

# Time Money Measurement



**a Forget Memorization book**

*Easy learning through images, stories, hands-on activities, & patterns*

**by Sarah K Major**

Right-Brained Time, Money, Measurement

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The Easy-for-Me™ Children's Readers  
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# ABOUT THIS BOOK

This book is for children who are strongly visual, who learn all at once through pictures, are drawn to patterns, rely on body motions, and who need to understand the process behind each math problem they solve. Child1st teaching and learning resources all follow the principle of conveying learning pieces using a variety of right-brain-friendly elements. We take learning tidbits that utilize symbols (numbers and letters) and abstractions, which are left-brained, and embed them in right-brained elements to beautifully integrate the left and right hemispheres in the brain.

## RIGHT-BRAINED ELEMENTS:

1- We embed symbols in **VISUALS** so that the child can take a quick look, absorb the learning piece, and store it as an image to be retrieved intact later.

2- We use **PERSONIFICATION** which is a powerful element in teaching and learning. The use of personification makes for rapid learning because the very look and personality of the character conveys the substance of the learning. For example, Ollie Owl, Molly Mongoose, and Sammy Stork have personalities that help cement their function in children’s memory. Ollie Hour is an owl who marks the hours and goes very slowly on his short legs. Molly Minute is a mongoose who ticks off the minutes, scuttling around the clock quickly. Sammy Second is a stork who swoops around the clock marking off the seconds.

3- We rely on **PATTERN DISCOVERY** as a way of making numbers come alive and as a means of conveying the amazing relationships between numbers. What results is number sense. Because the brain is a pattern seeking organ, it is drawn to material that follows patterns.

4- We use **STORY** to contain the meaning of what we are teaching in math. Stories, like visuals, make learning unforgettable. They explain the “why” behind math concepts and tie everything together, creating a vehicle for meaning and for recall.

5- We use **BODY MOTION**—both gesture and whole body movement that mirrors the symbol shape or the action in the math story (such as addition or subtraction). Again, body movement is a powerful agent for learning and remembering. For many people, body motion makes recall effortless if the learning piece is directly tied to a unique motion.

6- We employ **VISUALIZATION**—a powerful tool for right-brain-dominant learners. If these learners are given time to transfer the image on the paper in front of them to their brains (prompt them to close their eyes and SEE it in their mind’s eye), they will be able to retrieve that image later. If the image contains learning concepts, this is how they will remember what you want them to learn. So in this book, each time a visual is introduced, prompt the student(s) to “see” the image in their mind.

## HOW TO USE THIS BOOK

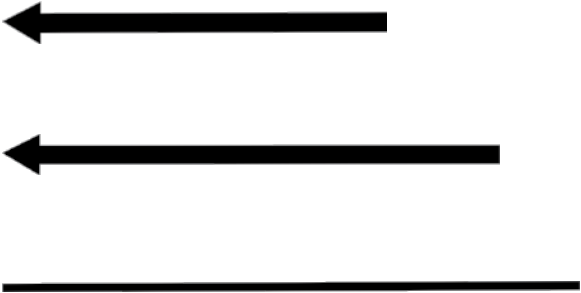
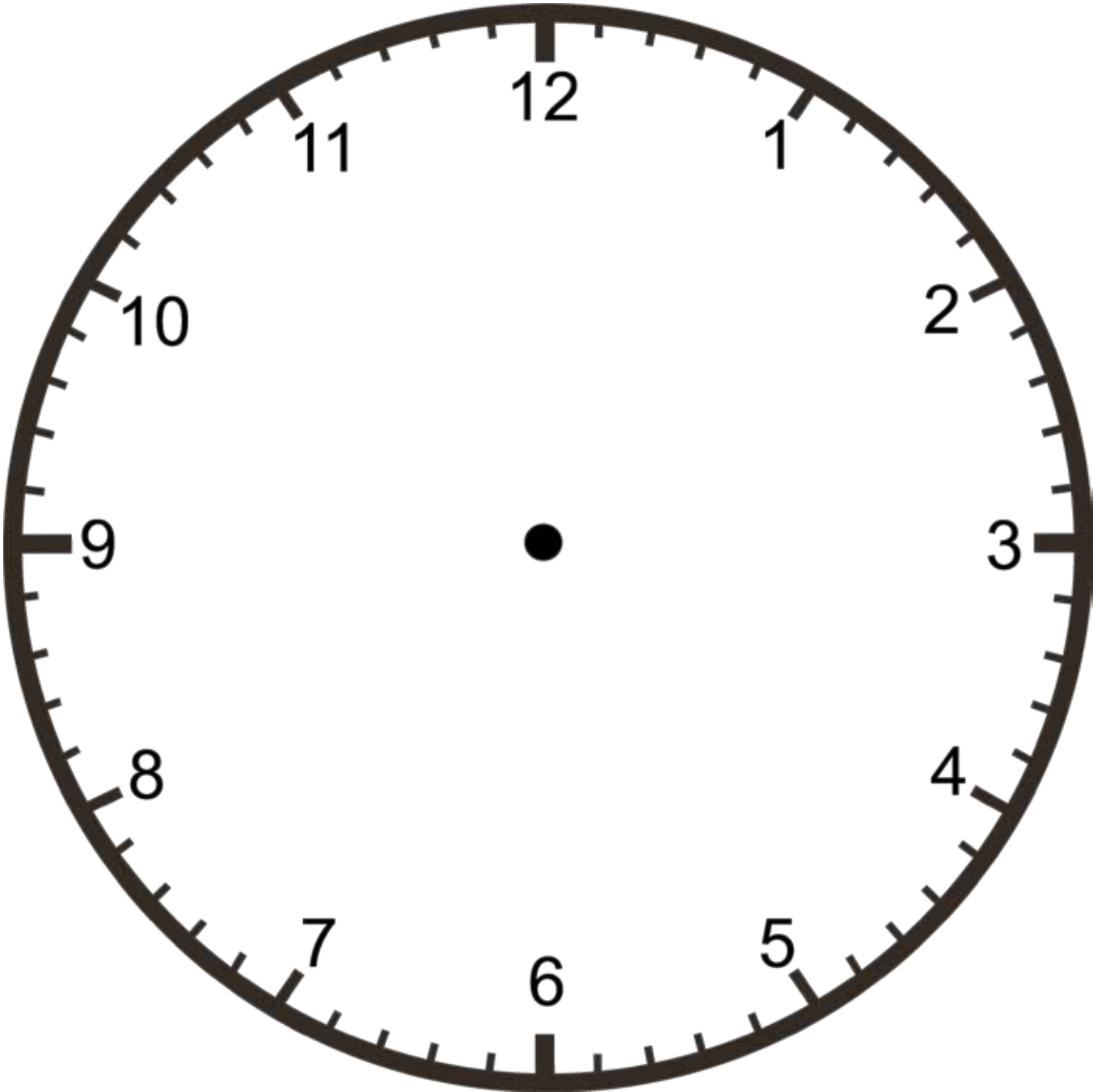
You may approach this book in several ways, depending upon your particular needs, the level and ages of the children you are teaching, and your time constraints. There are three sections for Time, Money, and Measurement. The material presented in each section begins at the very beginning and increases in difficulty. Simply go as far as your student(s) can go in each section.

