

# **RUN A COFFEE SHOP: A FRACTION PROJECT**

**BEST-SUITED FOR GRADES 4-6**

Incorporate practical, real-life application of fraction concepts including:

- equivalent fractions
- decomposing
- adding and subtracting fractions
- mixed fractions
- comparing and ordering
- problem-solving

**CREATED BY SHELLEY GRAY**

# ABOUT THIS RESOURCE

Are you looking for a way to reinforce fraction concepts in an engaging way that helps your students make connections? "Run a Coffee Shop" is a **real-life math project** where students will complete sixteen different fraction tasks.

You might choose to print specific tasks to use during Math centers, or you might make a booklet out of all of the tasks and let your students choose which one to do when. The choice is yours.

Take a look at what you'll find inside this math project:

## TASK #1: THE PLAN

You've always wanted to help run a little coffee shop and here's your chance! Let's think of a name for the coffee shop and design a poster to advertise.

## TASK#2: THE MENU

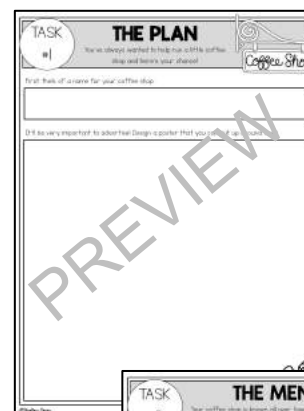
Let's figure out the menu for your coffee shop! We'll use the clues to complete the missing item prices.

**Skills: fractions using money**

## TASK#3: THE BEST COFFEE IN TOWN

You hear from your customers all the time that your coffee is the best! Let's take a look at what you've sold this morning.

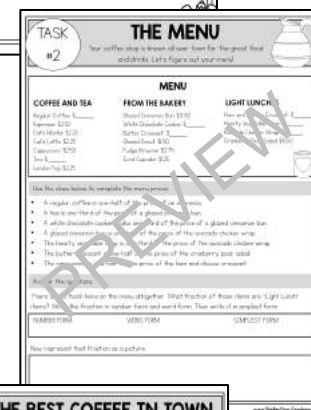
**Skills: fractions in number form and word form, visual models, equivalent fractions**



**TASK #1 THE PLAN**  
You've always wanted to help run a little coffee shop and here's your chance! Let's think of a name for the coffee shop and design a poster to advertise.

First think of a name for your coffee shop.

It's so very important to attract your design a poster that you can use to advertise.



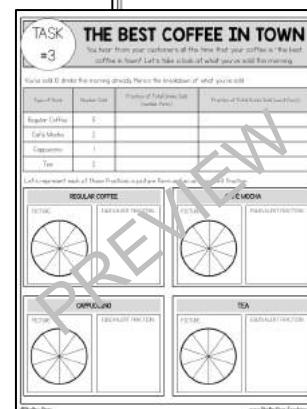
**TASK #2 THE MENU**  
You've always wanted to help run a little coffee shop and here's your chance! Let's figure out the menu for your coffee shop! We'll use the clues to complete the missing item prices.

COFFEE AND TEA	FROM THE BAKERY	LIGHT LUNCH
Regular Coffee \$2.00	White Chocolate-Cake \$1.50	Hotly Anticipated Sandwich \$3.00
Latte \$3.50	Soft Pretzels \$1.00	Crunchy Chicken Sandwich \$4.00
Latte with Caramel \$4.00	Chocolate-Cake \$1.50	Crunchy Chicken Sandwich \$4.00
Latte with Caramel \$4.00	Chocolate-Cake \$1.50	Crunchy Chicken Sandwich \$4.00
Latte with Caramel \$4.00	Chocolate-Cake \$1.50	Crunchy Chicken Sandwich \$4.00

Use the clues below to complete the menu prices.

