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Jamaica Plain Community Centers
Jamaica Plain, MA 02130

Integrating Math in ESOL
Teacher Resource Guide 2018

Jamaica Plain Community Centers Adult Learning Program

Many adult learners have the need and desire to continue their education, whether it is to get their high school diploma or continue on to college.

However, the language of math is a language in and of itself. Therefore, once students get to the level of English proficiency where college or high school equivalency prep is an option, they then have to get over this new language roadblock before they can move forward. This can mean more time in “remedial type classes” such as those in our HiSET program, or in fee based developmental classes at the college level which could have been bypassed if they had more language proficiency in math.

What this means on the ESOL side is we have a ***new*** imperative to integrate the language of math into our instruction. This is different than teaching math. We are not teaching math concepts per say, but giving our students **exposure to** and **practice** with language associated with those concepts.

Keeping all of this in mind, this collection of lessons with accompanying worksheets was created to address the need of many of the students for the language of math through ESOL. The levels range from low to intermediate, but the teacher is encouraged take the activities and modify the difficulty for their particular class. The foremost purpose of this resource is to make clear to the user through examples how to include math vocabulary and skills into their own lesson plans.

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	Theme	**Math Skill**	**Language Connection**	**Target Vocabulary**
4	Community, Census	Calculate percentages with a variety of data points in a word problem	Reading an article that includes statistical information, Surveying classmates	Data, Percentage calculate
5	Time	Read bar graphs	Writing, categorize vocabulary	Organize, chart, category
6	Money	Calculate percents, critical thinking	Reading	Percent, budget, cost, income

Sources used in the creation of this project:

Kitchen Math Workbook (Learning ZoneXpress 2009)

EMPower Math Series (McGraw Hill Education 2011)

Downtown: English for Work and Life (Heinle ELT 2006)

Future: English for Results (Pearson 2008)

Theme	Food: Fruits and Vegetables in Season
Math Skills:	Adding, Filling in Charts
Language Connection:	Reading, food vocabulary
Target Math Vocab:	How many, chart
Notes and Procedure:	Level: Pre-intermediate. Duration: 1.5 hours 1. Warm-up with a discussion of fruits and vegetables during different times of the year. Poll students on what fruits taste the best when, and why! Introduce or review the phrase “how many” by writing these questions on the board or prepare “Ask your partner” slips. As students talk with a partner, walk around to check understanding. a. Ask your partner: i. What is your favorite fruit and vegetable? ii. Do you eat them all seasons of the year? iii. What month or season do strawberries taste the best? iv. How many strawberries can one person eat in one day? 2. Recap with the whole group. 3. Hand out the reading and read the first paragraph together, going over the words **ripe** and **produce** if necessary. Ask the students what they see, then ask what fruits and vegetables are in season in January. 4. Write on the board: *In January,* _____ *are ripe and in season. How many?* _____ Write out some that students call out. Cold call on students to elicit ripe produce in other months. 5. Students read and answer comprehension questions. Walk around to answer questions about vocabulary. Tell the students that they do not need to understand every word, but if they do not know a fruit or vegetable, they should look for a **picture** in Google search. For fast finishers, ask questions (verbally): What did you learn? What did you already know? What will you eat differently, if anything? 6. Review questions, then hand out* and model chart. Students should fill in with a partner and compare with **another group** after. For fast finishers: Ask: Which produce item is ripe over

	the most months? Why do you think bananas and potatoes always taste good? How can you eat out of season produce? (Freeze, can, dry..) 7. Cool-down as a class: Which season has the most ripe produce? Least? Why might it be cheaper to buy? How would this chart look in your country? 8. Expansion: printable in season produce calendars (click link or Google: “Calendar What’s in season”) *Hand out separately so students do not start completing in advance. Worksheets attached.

Eating in Season

Fruits and vegetables always taste better when they are **ripe**. In season **produce** is also cheaper! Here's a guide to help you find the best produce in any month in the United States.

The word **ripe** means ready to eat! **Produce** means fruit and vegetables.

01 January

- Buy broccoli, Brussels sprouts, cabbage, cauliflower, grapefruit, kale, leeks, lemons, oranges, parsnips, rutabagas, tangelos, tangerines, and turnips in the deep winter month of January.

