the three businesses I researched and how much they charge for one hour of dog walking. The average cost for 30 minutes of walking the dog was \$18. Because this is my first time doing this business, I thought it'd be fair to charge a little less than average, \$15 for a 30-minute dog walk. This means that I will earn \$30 in an hour (two 30-minute dog walks).

Question 13:

I then put this into my pricing model:

$$125.33 = 30x + 0.27$$

$$125.06 = 30x$$

$$4.1687 = x$$

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Since I am looking for the point at which the business will begin to make a profit, I need to find the number for  $x$  that will make  $y$  be a number greater than 125.33, the cost for me to start my business. In my previous equation, I found that  $x = 4.1687$  when  $y = 125.33$ . This means that any number greater than 4.1687 would make  $y$  a number greater than my start-up costs, which would mean I was starting a profit. In the real world, this means that when I work more than 4.1687 hours I will start to actually make money. So, after nine 30-minute dog walks I will start earning a profit.

Question 14:

I want to make enough money to buy a few things I've had my eye on. I really want to buy a nice camera because I want to sign up for a photography class next year at my high school. I've looked online, and there's a great deal on a whole package that includes everything I need (like a tripod, case, memory card, zoom lens, etc.). It's \$649.00. I would also like to save some money to use on back-to-school shopping for clothes. I'm thinking \$500.00 would get me some nice things. I will need about \$1,300 to buy the things I want. (I'm including extra money for tax and to give myself a little extra to be sure I have enough.) I am going to add 125.33 to this total because I need to be sure to cover my start-up cost. Anything over that is profit, and I need \$1,300 profit to reach my financial goal. I will plug this into my equation to see how many hours ( $x$ ) I will need to work.

$$1425.33 = 30x + 0.27$$

$$1425.06 = 30x$$

$$47.502 = x$$

Since  $x$  represents an hour and I am charging for a 30-minute dog walk, I can multiply this number by 2 to find how many walks I need to do. Now I know I will need to do 95 30-minute dog walks. So, I will need to work at least 47.5 hours or 95 30-minute dog walks.

Question 15:

My summer is 10 weeks long, and I would like to spread my time evenly over this period. I will plan on doing 10 walks a week for 9 weeks and then 5 walks during the 10<sup>th</sup> week.

Question 16:

Based on my schedule, I will be working 47.5 hours at \$30/hour.

$$47.5 \times 30 = 1,425$$

I can expect to make \$1,425.

### **3 Point Response:**

The response demonstrates a strong understanding, but the work is incomplete or contains minor errors.

A level 3 response is characterized by:

- A completed table;
- A strong understanding of how to calculate a price point for services, demonstrated by a clear and correct explanation of how much to charge for services, but a minor calculation error is made; a strong understanding of how to use visual representation, demonstrated by a clear and correct visual representation that shows when the business will begin to make a profit, but a minor calculation error is made; a clear and correct explanation or work shown of how the price point was found and why the visual representation was selected, but a minor calculation error is made in each;
- A strong understanding of how to determine a financial goal, demonstrated by a clear and complete description of the financial goal for the business, but a minor calculation error is made;
- The number of clients/hours intended to work;
- A strong understanding of how to create a work schedule, demonstrated by a clear and complete work schedule and a clear and correct explanation of how the time will be managed, but a minor calculation error is made;

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- The total amount of money expected, which may be incorrect because of a minor error made in the calculations; a strong understanding of how to find the total expected profit, demonstrated by a clear and correct explanation of how the total amount of money expected is calculated, but a minor calculation error is made.

### **2 Point Response:**

The response demonstrates a basic but incomplete understanding.