- A regular coffee is one-half of the price of a latte.
- A latte is one-third of the price of a sandwich.
- A white chocolate-cake is the weight of a pretzel of a glazed donut than a sandwich.
- A glazed donut is one-third of the price of the sandwich.
- The hotly anticipated sandwich is the price of the sandwich.
- The hotly anticipated sandwich is the price of the sandwich.
- The hotly anticipated sandwich is the price of the sandwich.

Now represent each fraction as a picture.

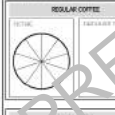




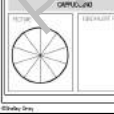
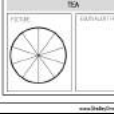

**TASK #3 THE BEST COFFEE IN TOWN**  
You hear from your customers all the time that your coffee is the best! Let's take a look at what you've sold this morning.

You will drink the morning already. Here's the breakdown of what you've sold.

Type of Drink	Number Sold	Fraction of Total Sales (as a Number)	Fraction of Total Sales (as a Fraction)
Regular Coffee	8		
Latte	3		
Tea	2		

Let's represent each of these fractions using pie charts.

REGULAR COFFEE	TEA	LATTE
		

REGULAR COFFEE	TEA	LATTE
		

## TASK #4: BAKERY TRAYS

Your fresh baked goods are popular – so popular that some people buy them in large trays. Let's take a look at three of the orders.

**Skills:** twelfths, adding fractions, equivalent fractions, number form and word form, visual models

**TASK #4 BAKERY TRAYS**  
Your fresh baked goods are popular – so popular that some people buy them in large trays.

Today you've had three people order bakery trays. Each tray contains 12 items.

Item	Quantity	Fraction of Items on This Tray
Round Chocolate Cakes	1	
White Chocolate Cookies	3	
Butter Cookies	2	
Chocolate Cakes	3	
Fudge Brownies	4	
Small Cakes	3	

Think about your tray, what fraction you represent (write).

Item	Quantity	Fraction of Items on This Tray
Round Chocolate Cakes	3	
White Chocolate Cookies	3	
Butter Cookies	3	
Small Cakes	4	
Fudge Brownies	1	
Small Cakes	1	

Think about your tray, what fraction you represent (write).

Item	Quantity	Fraction of Items on This Tray
Round Chocolate Cakes	2	
White Chocolate Cookies	3	
Butter Cookies	3	
Small Cakes	4	
Fudge Brownies	1	
Small Cakes	1	

Think about your tray, what fraction you represent (write).

**ANSWER THE QUESTIONS**

Other fractions of the tray are chocolate, vanilla, and raspberry. Write the fraction of each item on the tray.

Is the total number of chocolate and vanilla the same as the number of raspberry? How do you know?

1. Think about your tray, what fraction you represent (write).

Answer the questions.

When the baker makes the fudge brownies he makes them in a tray of 12. So, if you have 3 brownies, how many trays did he make?

2. Represent the fraction  $\frac{3}{12}$  on a tray. What fraction of the tray is it?

3. How many trays does it take to get 12 brownies?

4. How do you know that they are equivalent?

5. How many trays were sold this morning? How many boxes of 12 total? What fraction of the total of brownies was sold?

FRAC TO NUM FORM      FRAC TO WORD FORM  
What fraction of the total of brownies was sold?

FRAC TO NUM FORM      FRAC TO WORD FORM

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## TASK #5: COFFEE BREAK

Afternoon coffee break is always the busiest time of the day. Let's take a look at what's selling this afternoon.

**Skills:** representing fractions with visual models, comparing halves to quarters, equivalent fractions

**TASK #5 COFFEE BREAK!**  
Afternoon coffee break is always the busiest time of the day.

Solve each problem.

Mrs. Jenkins ordered a coffee and a chocolate cream on top. He is supposed to add  $\frac{1}{4}$  cup of hot milk and 1 cup of whipped cream. But he accidentally used  $\frac{1}{2}$  cup of hot milk and  $\frac{1}{2}$  cup of whipped cream.

Represent the coffee (C) and whipped cream (WC) on each diagram.

Each cup of hot milk is  $\frac{1}{4}$  cup. Write the fraction of your cup of coffee.