02 February

- February's best buys are similar to those in January: broccoli, Brussels sprouts, cabbage, cauliflower, grapefruit, kale, leeks, lemons, oranges, parsnips, rutabagas, tangelos, and turnips.

03 March

- March changes up the season list somewhat with artichokes, broccoli, Brussels sprouts, cauliflower, leeks, lettuce, mushrooms, parsnips, pineapples, radishes, rutabagas, and turnips.

04 April

- This first full month of spring brings artichokes, asparagus, broccoli, cauliflower, leeks, lettuce, mushrooms, pineapples, radishes, rhubarb and spring peas. Asparagus is a traditional part of Easter dinner and other spring feasts.

05 May

- The list starts to lengthen in May as spring deepens with apricots, artichokes, asparagus, cherries, lettuce, mangoes, okra, pineapples, radishes, rhubarb, spring peas, strawberries, swiss chard, and zucchini.

06 June

- June welcomes summer and brings a fruit-heavy harvest of apricots, blueberries, cantaloupe, cherries, corn, kiwi, lettuce, mangoes, peaches, strawberries, swiss chard, watermelon, and zucchini.

07 July

- July is high summer, and the racks at the farmer's markets are bursting with apricots, blackberries, blueberries, cantaloupe, corn, cucumbers, green beans, kiwi, kohlrabi, lettuce, mangoes, okra, peaches, peppers, plums, raspberries, strawberries, summer squash, swiss chard, tomatoes, watermelon, and zucchini.

08 August

- The bountiful harvest of summer continues in August with acorn squash, apples, apricots, blueberries, butternut squash, cantaloupe, corn, cucumbers, eggplant, figs, green beans, kiwi, kohlrabi, lettuce, mangoes, okra, peaches, peppers, plums, raspberries, strawberries, summer squash, swiss chard, tomatoes, watermelon, winter squash, and zucchini.

09 September

- The still-warm days of September bring acorn squash, apples, beets, butternut squash, cantaloupe, cauliflower, eggplant, figs, grapes, green beans, lettuce, mangoes, mushrooms, okra, peppers, persimmmons, pomegranates, pumpkins, spinach, sweet potatoes, swiss chard, and tomatoes.

10 October

- The first full month of fall isn't short on seasonal produce, with acorn squash, apples, beets, broccoli, brussels sprouts, butternut squash, cabbage, cauliflower, cranberries, grapes, leeks, lettuce, mushrooms, parsnips, persimmons, pomegranates, pumpkins, rutabagas, spinach, sweet potatoes, swiss chard, turnips, and winter squash.

11 November

- November is the time to buy beets, broccoli, brussels sprouts, cabbage, cauliflower, cranberries, leeks, mushrooms, oranges, parsnips, pears, persimmons, pomegranates, pumpkins, rutabagas, spinach, sweet potatoes, tangerines, turnips, and winter squash.

12 December

- Deep in December, the seasonal shelves hold broccoli, brussels sprouts, cabbage, cauliflower, grapefruit, kale, leeks, mushrooms, oranges, papayas, parsnips, pears, pomegranates, rutabagas, sweet potatoes, tangelos, tangerines, and turnips.

Tip: Bananas, celery and potatoes taste good all year round!

Source of information:
https://www.thebalance.com/the-cheapest-fruits-and-vegetables-month-by-month-1388345

Reading Comprehension Questions

1. What fruits and vegetables are ripe in March?

   _____

   _____

   _____

2. How many fruits and vegetables are ripe in November?_____
3. What is your favorite produce item ripe in October? _____

In Season Produce Chart

Instructions: Fill in this chart to show the ripe produce in each season.