A level 2 response is characterized by:

- A partially-completed table;
- A basic understanding of how to calculate a price point for services, demonstrated by an explanation of how much to charge for services, but two or more minor calculation errors or one major calculation or concept error is made; a basic understanding of how to use visual representation, demonstrated by a visual representation that shows when the business will begin to make a profit, but two or more minor calculation errors or one major calculation or concept error is made; an explanation or work shown of how the price point was found and why the visual representation was selected, but two or more minor calculation errors or one major calculation or concept error is made;
- A basic understanding of how to determine a financial goal, demonstrated by a description of the financial goal for the business, but two or more minor calculation errors or one major calculation or concept error is made;
- The number of clients/hours intended to work;
- A basic understanding of how to create a work schedule, demonstrated by a work schedule and an explanation of how the time will be managed, but two or more minor calculation errors or one major calculation or concept error is made;
- The total amount of money expected, which may be incorrect because of two or more minor calculation errors or one major calculation or concept error; a basic understanding of how to find the total expected profit, demonstrated by an explanation of how the total amount of money expected is calculated, but two or more minor calculation errors or one major calculation or concept error is made.

### **1 Point Response:**

The response demonstrates minimal understanding.

A level 1 response is characterized by:

- A partially-completed table;
- A weak understanding of how to calculate a price point for services, demonstrated by an explanation of how much to charge for services, but two or more major calculation errors are made or the explanation is missing; a weak understanding of how to use visual representation, demonstrated by a visual representation that shows when the business will begin to make a profit, but two or more major calculation errors are made; an explanation or work shown of how the price point was found and why the visual representation was selected, but two or more major calculation errors are made or the explanation is missing;
- A weak understanding of how to determine a financial goal, demonstrated by a description of the financial goal for the business, but two or more major calculation errors are made or the description is missing; the number of clients/hours intended to work, which is incorrect because of a major error in calculation;
- A weak understanding of how to create a work schedule, demonstrated by an incorrect work schedule and an incorrect explanation of how the time will be managed, and two or more major calculation errors are made or the explanation is missing;

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- The total amount of money expected, which may be incorrect because of major calculation errors; a weak understanding of how to find the total expected profit, demonstrated by an explanation of how the total amount of money expected is calculated, but two or more major calculation errors are made or the explanation is missing.

### **0 Point response:**

There is no response, or the response is off topic.

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### **Part C**

#### **4 Point Response:**

The response demonstrates a high level of understanding. The response demonstrates:

- A strong ability to make sense of a real-world problem and develop a solution that meets given requirements;
- A strong ability to check work and communicate reasoning in a clear and precise way;
- A strong ability to justify the solution and communicate this to others;
- A strong ability to calculate accurately with an appropriate degree of precision;
- A strong understanding of how to solve real-world and mathematical problems leading to linear equations with two variables.

A level 4 response should include:

- An outline of a plan that clearly explains how the financial goal for the business will be reached and includes the correct calculations for everything involved in the running of the business; specifics that should be detailed in the plan: the name of the company and description of the services/products provided, the unique features of the business, how much money it will take to begin to see a profit, the financial goals for the company, potential customers, and the marketing plan;
- A plan that contains the reasoning behind the choices made by the student; the choices are strongly supported and they clearly demonstrate a strong understanding of the thought process involved in making these decisions.

#### **3 Point Response:**

The response demonstrates a strong understanding, but the work is incomplete or contains minor errors.

A level 3 response is characterized by:

- An outline of a plan that demonstrates a strong understanding of how the financial goal for the business will be reached and includes the correct calculations for everything involved in the running of the business; specifics that should be detailed in the plan: the name of the company and description of the services/products provided, the unique features of the business, how much money it will take to begin to see a profit, the financial goals for the company, potential customers, and the marketing plan; the plan may contain one minor error or may have one incomplete detail;
- A plan that contains the reasoning behind the choices made by the student; the choices are supported and they demonstrate a strong understanding of the thought process involved in making these decisions; but one idea is incomplete or incorrect due to minor errors made in the calculations.

#### **2 Point Response:**

The response demonstrates a basic but incomplete understanding.