A group of six friends came to the coffee.  $\frac{1}{2}$  of them ordered a coffee. How many people ordered a coffee?

Represent five cups of coffee on the diagram.

How many cups of coffee are there in total? Is it equal to the total amount of the order?

A group of six friends came to the coffee. They need half a cup of coffee. How many cups of coffee do they need?

If each person orders a coffee, how many cups of coffee will they need? Write the number of cups on the diagram.

Circle the fraction that is equivalent to  $\frac{1}{2}$ .

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## TASK #6: CUPCAKE DECORATING

It's time to decorate some cupcakes! Use your knowledge of equivalent fractions.

**Skills:** equivalent fractions, visual models, representing fractions

**TASK #6 CUPCAKE DECORATING**  
It's time to decorate some cupcakes!

Decorate each box of cupcakes.

Color	Number of Cupcakes	Fraction of Cupcakes (Write the fraction)
red	1	
green	2	
yellow	3	
orange	4	
purple	5	
pink	6	
blue	7	
white	8	
brown	9	
orange	10	
green	11	

**THINK FACT!** Use fourths of a box of 12 cupcakes to represent the total. How many cups of 12 cupcakes can you make? How many cups of 12 cupcakes can you make?

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## TASK #7: MAKING THE FUDGE BROWNIES

The fudge brownies are delicious! They've been a popular item lately, so let's make a few more batches.

**Skills:** multiplying fractions, adding fractions

**TASK #7 MAKING THE FUDGE BROWNIES**  
The fudge is one of our most popular items. They've been popular lately, so let's make a few more batches!

They are now going to make FOUR batches of fudge brownies. To save time and make them all at once, the chef asks to look at the recipe and figure out how much of each ingredient we will need for four batches.

Here's the recipe for one batch of brownies:

1/2 tablespoons butter	1/2 cup brown sugar
1/2 cup cocoa powder	1/2 teaspoon salt
1 teaspoon vanilla extract	2 eggs
1 cup flour	1/2 cup chopped walnuts

Multiply the amount of each ingredient by 4 to show the recipe for FOUR batches.

How much butter do we need for four batches?

How much brown sugar do we need for four batches?

How much cocoa powder do we need for four batches?

How much salt do we need for four batches?

How much vanilla extract do we need for four batches?

How much flour do we need for four batches?

How much walnuts do we need for four batches?

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## TASK #8: SCHEDULING THE STAFF

Each employee knows how to do all of the jobs at the coffee shop – cook, serve, and work the cash register. Let's take a look at two of the schedules.

**Skills: representing time as a fraction, visual models, comparing fractions**

**TASK #8 SCHEDULING THE STAFF**  
Each employee knows how to do all of the jobs at the coffee shop – cook, serve, and work the cash register. Let's take a look at two of the schedules.

Use the following colors for each job: **RED** cook, **BLUE** serve, **GREEN** work the register.

**EMPLOYEE #1: LUISA**  
This diagram represents Luisa's shift of work. Shade the fraction for the amount of time she spends on each job.  
• The first hour Luisa works she works the cash register.  
• Then she spends the rest of her shift cooking and serving.  
• The second hour she spends the rest of her shift cooking.

**EMPLOYEE #2: JORDAN**  
This diagram represents Jordan's shift of work. Shade the fraction for the amount of time he spends on each job.  
• Jordan works the cash register for the first hour.  
• Then he spends the rest of his shift cooking and serving.  
• Jordan works the cash register for the first hour.

Let's compare Luis and Jordan's shifts.  
Compare the amount of time that each person worked the cash register. Why would you prefer to work the cash register?  
Compare the amount of time that each person worked. Who worked for longer and by how much?

## TASK #9: AN EXTRA LARGE ORDER

You just received an order for 100 dessert items! The customer will be here to pick them up in one hour, so let's get them packed up!