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# Part I - Time

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If desired, cut out this clock face, glue to posterboard, and laminate. Alternately, use a toy clock with moveable hands that track with each other to practice time.

## B. What do a.m. and p.m. mean?

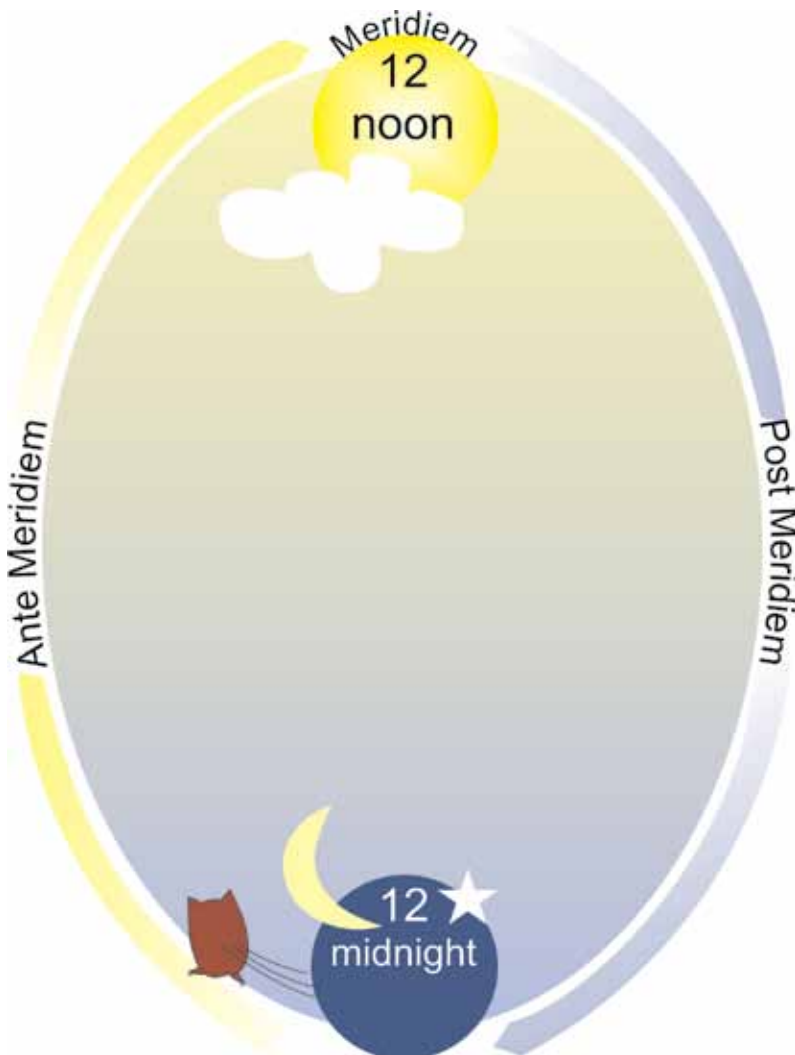
Morning stretches from 12 midnight to 12 noon. When we are telling time, we call morning “a.m.,” which stands for “ante meridiem.” Ante Meridiem is Latin for “before midday.” “Ante” means before, “meri” means “middle” and “diem” means “day.” When we are telling time, we call afternoon and evening “p.m.” “P.m.” stands for “post meridiem.” Post Meridiem is Latin for “after midday.”

There are several words in our language that start with “ante” or “before.”

- “Anteroom” is a room you pass through before entering a main room. An example of an anteroom is a waiting room in a doctor’s office.
- “Antenatal” means “before birth.” Often mothers have antenatal classes - classes they take before the baby is born.
- “Antepast” is food you eat before you eat the regular meal.

Words that begin with “post” include “postdate” (date it after today), “postpone” (put it off until later), and “post operative” (it happens after the operation).

Ollie left at 12 midnight (or midway through the night). As Ollie waddled away from the 12, it was the very earliest part of the morning. Follow Ollie’s progress on the picture below.



At midday, as soon as Ollie leaves the 12 again, it is afternoon and we say p.m. This time stretches from 12 noon to 12 midnight.

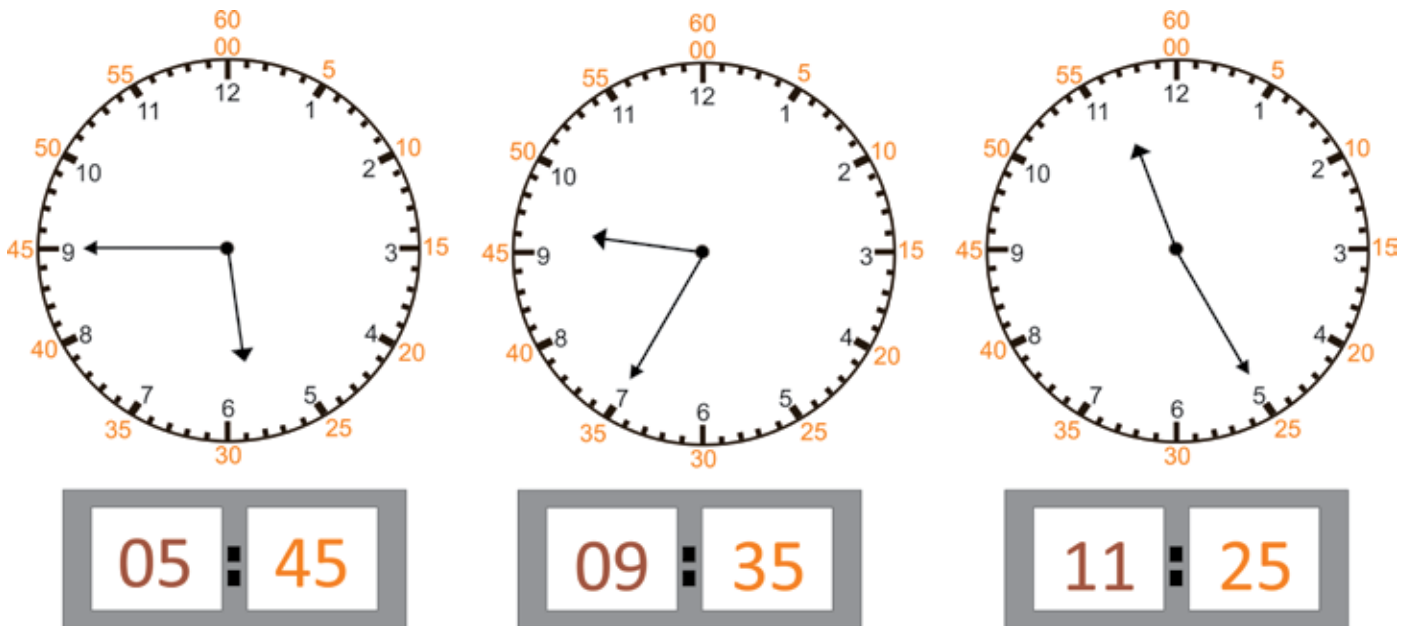
On the left is a picture that shows a.m. on the left and p.m. on the right, midday at the top, and midnight at the bottom.