Season	Produce	How Many
Spring (March April May)		
Summer (June July August)		
Fall (September October November)		
Winter (December January February)		

Theme	Clothing, Travel
Math Skills:	Probability, Patterns
Language Connection	Read and talk about a paragraph, clothing vocabulary
Target Math Vocab	Prediction, how many
CCR	S.CP.9 (+) Use permutations and combinations to compute probabilities of compound events and solve problems.
Notes and Procedure:	Level: Beginner. Materials: colored pencils. Duration: 1.5 hrs **Framing** 5 Mins: The teacher will talk about preparing for a trip and teach the verb "to pack" The teacher will ask if any students are going on any trips soon, or if they went on any recently. The teacher will ask, "What do you bring on trips?" and teach the word "luggage" 5 Mins: Students will then get into groups of three. They will be presented with a picture of a man packing his luggage. They will be asked to talk about the picture. "What do you see?" Possible answers: "I see a man…" "He packs for a trip" "He has T-shirts." 15 Mins: Students will first listen to the teacher read a small story about the man packing for their trip. Then they will read the story again in their groups and discuss on these questions "How many T-shirts does he need?" "How many pairs of shorts does he need?" and also to talk about how much clothes they would personally bring. **New Material** 15 Mins: Students will look at four different combinations of outfits and discuss as a class. Two patterns are done as a class, and the second two are examined in groups and explained by the teacher after some group discussion. Some students might be able to see the pattern for getting the number of possible outfits, and others may need more help.

	Practice Students will then do an activity where they have 4 pairs of shorts and 5 T-shirts, and will first predict how many outfits are possible, and then they will prove it by filling in a grid that demonstrates there are 20 possible options. “The Counting Principle” Then, individually, students will plan for their own trips, choosing a selection of clothes they will bring. They will then calculate how many possible outfits they have using a formula. Two groups will be called upon to present to the class. **Assessment** **Needs improvement:** Can only write about the clothes they bring. **Meets expectations:** Writes about the outfits they bring and calculates the number of outfits. **Exceeds Expectations:** Writes about the outfits and calculates the combinations, and can experiment with different combinations.

Name: _____

Look at the picture. What do you see?

Listen and read the story. Then, read the story again with your classmates.

It is December 22. Jean is going to visit his parents in the Dominican Republic for the holidays. He is excited. But first, He needs to pack his luggage. It's very hot in Panama, so he doesn't need to bring his winter jacket. He needs to bring some T-shirts and some pairs of shorts. He needs some good outfits. He will be in the Dominican Republic from December 23 to December 26.

Talk to your classmates for 5 minutes. Ask these questions.

How many T-shirts does he need?

How many pairs of shorts does he need?

What about you? Pretend you're going to Miami for 4 days. What do you need?

#1.

Jean brings 1 pair of brown shorts and 1 blue T-shirt.

How many outfits does he have?

Just one.

#2.

Jean brings 1 pair of brown shorts, 1 blue T-shirt, and 1 red T-shirt.

How many outfits does he have?

Two. It’s good for a weekend trip.

Outfit 1: He wears the red T-shirt and brown shorts.
Outfit 2: He wears the blue T-shirt and the brown shorts.

#3

Jean brings 1 pair of brown shorts and 1 pair of navy shorts and 1 red t-shirt and 1 blue t-shirt.

How many outfits does he have?

Talk about it with your group.

#4

Jean brings 3 T-shirts and 2 pairs of shorts.

How many outfits does he have?

#5

Jean brings 5 T-shirts. One blue T-shirt, one red T-shirt, one green T-shirt, one purple T-shirt, and one white T-shirt.