**Skills: hundredths as fractions and decimals, representing fractions, dividing fractions using a visual model**

**TASK #9 AN EXTRA LARGE ORDER!**  
You just received an order for 100 dessert items! The customer will be here to pick them up in one hour, so let's get them packed up!

Use your 100 items to fill in the table below.

Item	Fraction of the total order	Write the fraction as a decimal	Write the fraction as a percent
Round chocolate cake	$\frac{1}{4}$ dozen hand pies		
Whole chocolate cookies	half a pie		
Half the amount of round chocolate	three hand pies		
Round dough	three hand pies		
Fudge brownies	half a dozen hand pies		
Small cookies	one dozen hand pies		

Use a hundredths grid to show how many items you have for each item. Use a color representing each item.

Write the fraction for the amount of time you spend to make a dozen of each item. Then use 100 items to show how many items you need to make each item. If you have any items left over, write them down.

Write the fraction for the amount of time you spend to make a dozen of each item. Then use 100 items to show how many items you need to make each item. If you have any items left over, write them down.

## TASK#10: RUNNING INTO PROBLEMS

In any business, there are problems that will need to be solved. But with a bit of work you know that you can solve any problem.

**Skills: problem-solving with fractions, composing/decomposing fractions, comparing fractions, multiplying fractions**

**TASK #10 RUNNING INTO PROBLEMS**  
Every business has problems that will need to be solved. But with a bit of work you know that you can solve any problem.

The last night about to start today, the coffee shop had 20 cups of their signature blue bubble gum morning coffee. How many cups are available?

How many cups of coffee are available? Write the fraction for the amount of time you spend to make each item. Then use 100 items to show how many items you need to make each item. If you have any items left over, write them down.

How many cups of coffee are available? Write the fraction for the amount of time you spend to make each item. Then use 100 items to show how many items you need to make each item. If you have any items left over, write them down.

## TASK#11: CROISSANT CONSTRUCTION

The ham and cheese croissants are a popular lunch item. Let's make sure we have enough ingredients to last for the day!

**Skills: multiplying or adding fractions**

**TASK #11 CROISSANT CONSTRUCTION!**  
The ham and cheese croissants are a popular lunch item. Let's make sure we have enough ingredients to last for the day!

Each ham and cheese croissant uses the following ingredients:

- 1 croissant
- ham (2 grams)
- mozzarella cheese (4 grams)
- grated cheddar cheese (4 grams)
- mozzarella (1 gram)
- ham (1 gram)

How many croissants do you need? How many ham do you need? How many mozzarella do you need? How many cheddar do you need? How many mozzarella do you need? How many ham do you need?

## TASK #12: TODAY'S SPECIAL

Let's find out what today's special is by solving the fraction for each letter.

**Skills:** adding and subtracting fractions

**TASK #12 TODAY'S SPECIAL**  
Let's find out what today's special is by solving the fraction for each letter.

First of all, write the fraction that is represented for each letter.

A $\frac{1}{2} + \frac{1}{4}$	J $\frac{2}{3} - \frac{1}{6}$	S $\frac{3}{4} - \frac{1}{8}$
B $\frac{3}{8} + \frac{1}{4}$	K $\frac{1}{2} - \frac{1}{8}$	T $\frac{1}{3} + \frac{1}{6}$
C $\frac{1}{3} - \frac{1}{6}$	L $\frac{2}{5} + \frac{1}{10}$	U $\frac{1}{4} + \frac{1}{8}$
D $\frac{3}{8} - \frac{1}{4}$	M $\frac{1}{2} + \frac{1}{4}$	V $\frac{3}{4} - \frac{1}{2}$
E $\frac{3}{8} + \frac{1}{4}$	N $\frac{2}{3} + \frac{1}{6}$	W $\frac{3}{4} - \frac{1}{8}$
F $\frac{1}{2} + \frac{1}{4}$	O $\frac{1}{3} + \frac{1}{6}$	X $\frac{1}{2} + \frac{1}{4}$
G $\frac{1}{3} + \frac{1}{6}$	P $\frac{1}{2} - \frac{1}{4}$	Y $\frac{3}{4} - \frac{1}{8}$
H $\frac{1}{2} + \frac{1}{4}$	Q $\frac{1}{3} + \frac{1}{6}$	Z $\frac{3}{4} - \frac{1}{8}$
I $\frac{1}{2} + \frac{1}{4}$	R $\frac{1}{2} - \frac{1}{4}$	

Now find the lunch special.