It takes Ollie 12 hours to waddle from 12 midday to 12 midnight! Then 12 more hours to go from 12 midnight to 12 midday.

If Ollie is walking after midnight, he will say, “It is 7 a.m.,” for example. If he is walking after 12 midday, he will say, “It is 4 p.m.”

Molly is amazing! In the time it takes Ollie to waddle from the 7 to the 8, Molly will have circled the whole clock face one time - from 12 back around to 12 again.

Let's practice telling time as Ollie and Molly race. Here are three clocks showing how the race is going. Practice reading the time. Look at the black hour numbers first, then add the orange number Molly is pointing to.



Notice in the three clocks above that Ollie is not pointing exactly to the hour. He has passed the hour a bit while Molly was racing around marking her minutes. When you are telling time, pay attention to the hour Ollie has already passed because he won't always be right on the number. Ollie doesn't mark the new hour until he actually passes it.

In the first clock, Molly has already traveled 45 minutes, so Ollie is almost to the 6! In the second clock, Ollie has passed the 9 and is moving towards the 10. Same goes for the last clock that shows Ollie having passed 11.



Give your child a toy clock. Call out times and have him/her first set Ollie's hour, then set Molly's minute hand on the correct numbers.

**RULE:** When we tell time, we say the hour Ollie is on or has just passed. Next we say Molly's minutes.

Let's review what the race looks like when Ollie, Molly, and Sammy are all involved. They all three start on 12 noon (or 12 midday). Here's what happens:

- Ollie takes an hour to get from 12 to 1.
- Molly takes an hour to get from 12 clear around the clock to 12 again.
- Sammy rounds the clock every time Molly clicks off a minute. So in the time it takes Molly to get around from 12 to 12, Sammy has been around the clock 60 times! Wow!



*Ollie*



*Molly*



*Sammy*

**RULE:** It takes 1 hour for Ollie to go from one number to the next. It takes 1 hour for Molly to go around the clock once. It takes 1 hour for Sammy to circle the clock 60 times.

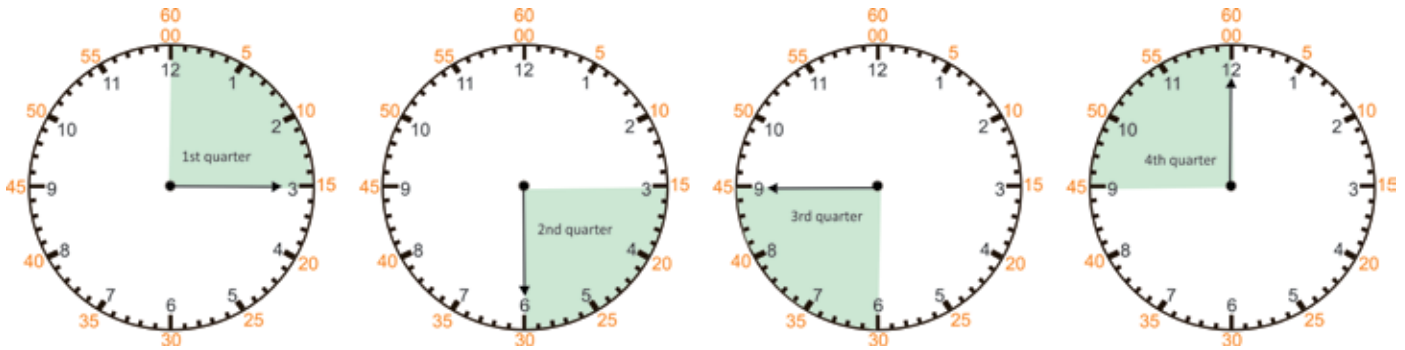


Use resource 4.1 to practice writing in Molly's minutes.  
Use resource 4.2 to have your child practice writing and reading the times shown.

Before moving on to the next chapter, please practice the arm motions and numbers that go with Molly's minutes. After all, analog clocks don't usually have minutes written out.

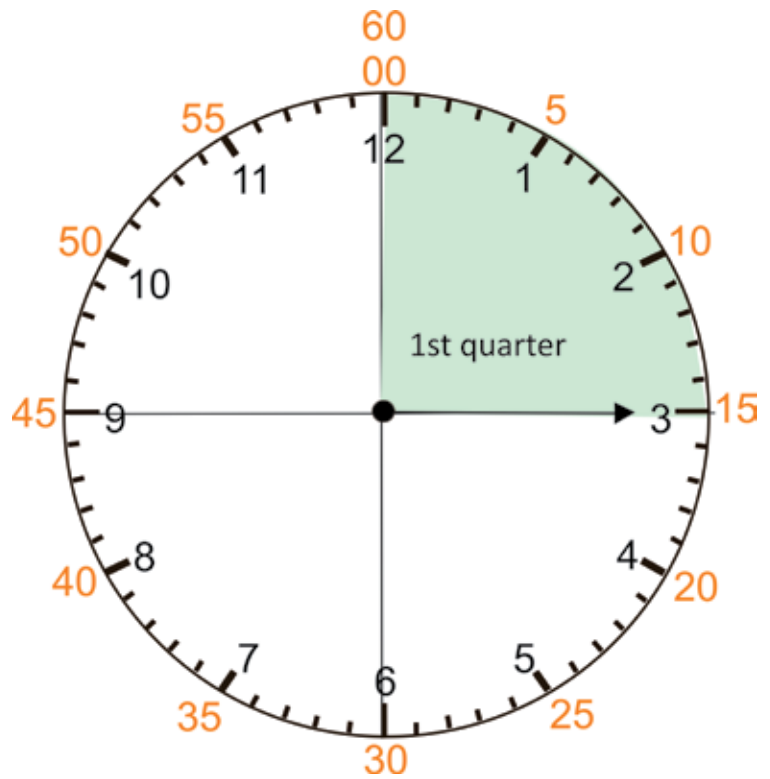


Below are four clock faces. Each of them shows a quarter hour and Molly is racing ahead to mark the end of each quarter.



The first quarter of the hour ends when Molly reaches 3. See clock 1. The second quarter hour is on clock 2 and shows Molly reaching the 6. Hey! Isn't that where Molly points when she is marking the half hour? Yes it is! This means that two quarter hours is the same as one yellow half hour.

Clock 3 shows the third quarter hour with Molly pointing to 9. Finally, clock 4 shows the fourth quarter hour with Molly back at the starting gate: 12. The quarter hours are marked easily by drawing two lines to divide the clock face and also by skip counting by 3's: 3, 6, 9, and 12.



When Molly reaches the 3, we say it is quarter after whatever hour Ollie is on. When she reaches the 2nd quarter, Molly is pointing down and we say the hour and "thirty." When she is at the end of the third quarter, we say, [the hour] forty-five. At the end of the fourth quarter, we are back to hearing Molly say, "O'clock."