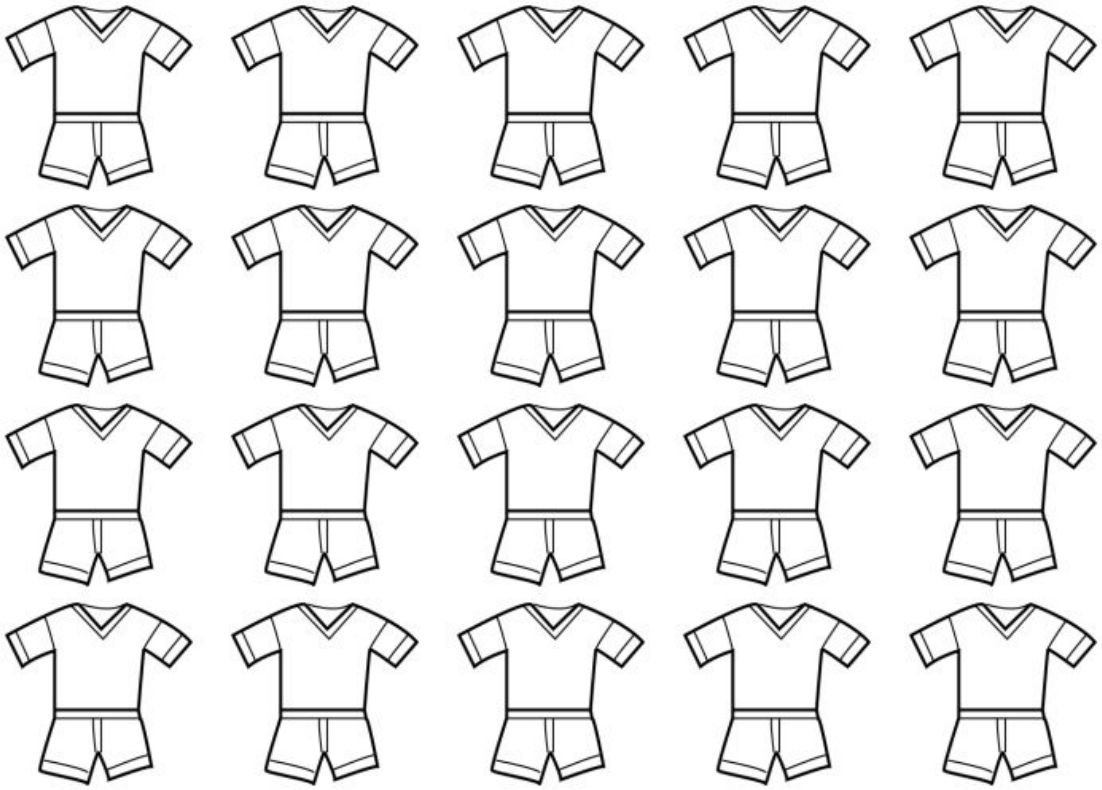
Jean brings 4 pairs of shorts. One brown pair, one navy pair, one grey pair, and one black pair.

How many outfits does he have? Write what you think next to “prediction”.

See if you are correct. Write the color names or use colored pencils and make the outfits.

Can you explain the pattern?

Prediction: _____ outfits



Actual: _____ outfits

#6 Now it's your turn.

You're going to your country for 4 days. You need to bring shorts, T-shirts, and flip flops.

What types of clothing will you bring? How many outfits will you have?

For example…

"I'm going to bring brown shorts and white shorts. I'm going to bring a blue T-shirt, a red T-shirt, and a green T-shirt. I'm going to bring black flip-flops and brown flip-flops. I have 12 outfits."

_____ *X* _____ *X* _____ = _____ *outfits*
# of pairs of shorts *# of shirts* *# of pairs of flip flops*

I'm going to bring _____

_____

I'm going to bring _____

_____

I'm going to bring _____

_____

I have _____ outfits.

Theme	Food, Restaurants
Math Skills:	Addition and subtraction calculations using numbers with decimal points
Language Connection:	Speaking
Target Math Vocab:	Decimals, tax, subtract, add, percent, total
Notes and Procedure:	Level: Beginner. Duration: 1.5 hours Note: The class before, students need to plan to each bring a dish or beverage for two “restaurants”. 30 Mins: Warm-Up and Reviewing homework - In the warm-up, the students will write down what they might answer in the following dialogues in a restaurant. We will then review possible responses together as a class. 15 Mins: Students will practice restaurant conversations and get to the point where they try to ask the questions without reading them entirely. Waiter: “Welcome to Olive Garden. Here is your menu and here is your table.” Customer: _____ Waiter: “Can I take your order?” Customer: _____ Waiter: “What would you like to drink?” Customer: _____ Waiter: “Do you want an appetizer?” Customer: _____ Waiter: “How is your food?” Customer: _____