Today's lunch special is:

$\frac{1}{2} + \frac{1}{4}$	$\frac{1}{3} + \frac{1}{6}$	$\frac{2}{3} - \frac{1}{6}$	$\frac{3}{4} - \frac{1}{8}$	$\frac{1}{2} + \frac{1}{4}$	$\frac{1}{3} + \frac{1}{6}$
$\frac{1}{2} + \frac{1}{4}$	$\frac{1}{3} + \frac{1}{6}$	$\frac{2}{3} - \frac{1}{6}$	$\frac{3}{4} - \frac{1}{8}$	$\frac{1}{2} + \frac{1}{4}$	$\frac{1}{3} + \frac{1}{6}$

## TASK #13: WHAT'S LEFT?

After a busy day, it's time to take inventory of what is left over from the day.

**Skills:** mixed and improper fractions, comparing fractions

**TASK #13 WHAT'S LEFT?**  
After a busy day, it's time to take inventory of what is left over from the day. Do each problem. Be sure to label your answers!

**FRUIT BASKETS**  
If you put three  $\frac{1}{2}$  baskets of fruit into one basket, how many baskets are left?  
Write the amount that is left on the number line.

**PIZZAS**  
If you had three  $\frac{1}{2}$  pizzas and you ate one, how many pizzas are left?  
Write the amount that is left on the number line.

**TOYS**  
If you had three  $\frac{1}{2}$  toys and you gave one away, how many toys are left?  
Write the amount that is left on the number line.

**TOYS**  
If you had three  $\frac{1}{2}$  toys and you gave one away, how many toys are left?  
Write the amount that is left on the number line.

**TASK #13**  
Write a greater (>), less (<) or equal (=) to compare each set of fractions.

$\frac{1}{2}$ > $\frac{1}{3}$	$\frac{1}{4}$ < $\frac{1}{5}$	$\frac{2}{3}$ > $\frac{1}{2}$	$\frac{3}{4}$ > $\frac{1}{3}$
$\frac{1}{2}$ > $\frac{1}{3}$	$\frac{1}{4}$ < $\frac{1}{5}$	$\frac{2}{3}$ > $\frac{1}{2}$	$\frac{3}{4}$ > $\frac{1}{3}$

## TASK#14: OFFICE COFFEE PACKAGES

You're trying something new this month - office coffee packages! You'll surprise one office around town each week with a tray of 12 cups of coffee for their staff!

**Skills:** decomposing fractions, adding fractions, ordering fractions

**TASK #14 OFFICE COFFEE PACKAGES**  
Let's make four office coffee packages. Each package should contain 12 cups of coffee.

**OFFICE COFFEE PACKAGE #1**

Type of Coffee	Color	Fraction of the Total	Equivalent Fraction
Espresso	Blue	$\frac{1}{2}$	$\frac{6}{12}$
Latte	Green	$\frac{1}{3}$	$\frac{4}{12}$
Capuccino	Red	$\frac{1}{6}$	$\frac{2}{12}$
Espresso	Blue	$\frac{1}{2}$	$\frac{6}{12}$

**OFFICE COFFEE PACKAGE #2**

Type of Coffee	Color	Fraction of the Total	Equivalent Fraction
Espresso	Blue	$\frac{1}{2}$	$\frac{6}{12}$
Latte	Green	$\frac{1}{3}$	$\frac{4}{12}$
Capuccino	Red	$\frac{1}{6}$	$\frac{2}{12}$
Espresso	Blue	$\frac{1}{2}$	$\frac{6}{12}$