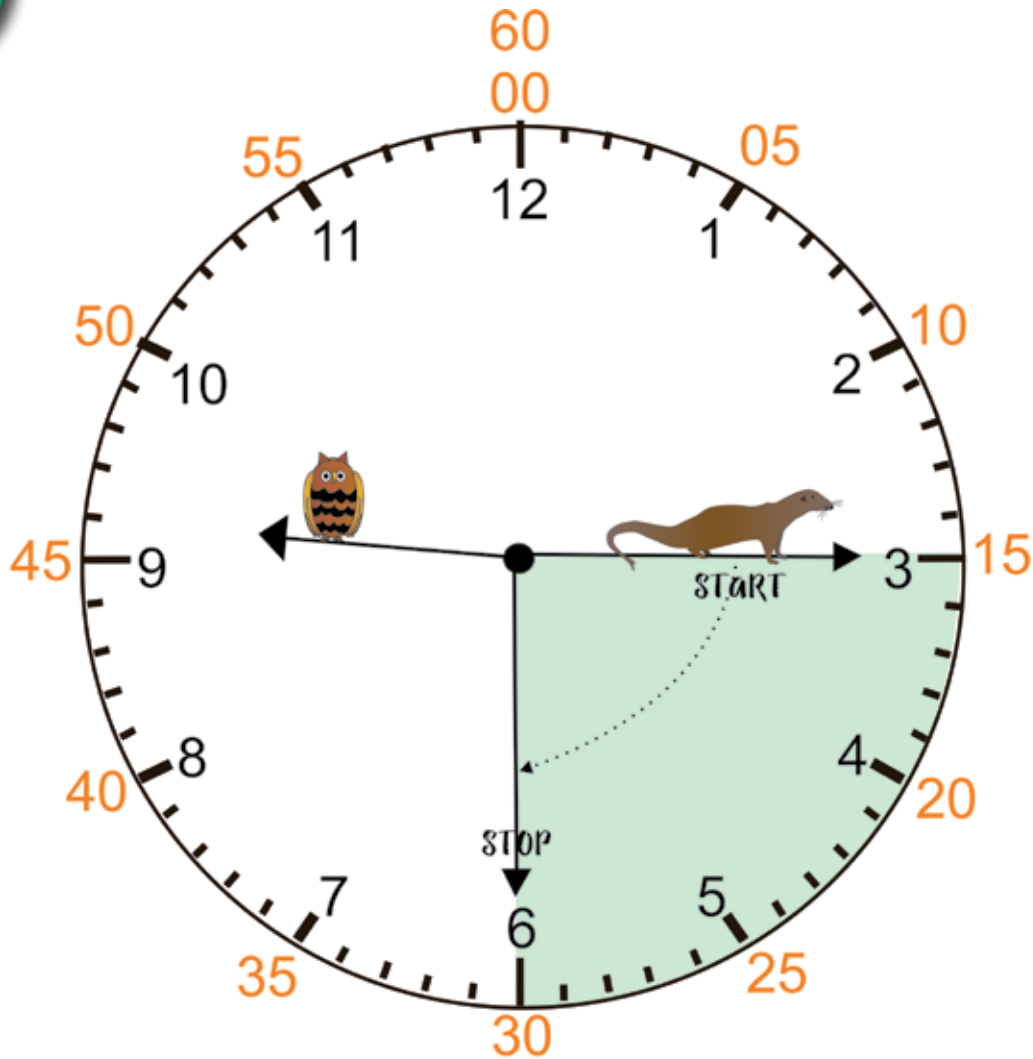
**RULE:** The four quarter hours end when Molly is at the 3, the 6, the 9, and the 12.



Use R 6 to practice quarter hour increments.

# 9

## Elapsed Time



Start Time:



End Time:

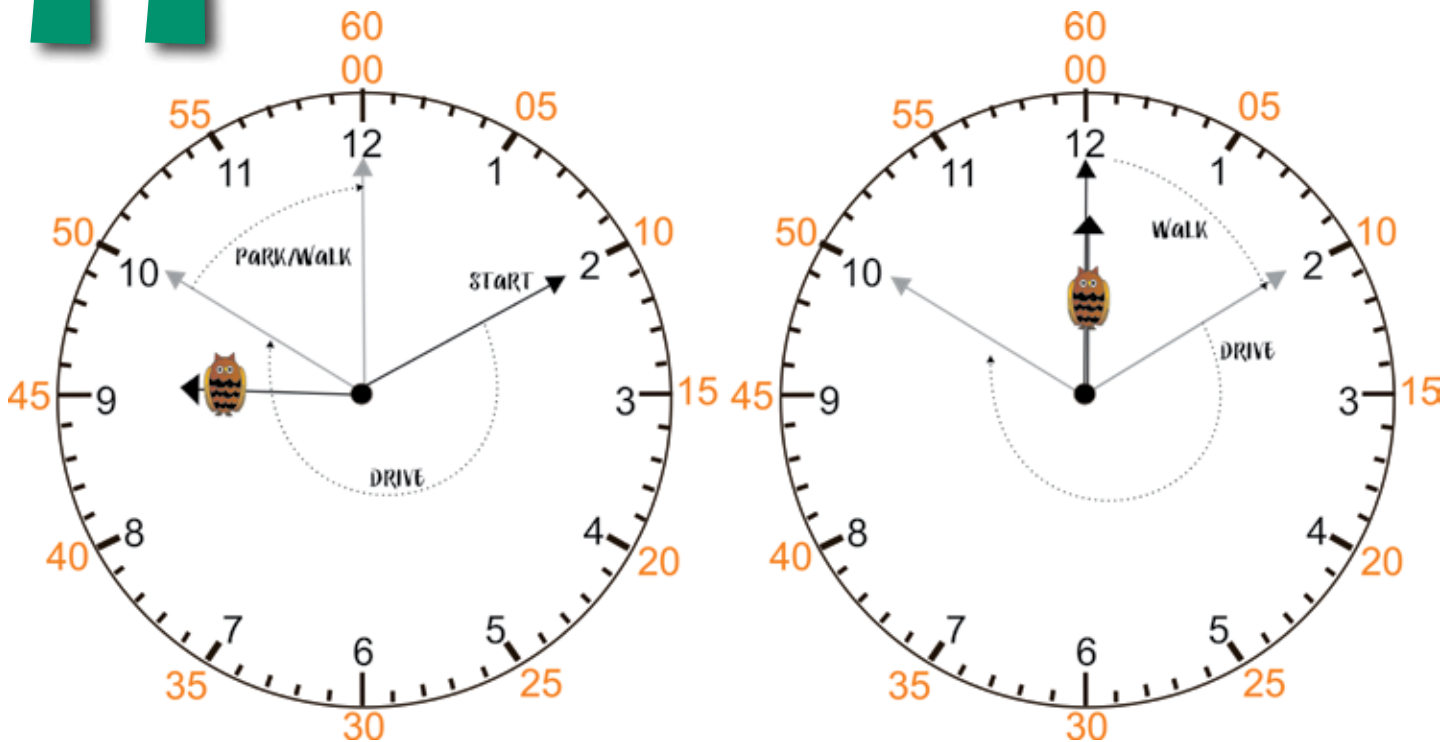


Sometimes when we are making plans with a friend, we speak of a time we will start an activity and a time we will finish. For example, your friend might say, “Let’s go run around the track. We can start at 9:15 and we’ll be done at 9:30 in plenty of time to go to the park.”