A level 2 response is characterized by:

- An outline of a plan that demonstrates a basic understanding of how the financial goal for the business will be reached and includes some of the calculations for the things involved in the running of the business; the plan may contain two or more minor errors or one major error or may have two to three incomplete specifics or one to two missing specifics;
- A plan that contains the reasoning behind the choices made by the student; the choices are supported and they demonstrate a basic understanding of the thought process involved in making these decisions with two ideas being incomplete or incorrect due to errors made in the calculations.

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### **1 Point Response:**

The response demonstrates minimal understanding.

A level 1 response is characterized by:

- An outline of a plan that demonstrates a minimal understanding of how the financial goal for the business will be reached and includes some of the calculations for the things involved in the running of the business; the plan may contain two or more major errors or may have four or more incomplete specifics or three to four missing specifics;
- A plan that contains the reasoning behind the choices made by the student; the choices are supported and they demonstrate a minimal understanding of the thought process involved in making these decisions with three or more ideas being incomplete or incorrect due to errors made in the calculations.

### **0 Point response:**

There is no response, or the response is off topic.

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### **Part D**

#### **4 Point Response:**

The response demonstrates a high level of understanding. The response demonstrates:

- A strong ability to make sense of a real-world problem and develop a solution that meets given requirements;
- A strong ability to check work and communicate reasoning in a clear and precise way;
- A strong ability to justify the solution and communicate this to others;
- A strong ability to calculate accurately with an appropriate degree of precision;
- A strong understanding of how to solve real-world and mathematical problems leading to linear equations with two variables.

A level 4 response should include:

- A plan that clearly explains how the financial goal for the business will be reached and includes the correct calculations for everything involved in the running of the business; specifics that should be detailed in the plan: the name of the company and description of the services/products provided, the unique features of the business, how much money it will take to begin to see a profit, the financial goals for the company, potential customers, and the marketing plan;
- A plan that contains the reasoning behind the choices made by the student; the choices are strongly supported with at least 6 sentences that clearly demonstrate a strong understanding of the thought process involved in making these decisions.

#### **3 Point Response:**

The response demonstrates a strong understanding, but the work is incomplete or contains minor errors.

A level 3 response is characterized by:

- A plan that demonstrates a strong understanding of how the financial goal for the business will be reached and includes the correct calculations for everything involved in the running of the business; specifics that should be detailed in the plan: the name of the company and description of the services/products provided, the unique features of the business, how much money it will take to begin to see a profit, the financial goals for the company, potential customers, and the marketing plan; the plan may contain 1–2 minor errors or may have 1–2 incomplete specifics;
- A plan that contains the reasoning behind the choices made by the student; the choices are supported with at least 6 sentences that demonstrate a strong understanding of the thought process involved in making these decisions, but 1–2 ideas are incomplete or incorrect due to minor errors made in the calculations.

#### **2 Point Response:**

The response demonstrates a basic but incomplete understanding.

A level 2 response is characterized by:

- A plan that demonstrates a basic understanding of how the financial goal for the business will be reached and includes some of the calculations for the things involved in the running of the business; the plan may contain more than 2 minor errors or 1 major error or may have 3 incomplete specifics or 1–2 missing specifics;
- A plan that contains the reasoning behind the choices made by the student; the choices are supported with 4–5 sentences that demonstrate a basic understanding of the thought process involved in making these decisions with 3 or more ideas being incomplete or incorrect due to errors made in the calculations.

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### **1 Point Response:**

The response demonstrates minimal understanding.

#### **A level 1 response is characterized by:**

- A plan that demonstrates a minimal understanding of how the financial goal for the business will be reached and includes some of the calculations for the things involved in the running of the business; the plan may contain more than 2 major errors or may have 4 or more incomplete specifics or 3–4 missing specifics;
- A plan that contains the reasoning behind the choices made by the student; the choices are supported with 2–3 sentences that demonstrate a minimal understanding of the thought process involved in making these decisions with 3 or more ideas being incomplete or incorrect due to errors made in the calculations.

### **0 Point response:**

There is no response, or the response is off topic.