**OFFICE COFFEE PACKAGE #3**

Type of Coffee	Color	Fraction of the Total	Equivalent Fraction
Espresso	Blue	$\frac{1}{2}$	$\frac{6}{12}$
Latte	Green	$\frac{1}{3}$	$\frac{4}{12}$
Capuccino	Red	$\frac{1}{6}$	$\frac{2}{12}$
Espresso	Blue	$\frac{1}{2}$	$\frac{6}{12}$

**OFFICE COFFEE PACKAGE #4**

Type of Coffee	Color	Fraction of the Total	Equivalent Fraction
Espresso	Blue	$\frac{1}{2}$	$\frac{6}{12}$
Latte	Green	$\frac{1}{3}$	$\frac{4}{12}$
Capuccino	Red	$\frac{1}{6}$	$\frac{2}{12}$
Espresso	Blue	$\frac{1}{2}$	$\frac{6}{12}$

**TASK #14**  
Write the fraction of regular coffee from the four coffee packages.  
Now order these fractions from least to greatest.

Write the fraction of decaf coffee from the four coffee packages.  
Now order these fractions from least to greatest.

## TASK#15: PROVE IT!

Complete each statement and prove it with a picture or a number line.

**Skills:** comparing fractions with a number line or visual model

**TASK #15 PROVE IT!**  
Complete each statement and prove it with a picture or a number line.

If 1000 you add  $\frac{1}{2}$  of a pan of brownies. If 1000 you add  $\frac{1}{4}$  of a pan of brownies. Did you eat more brownies of 1000 or 2000? Prove it with a picture or a number line.

You make a quantity smaller of the coffee. If you have  $\frac{1}{2}$  of a pan of coffee. If you add  $\frac{1}{4}$  of a pan of coffee. How much coffee do you have now? Draw it with the diagram.

Identify you add  $\frac{1}{2}$  of a pan of coffee. If you have  $\frac{1}{2}$  of a pan of coffee. How much coffee do you have now? Draw it with the diagram.

You make a quantity smaller of a package of water. If you have  $\frac{1}{2}$  of a package of water. If you add  $\frac{1}{4}$  of a package of water. How much water do you have now? Draw it with the diagram.

**TASK #15**  
Order the fractions from greatest to least.

$\frac{1}{2}$	$\frac{1}{3}$	$\frac{2}{3}$	$\frac{3}{4}$	$\frac{1}{4}$	$\frac{1}{5}$
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## TASK #16: REVENUE BREAKDOWN

Today the coffee shop made \$1000.00. Let's take a look at a breakdown of where that money was made.

**Skills: representing fractions as numbers, words, and on a visual model, common denominators, equivalent fractions, subtracting fractions**

**TASK #16: REVENUE BREAKDOWN**  
Today the coffee shop made \$1000.00. Let's take a look at a breakdown of where that money was made.

**Section 1: Total \$1000.00**  
Coffee: \$600.00 (60%)  
Lunch Items: \$200.00 (20%)  
Bakery Items: \$200.00 (20%)

**Section 2: Total \$500.00**  
Coffee: \$300.00 (60%)  
Lunch Items: \$100.00 (20%)  
Bakery Items: \$100.00 (20%)

**Section 3: Total \$250.00**  
Coffee: \$150.00 (60%)  
Lunch Items: \$50.00 (20%)  
Bakery Items: \$50.00 (20%)

**ANSWER KEYS ARE INCLUDED TO MAKE SELF-CHECKING SIMPLE.**

## WAYS TO USE MATH PROJECTS IN YOUR CLASSROOM:

Math projects are an ideal way to consolidate learning. I recommend using them as an engaging activity AFTER skills have been learned rather than during learning. You will likely find that engagement is very high and that your students ask to do more of these!

There are many ways to use math projects in your classroom. Some of the most popular are:

- a small-group or pairs activity
- a guided math activity to allow you to see where your students are struggling
- a fun, rewarding way to engage your early finishers
- a low-prep, easy-to-implement activity for a substitute teacher

Enjoy!

Shelley Gray

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