When we speak of a start and finish time, it is helpful to understand how much time the activity will take. Look at the clock above. The kids started running at 9:15 and finished at 9:30. How much time did they spend running? They ran for a quarter hour - or for 15 minutes. The time that elapsed was 15 minutes.

# 11

## Estimating Time



A wonderful skill to learn is how to estimate time. Sounds super boring, but it will help make life smoother for you! Here is an example of what it means to estimate time. A flea market your family wants to go to is open from 10-12 in the morning. The market is 40 minutes away. If you want to have both hours for browsing, it is wise to make a plan in which you estimate the time it will take to drive, park, and walk into the market. Here is a sample plan:

1. Drive to market 40 minutes
2. Park and walk 10 minutes
3. Shop 2 hours
4. Walk to car 10 minutes
5. Drive home 40 minutes

In this case, start with the 2 hours the market will take. Now add  $40 + 10$  to calculate the time you need *before* 10:00. If you leave home at 9:10, you will have 40 minutes to drive, and 10 minutes to park and walk before the market opens. If you leave the market at 12 noon, you will take  $10 + 40$  minutes (50 minutes) to get home. You will reach home at 12:50.

Look at the two clocks above. The first clock shows the time it will take you to drive, park, and walk. The second clock shows the time you need to get home after the market is over. That clock starts at noon when the market closes, and takes you the 50 minutes you will need to get back to the car and drive home.

# Part II - Money

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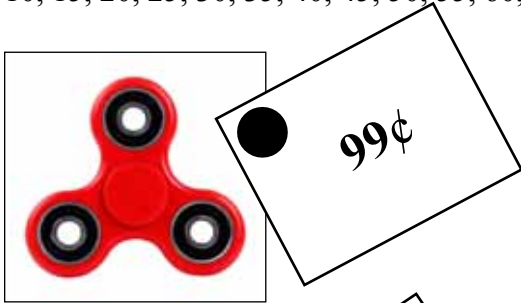


Now, let's get some practice changing pennies for nickels. For this activity, you will need a large pile of pennies and a smaller pile of nickels. Make stacks of 5 pennies in each stack. When you have finished all the pennies, put 1 nickel by each stack of 5 pennies.

Point to each nickel in turn and count by fives as you do. Write down the number you end on. For example, if you have 15 nickels, you would count by 5's like this: 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75. Your 15 nickels are worth 75 pennies. Without having to count your stacks of pennies, you know you also have 75¢ worth of pennies. Wow!

## Shopping with pennies and nickels

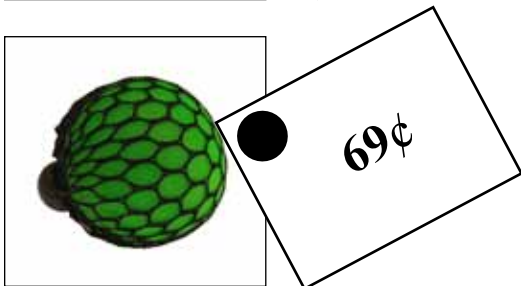
Now the fun begins! Let's use the same toys we were working with last time, but this time, let's use mostly nickels and just fill in with pennies when we have to. The first toy costs 99¢. Let's start counting out nickels until we are very close to the 99¢, but without going over. Put one nickel down each time you say a number: "5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90, 95." We'd better stop! Now let's add pennies



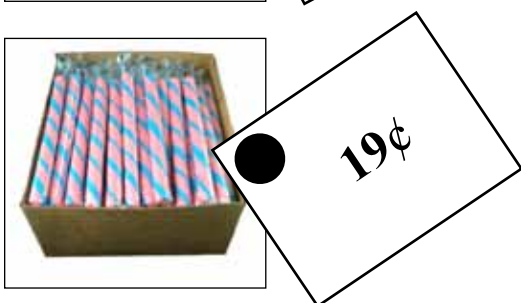
until we reach exactly 99¢. "96, 97, 98, 99." How many nickels and pennies equal 99¢. We used 19 nickels and 4 pennies instead of using 99 pennies like last time!



The chalk box costs 79¢. Start counting by 5's, laying a nickel down each time you say a number. "5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75." Now add pennies as you continue to count: "76, 77, 78, 79." Count how many nickels you used, and then how many pennies you used. 15 nickels and 4 pennies is the same as 79 pennies! To buy the chalk, you would only have to carry 19 coins - instead of 79 coins!



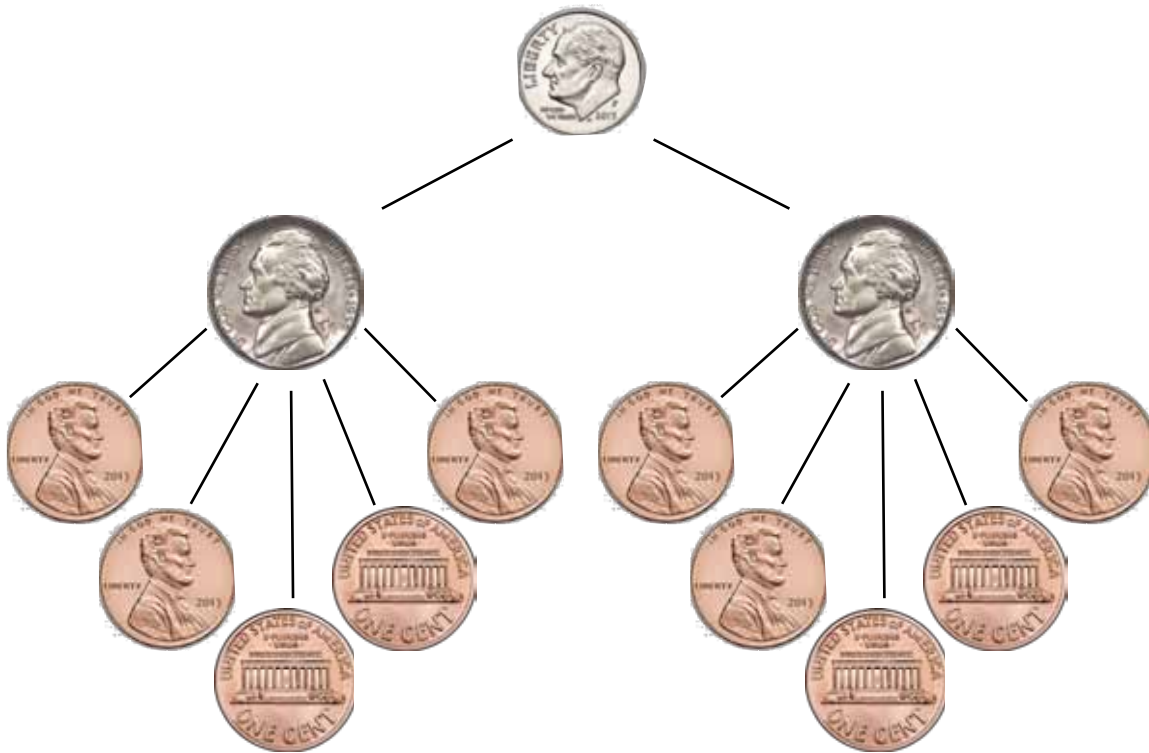
The squishy ball costs 69¢. Let's count by 5's and place a nickel on the table each time we say a number. Just remember to stop before reaching 69. "5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65." Now count on, laying down pennies until you reach 69: "66, 67, 68, 69." How many nickels and pennies did you use? 13 nickels and 4 pennies instead of 69 pennies!