	Customer: “Can I have the check please?” Waiter: _____ 30 Mins: Groups will have to create a name for their restaurant, write down a menu, and decide on prices for each of their dishes. Each person will have to write out the menu that they all agree upon. They also will include one item that they don’t have. If someone orders that, the waiter will have to say, I’m sorry. We don’t have that today. Teams will collectively create their menu in the computer lab on a shared Google Doc. On the menu, students will list the name of the dish, the ingredients, and the price. 20 Mins: Break/ Setup - During the break students will need to set up their restaurant on one side of the classroom. Each restaurant will have 4 tables on their side of the classroom with two chairs at each table. They will also need a “kitchen” area where they will serve the food from after the guests order it. 40 Mins: Group 1 are the guests and Group 2 are the waiters and the chefs. There are 4 waiters, 1 host who seats the guests and helps clear dishes, 1 cashier who makes sure all of the tables paid the correct amount, and 2 cooks who serve the food. (These roles were explained and decided the day before.) Each waiter will have to add up the total bill for their table and give the table a bill. Then, the diners will have to calculate a 15% or 20% tip and will have to pay the bill using the correct dollar bills. (Each table will be given an envelope with pretend money in it.) The host and waiter will have to count the money, make sure it is correct and deposit it into the cash register. 40 Mins: Group 2 are the guests and Group 1 are the restaurant staff. Throughout the whole experience, I will be the restaurant reviewer and I will give each team a score at the end of the class. The ONLY criteria is how much English is used and used correctly. Every time

	the teacher hears someone say a great English sentence, write it on the board and add a point. 5 Mins: Clean up and the teacher presents “restaurant reviews” to the class and reviews great English phrases heard around the room.

_____

Restaurant Receipt

Food Items: Price:

Subtotal:

Tip:
(Calculated by the person eating)

Total:

Menu for _____ Restaurant	
Appetizers (with ingredients): Price:	Desserts: Price:
Main Course: Price:	Drinks: Price:

Theme	Civics, Community
Math Skills:	Calculate percentages with a variety of data points in a word problem
Language Connection:	Reading, speaking
Target Math Vocab:	Data, percentage, calculate
Notes and Procedure	Level: Beginner. Duration: 2.5 hours 25 Mins: Give students a short reading about hispanics and the census (attached.) Read for understanding and pronunciation and then have a discussion about the census - what it is, why it is important. 25 Mins: Census role play with explanation of questions and filling in information 15 Mins: Data collection - Students will circulate around the classroom taking a class census. They will use the questions that the census takers use to ask classmates if they are the head of household and how many members are in their households and record the results (see attached worksheet) Option for Break 30 Mins: Teach how to calculate percentages with a worksheet Using the “census data” they collected, students have to calculate percentages of people in class who are head of household, percentage of people with who live with 4 or more people in their household, and percentage of their classmates who have only 1 or 2 people living in their household. There is also a challenge question which asks them to look up what percentage of Americans are from their country. 35 Mins: Review worksheet and have students calculate percentages on their tests including the midterm - people did very well overall and I want them to see that they improved in their percentages (I will give a pretend score to the four new students) If there is time, we will have a discussion of what people do to study and what they could do for the next test to improve their percentage correct.

	15 Mins: Student presentations: Students have written short biographical descriptions of a family member and have been presenting them one by one to the class while showing a picture of the family member. We will have 4 more students present their family member. The other students take notes on a worksheet and ask questions at the end of the presentations. 10 Mins: Completing exit ticket and explaining homework. The exit ticket will ask students to answer on an index card 1. What is the census? 2. What percentage is 15 out of 20?

Music and dancing are often part of Hispanic festivals.

The face of the United States is changing. Hispanic Americans, also known as Latinos, make up the fastest-growing group. The latest U.S. **census** update shows that 52 million people are Hispanic. A census is a count of people.

Hispanic Americans are people whose families are from Spanish-speaking countries. Most of those countries are in Central and South America.

Nearly 312 million people live in the United States today. One of every six people in our country is Hispanic!

Questions:

1. Did anything surprise you?

2. What is the census?

3. Why is it important?

Calculating Percentages

Percent means “part of 100” so 40/100 is 40% and 75/100 is 75%.

1. What percent is 63/100?

2. What percent is 75/85? (You can use a calculator)

3. What percent is ¾?

4. What percentage of Americans are Hispanic? (Use the reading on the other side)

Now use the “census data” you collected about our class.