Finally, one stick candy costs 19¢. Count out nickels: "5, 10, 15." Now count on with pennies: "16, 17, 18, 19." How many coins? Only 7! Did you notice that in each case you only used 4 pennies? Why is this? (Each price ends in a 9, which is 4 more than the last number that ends in 5 in the price.)

## What it buys

Look at the money picture below. At the very top is the dime. It is worth 10¢. Two nickels are also worth 10¢, and so are 10 pennies. When you look at the 10 pennies, does it remind you of the 10 fingers on your hands? You can pretend that the two nickels represent your two hands, and the pennies represent your 10 fingers, and the dime is your two hands clasped together. It is pretty easy to remember a dime when you say, “It’s time for a dime!” as you clasp your hands together.



When you were practicing shopping using pennies and nickels, it would have been really helpful to have dimes! Remember that at first you counted out all pennies? Boy, that took a long time, didn’t it? Next, you speeded things up by counting nickels first and then filling in the left over numbers with pennies. Shopping with dimes makes paying for things much faster! It helps to know how to count by 10’s well, and it helps to know there are 10 dimes in a dollar.

Now, let’s get some practice changing pennies and nickels for dimes. This time, your pennies will be in stacks of 10 and your nickels in stacks of two coins. Beside each stack of pennies, put a stack of two nickels and then add one dime.

You can quickly count how much money you have in all by simply counting the dimes. Say you have 7 stacks of coins. You would count: 10, 20, 30, 40, 50, 60, 70. You have 70¢ worth of dimes. This means you also have 70¢ worth of nickels, and another 70¢ worth of pennies. Now, let’s take all that money and go shopping!

Here is a five-frame of numbers 1-100. We are going to make friends with this chart because it will help us a lot as we become more and more comfortable with using money.

1	2	3	4	5
6	7	8	9	10
11	12	13	14	15
16	17	18	19	20
21	22	23	24	25
26	27	28	29	30
31	32	33	34	35
36	37	38	39	40
41	42	43	44	45
46	47	48	49	50
51	52	53	54	55
56	57	58	59	60
61	62	63	64	65
66	67	68	69	70
71	72	73	74	75
76	77	78	79	80
81	82	83	84	85
86	87	88	89	90
91	92	93	94	95
96	97	98	99	100

Let's study the chart. There are 100 spaces in all - the same number of pennies in a dollar.

Each row has 5 pennies, which is the same thing as a **nickel**! If you count by fives down the right hand column, you will quickly find that there are 20 nickels in a dollar.

Each two rows equals a **dime**. If you start on the 10 and count by 10's to 100, you will find you are skipping the number that end in a 5.

How many rows would equal a quarter? [Hint, you can count by fives or you can just look for the number 25 on the chart and count the rows.]

#### Try it out

What if you wanted to pay for something that costs 35¢? If you use the chart, you can look for the 35 and then figure out the coins you can use to pay.

- You could count out 35 pennies.
- You could use all nickels - 7 of them. Count by 5's down the column on the right to see if this is true.
- You could use dimes, too. But as you count by 10's down the right column, you will see you can't quite reach the 35 with just dimes. What coins can you use to get from 30 to 35? [5 pennies or a nickel].
- You could start with a quarter which would get you to the 25. You are still not quite at the 35 though. Can you use another quarter? [No. That would equal 50. Some options are to use a dime - that would equal 35¢. But you could also use two nickels or 10 pennies.]

Look for more shopping opportunities in a couple of pages.

# 8

## Making Change

You pay \$10.00...



for this...



and get back the "too much."



“\$8.77. 78, 79, 80, 90, \$9.00, \$10.00”



*Item + change = money paid.*

### Why Make Change?

In a magical world, every human on earth would be carrying a wallet with the exact amount of money in the exact value that they will need anytime they go shopping for anything ever. But we don't live in a *that kind* of a magical world! Usually we don't find that we have the right coins and bills in the exact amounts we need to pay for something. So we solve this by giving the shop keeper a bill larger than the cost of the item and the shop keeper gives us back the money we paid too much. We get the “too much” back! Shop keepers can do this because they have little drawers full of stacks of each kind of coin.

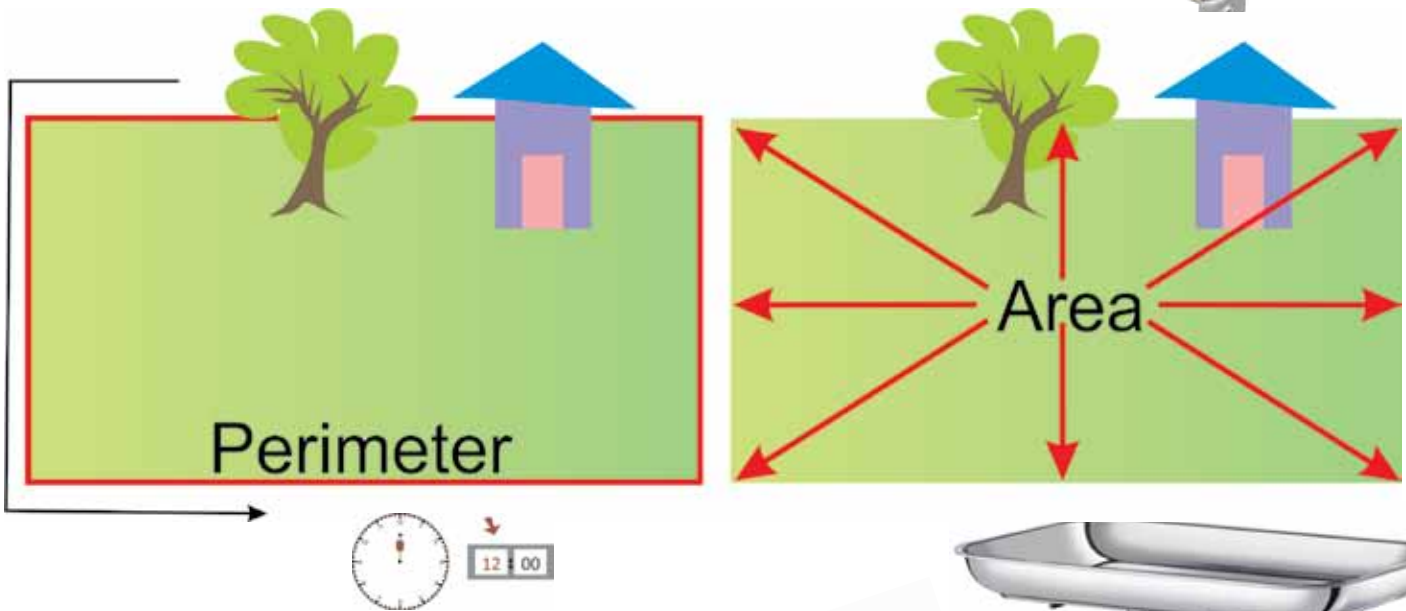
In the picture above, Oliver wanted to buy a Connect4 game that cost \$8.77. He took a quick look in his wallet and saw only a \$10.00. So he gave the shop keeper the \$10.00 and the shop keeper gave him back the “too much” that he paid. This is what he did: He said the price of the game because that is what Oliver owed him, then as he counted out the coins above, he said, “78, 79, 80, [pennies] 90, \$9.00 [dimes]” and then when he handed him the dollar bill, he finished with, “\$10.00.”



# Part III - Measurement

Temperature .....91  
 Length .....94  
 Perimeter.....99  
 Area .....101  
 Weight .....103  
 Volume.....108

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## Reading thermometers

Notice that on the thermometers, some of the lines have numbers by them. They have little lines without numbers in between - just like a clock does.

On a clock, the little lines with no numbers represent minutes. On thermometers, the little lines show degrees of heat.

- Sometimes you will be counting by 10's like on the weather thermometer.
- The food thermometer counts by 20's, but the little lines between the numbers let you count by 2's.
- Body thermometers count by 1's but have little lines between them that represent tenths of degrees! When a person's temperature is 98.6° it means their temperature is 98 degrees and 6 tenths of a degree more.

## Practice reading temperatures

You will need the three different types of thermometers we have talked about.

### Temperature of the air

For a week or two, read an outdoor thermometer each day at the same time and record the temperature on a sheet of blank thermometers. (See the Measurement Resources section for blank thermometers.)

### Temperature of food and liquids

Using a food thermometer, measure and record the temperature on another sheet from Measurement Resources. Ideas of foods to measure include: boiling water, chicken from the oven, a baked casserole, meat on the grill, and taffy (or other candy) cooking.

### Body temperature

Get 3-5 volunteers and take their temperatures. Record them on a sheet (see Measurement Resources). Not every person has exactly the same temperature! Your family might have a digital thermometer that shows the temperature in numbers like this:



**RULE:** Use thermometers to measure temperature. "Thermos" & "metron" mean "heat measure." in Greek.



Use Resource 1 to practice measuring temperature.

# Units of Length

## Inch

Because of Farmville, we know that inch worms are about an inch long. They are interesting creatures that have legs only in the front and back of their body. When they walk, they hump up and then stretch out, looking very much like they are measuring length. Right under the inchworm is a rectangle that shows the size of an inch.



1 inch

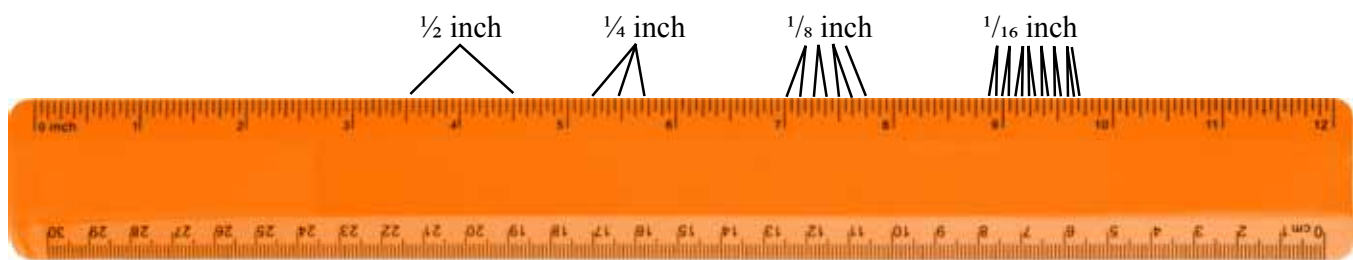
## Foot

Also because of Farmville, we know a foot is about the length of a man's foot. Here is a picture of a man's foot with a ruler lying beside it. This foot happens to be a foot long! We can't show the foot and ruler exactly a foot long because it would not fit into this book. This ruler is 12 inches long and 12 inches = a foot!

A great thing you can do is grab a ruler and then find some adults and measure their feet. The foot closest to the length of the 12 inch ruler wins!



If you keep a record of the feet you measure, you can also record the number of inches long each foot is. You will measure each foot by lining up the zero to the back of their heel, then look at where their toe ends. If the toe doesn't land exactly on a number, look at the ruler below:

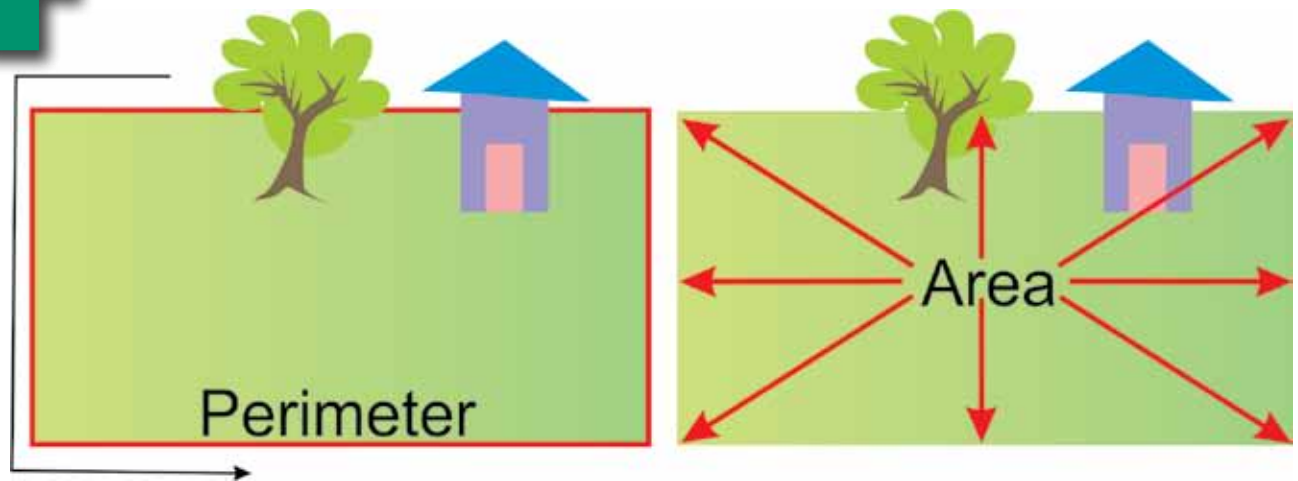


Between each number are little lines. Identify the lines that are exactly halfway between the numbers. These are half inch lines. Also between inches are three lines that mark quarter inches. Next we see lines that mark eighth inches, and finally sixteenth inches.