5. Calculate the percentage of people in class who are head of household.

6. Calculate the percentage of people in class with who live with 4 or more people in their household.

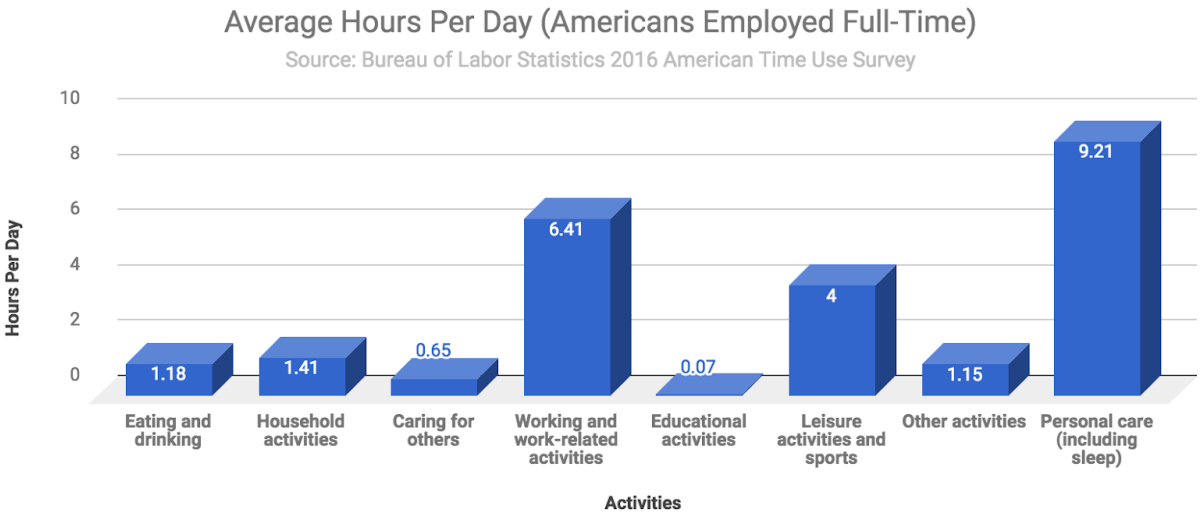
7. Calculate the percentage of your classmates who have only 1 or 2 people living in their household.

Challenge: Search on your phone to find the percentage of Americans who are from Haiti or are from your country.

Class Census

First Name Ask: What is your name?	**Head of Household** Ask: Are you the head of household?	**Number of people in household** Ask: How many people are in your household?
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
11.		
12.		
13.		
14.		
15.		
16.		
17.		
18.		
19.		

Theme	Time
Math Skills	Read bar graphs
Language Connection	Writing, categorize vocabulary
Target Math Vocab	Organize, chart, category
CCR	Represent and interpret data. Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another. **(1.MD.4)**
Notes and Procedure	Level: Pre-intermediate. Duration: 1.5 hours. 1. Ask students to think about a typical day in their lives. Make a list as a class about some activities they usually do everyday. For example: cook, clean the kitchen, dress my children, etc. 2. Provide students with a bar graph about time use on an "average" work day for Americans 20-64 years old who are employed. The data in the bar graph is taken from the Bureau of Labor Statistics. a. https://www.bls.gov/charts/american-time-use/activity-by-emp.htm 3. Students answer a number of information questions on the worksheet. 4. Students are then given a daily schedule of a woman named "Sarah". This is a "typical" day in her life. Students will identify the different activities Sarah does each day, and where they can fit into the 7 categories identified earlier in our first bar graph. a. Students will add up the total number of hours Sarah spends in each category. 5. Students will create a bar graph for Sarah's typical day. 6. With a partner, students will compare Sarah's bar graph to the one we saw earlier. How is her bar graph similar and how is it different? Discuss some possible reasons as a class. 7. For homework, students turn their daily activities into a chart with categories with hours. Students who are ready should graph their daily activities.



1. What is the title of this chart?

   _____

2. What is the "source" of this information?

   _____

3. How many activities are included on this chart?

   _____

4. How many hours per day do people spend on household activities?

   _____

5. How many hours per day do people spend on personal care?

   _____

6. How many hours per day do people spend on working and work-related activities?

   _____

7. What do people spend more time on, eating and drinking or leisure activities?

   _____

8. What do people spend more time on, caring for others or educational activities?

   _____

9. What activities do you think are included in "household activities"?

   _____

   _____

10. What activities do you think are included in "other"?

    _____

    _____

Sarah is a 27-year old, single woman. She moved to America 5 years ago. She works a full-time job and lives by herself in a small apartment. This is a typical Wednesday for Sarah. Look at her schedule and answer the question.

12:00AM - 6:00AM	Sleep
6:00AM - 7:00AM	Get ready for work
7:00AM - 8:15AM	Commute to work on the bus and train
8:15AM - 8:30AM	Eat breakfast (at work)
8:30AM - 12:30PM	Work
12:30PM - 1:30PM	Lunch break
1:30PM - 5:00PM	Work
5:00PM - 6:15PM	Commute home on the train and bus
6:15PM - 7:30PM	Prepare and eat dinner
7:30PM - 8:15PM	Clean the house
8:15PM - 8:45PM	Study English
8:45PM - 10:30PM	Watch TV and use the computer
10:30PM - 11:00PM	Shower and personal care
11:00PM	Go to bed

Organize Sarah's schedule into the eight (8) categories from the earlier chart. Make a note of how much time Sarah spends in each category!

Personal care (including sleep)	**Working**	**Leisure activities**	**Caring for others**	**Household activities**	**Eating and drinking**	**Educational activities**	**Other**

Theme	Money
Math Skills	Calculate percentages, problem solve
Language Connection	Reading
Target Math Vocab	Percent, budget, cost, income
CCR	**(6.RP.3c)** Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent.
Notes and Procedure	Level: Pre-intermediate Duration: 1.5 hours 1. Define vocabulary: percent, budget, costs, income etc. 2. Do the reading together and answer comprehension questions. a. Example: What percent of your income should you spend on housing? What percent should you spend on transportation? How much should you try and save every month? 3. Do an example for the class of how to calculate a percentage using raw math. a. 31/100 = 31%, 62/100 = 61%, 76/80 * 100 =95% b. Do another example with money, for example: $281/$2200 = .127 * 100 = 12.7%, so $281 dollars is 12.7% of $2200 4. Have students calculate percentages for some spending items and total income. a. Then, as a class, reflect back on the concepts from the reading. Are these percentages close to the "ideal"? What percentages are too high? 5. Students will get one of three character profiles. Students will read about their character and complete a simple chart for how much the person spends in each category. Then, students will calculate the percentage of income for each spending category. 6. Students will group with classmates who have the same profile and discuss the characters current budget. a. Is this a good budget? According to our reading, what does the character need to try and change? 7. Together, create a new budget for the character with dollars and percentages. Certain factors of the budget are impossible to change (rent, etc.) so students will need to work around it. The group should also answer about what the character can change in order to stay within their new budget

	(take shorter showers, buy groceries using coupons, take the bus instead of Uber, etc.) 8. Have students create mixed groups, and present their character and their challenges to their classmates

A Guide to Creating Your Household Budget

Here are some things experts say you should pay attention to when creating a budget:

- **Housing.** Experts say your housing should be less than 30 percent of your budget. Many experts even recommend less than 25 percent.
- **Transportation.** This isn't just your car payment, but gas and repairs, too! Experts recommend spending 8 percent of your budget on transportation. If you spend more, don't feel bad! Most Americans actually spend 17 percent.
- **Food.** Spending around 5 to 15 percent on your budget is okay. The average American spends 12.5 percent of their household budget on food.
- **Unexpected costs.** It seems like there are endless things to budget for, since after housing, utilities, transportation, and food, you need to budget for health care, insurance, debt, clothing, and entertainment. But it's the unexpected costs that trip up many people. It's important to plan for the unplanned. Make sure that you aren't living paycheck to paycheck, and that you always have a little extra money. Experts say you should save 5 to 20 percent of your income every month for unexpected costs!

Source:https://money.usnews.com/money/personal-finance/articles/2014/06/03/a-guide-to-creating-your-ideal-household-budget