When you are measuring feet, it is enough to record a person's foot measurement as so many inches and a half, if their toes pass one number but don't quite reach the next number. My own foot, for example, is 9 inches a bit more, so I can say, "My foot is about 9½ inches long." This is how I would write it: 9½".

# 4

## Area



### What is Area?

Area is a very different thing from perimeter, but both are very useful! The word area refers to how much space is within a certain boundary. The left picture, above, shows a red fenceline which goes around the perimeter of the property. The second picture shows area, or how much actual space is on the property. Picture “area” as being everything that is covered by grass. When you buy carpet for your living room, you need to figure area. And best of all, when you are building a tree house, you need to figure out the area of the floor so you will know how much flooring you will need.

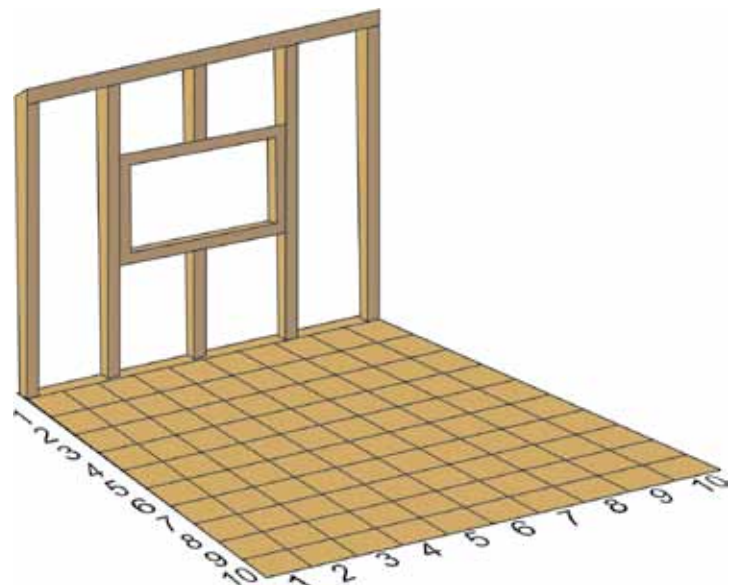
### Measuring Area

Measuring area can be easy and fun. Let’s say in building a fort we think that 12” tiles would be perfect for the floor. We need to calculate how many tiles we will need. First we will measure the floor. We find the floor is exactly 10’ by 10’. This means each side measures 10 feet. We can see on the picture that the floor has been marked to show where each tile will lay.

What will be the easiest way to figure out how many tiles we will need?

1. Count each tile. This is the slow way!
2. Calculate: if there are 10 rows of 10 tiles, couldn’t we just multiply 10 (rows) X 10 (tiles)?  
Yes!  $10 \times 10 = 100$ . We need 100 tiles!

On a side note. What is the perimeter of this floor? It will be useful to have this information when it comes time to make baseboards. Since each side is the same, we can do  $4 \times 10' = 40'$ .



# Mass and Weight

## Mass

We normally talk about how much something or someone *weighs*. Technically, we should talk about someone or something's *mass*. Mass means how much matter is in the object or person. For example, the mass of a bag of cotton is small compared to the mass of a bag of rocks of the same size. We talk about the mass of something saying pounds, ounces, or tons. But how much that object weighs depends on where it is.

## Weight

Weight refers to how much force an object or a person exerts on the earth as a result of gravity. An elephant with a mass of 7 tons pushes on the earth with the force of 7 tons because of gravity pulling it down. But what if you loaded the elephant into a rocket ship and took him to the moon? Would the elephant (who's mass is still 7 tons) weigh 7 tons on the moon? No! The elephant would only weigh a little over 2 tons on the moon. And what if, on the way to the moon, the rocket ship burst open and the elephant floated out into space? The elephant, with its mass of 7 tons, would weigh nothing because in space, all matter is weightless. There is no gravity at work in space. Mass never changes unless the object changes, but weight can change depending on where it is.



RULE: We use "ounces, pounds, and tons" when we speak of weight.



Use Resource 5 to practice measuring weight.

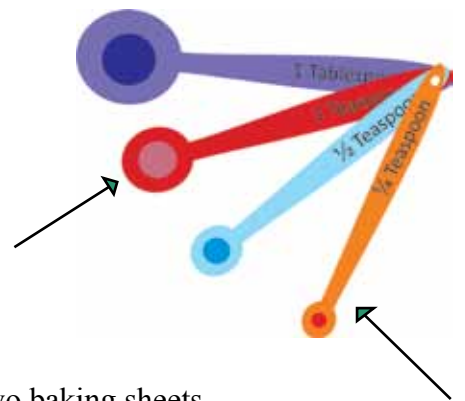
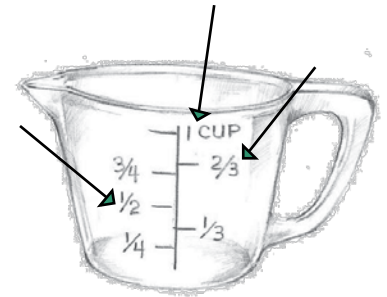
## Practice Measuring With Cups and Spoons

The very best way to practice measuring is by actually making something you will enjoy making! Gather your tools. You will need a measuring cup, measuring spoons, a large bowl, cookie sheets, spatula, and the ingredients listed below. When you measure, make sure the item is right at the top of each spoon, or that it comes right up to the correct line on the measuring cup. Arrows are pointing to measures you will use.

### King Arthur Chocolate Chip Cookies



- 2/3 cup light brown sugar, firmly packed
- 2/3 cup granulated sugar
- 1/2 cup unsalted butter, right from the fridge, or at room temperature
- 1/2 cup vegetable shortening
- 3/4 teaspoon salt (use 1/2 teaspoon salt if you use salted butter)
- 2 teaspoons vanilla extract
- 1/4 teaspoon almond extract, optional
- 1 teaspoon vinegar, cider or white
- 1 teaspoon baking soda
- 1 large egg
- 2 cups King Arthur Unbleached All-Purpose Flour
- 2 cups semisweet chocolate chips



### Directions

- Preheat the oven to 375°F. Lightly grease (or line with parchment) two baking sheets.
- In a large bowl, combine the sugars, butter, shortening, salt, vanilla and almond extracts, vinegar, and baking soda, beating until smooth and creamy.
- Beat in the egg, again beating till smooth. Scrape the bottom and sides of the bowl with a spatula to make sure everything is thoroughly combined.
- Mix in the flour, then the chips.
- Use a spoon (or a tablespoon cookie scoop) to scoop 1 1/4" balls of dough onto the prepared baking sheets, leaving 2" between them on all sides; they'll spread.
- Bake the cookies for 11 to 12 minutes, till their edges are chestnut brown and their tops are light golden brown, almost blonde. Remove them from the oven, and cool on the pan till they've set enough to move without breaking. Repeat with the remaining dough.



Use Resource 6 to practice measuring liquid volume.