Spring 5-5-2015

Culturally Responsive Curriculum: Third Grade Dual Language Immersion Fraction Unit

Katherine Elizabeth Jacques
Hamline University, kjacques02@hamline.edu

CULTURALLY RESPONSIVE CURRICULUM:

THIRD GRADE DUAL LANGUAGE IMMERSION FRACTION UNIT

By

Katherine E. Jacques

A capstone submitted in partial fulfillment of the requirements for the degree of

Masters of Arts in Education.

Hamline University

Saint Paul, Minnesota

April 2015

Committee:

Barbara Swanson, Primary Advisor

Emily Kraus, Secondary Advisor

Alia Morales Towns, Peer Reader

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER ONE

INTRODUCTION

Overview

As I have grown as an educator I have developed many passions and interests within the field that ignite my drive to deliver a better experience for the students that I serve. For the purposes of this study, I have chosen to focus in on the convergence of three of my passions: closing the racialized achievement gap, data-driven math instruction, and culturally responsive teaching strategies. This capstone explores the research question: How can cooperative learning strategies, culturally responsive instructional techniques and the response to intervention and curriculum-based measurement model be used to develop a math fractions unit for third-grade bilingual students in the dual language immersion setting?

I have a deeply held belief that all children have the right to be bilingual and to develop into bilingual adults. The program model used in my study, dual language immersion (DLI), is one method for developing bilingual skills. It has been proven to be the most effective approach for ensuring that students perform at or above grade level norms in standardized math and reading assessments given in English while also developing grade-level academic skills in a second language (Thomas & Collier, 2003). For DLI students, the achievement gap, measured by standardized assessments in English, between English language learners (ELLs) and native English speakers (NES) generally closes by fifth grade (Collier & Thomas, 2004; Lindholm-Leary 2012).

I also believe that skin color should not continue to be a determining factor for the likelihood of success in the United States. I have witnessed the transformative nature of

dual language immersion education for all students. However, the racialized achievement gap is present in my school and in my classroom in both English and Spanish-based mathematics assessments, and I am determined to work towards eliminating race as a predictor of the success of the students that I work with.

In this research, I describe how I developed an interest in DLI, the basic tenets of the DLI model, how racism is present in schools in the United States and how the achievement gap can be closed through culturally responsive instruction. Additionally, I will share what my role is as a researcher in developing the curriculum and how data-driven math instruction is implemented in my classroom.

Origins of Interest

I first developed an interest in language immersion education as an undergraduate student. My passion for immersion education developed quickly as I began teaching, but my frustration grew as I discovered that very few professional development resources exist for immersion educators. I began my career in a district that had a long-established, but poorly implemented, immersion program. I have been in my current district for six years and have had the opportunity to work under the leadership of two well-informed principals and alongside accomplished and knowledgeable teaching staff. However, I recognize the need to become better versed in best practice in dual language immersion in order to be a better teacher and advocate for my students.

As I have worked in DLI programs I have witnessed the transformative nature of the programming for Latino students. In many programs English language learners are viewed as having deficits because they are not as proficient in the English language as their native English-speaking peers (Baralis, 2009). DLI programs characteristically

elevate the status of the target, or non-English, language and in doing so also elevate the status and culture of the native speakers of that language (Thomas & Collier, 2003). The Spanish-speaking Latino students in my school are the linguistic experts, thus balancing the status quo found in many United States (U.S.) schools due to the monolingual nature of the majority of U.S. schools. This particular characteristic along with around half of each class being composed of Latino students helps keep the dominance of English and the dominant White culture in the United States, in check. The dominant, mainstream, White culture is also referred to as whiteness. Unchecked or unrecognized whiteness can negatively hurt students of color and is one of the factors perpetuating the achievement gap (Ladson-Billings & Tate, 1995; Pacific Education Group, 2008).

DLI schools may employ teachers of color, paraprofessionals of color, and teachers who have may have spent significant time living abroad and who may also have a spouse who is a racial and linguistic minority. All classroom teachers in my school either grew up abroad, have lived abroad, or learned Spanish through immersion programs. More than half of the classroom teachers are either married to a person of color or are themselves people of color, and many are raising children of color. Yet, despite the staff having all of these potential advantages, the native Spanish-speaking Latino students are underperforming their White counterparts in math.

White and Black students outperform Latino students in Spanish-language mathematics assessments in my school. The language of instruction for mathematics is Spanish. While native Spanish speakers only need to focus on math skills, the native English speakers must learn both Spanish and math during math instruction. Despite this, the White and Black students continually outperform the Latino students at my school.

This has developed into one of my greatest concerns for my school. My work as part of the equity team at my school, which focuses on creating a more culturally responsive and equitable school environment, has taught me that my own thoughts, beliefs, and convictions must be critically examined before technical solutions are sought. Recognizing the importance of self-examination, I feel ready to move forward towards technical solutions that better serve the students of color in my classroom.

Dual Language Immersion

The world of language immersion programs, while growing, still remains rather small within the larger context of educational systems in the United States. There are many types of language immersion programs with differing structures (Thomas & Collier, 2003), but this study will focus on dual language immersion which has the goal of developing biliterate and bicultural students (Thomas & Collier, 2003).

DLI students generally begin kindergarten with 90 percent of their instruction in the target language (Hamayan, Genesee, & Cloud, 2013). The percent of instructional minutes in the target language declines by around ten percent each year until fifth grade when the instructional minutes are approximately equal between the two languages (Hamayan, Genesee, & Cloud, 2013; Howard, Sugarman, Christian, Lindholm-Leary, & Rogers, 2007). For the purpose of this study, I focused on dual immersion programs where the target language is Spanish. In contrast to other language immersion programs that use the target language as a means to acquire English language skills, DLI is an additive bilingualism approach where all students develop bilingual skills in both languages and continue to do so throughout the program (Howard et al., 2007; Smith &

Rodriguez, 2011; Thomas & Collier, 2003). The definition, structure, and other characteristics of DLI will be explored further later in this paper.

Between student teaching and my professional positions, I have taught in four different implementations of immersion models and have seen varying degrees of program fidelity. I have witnessed firsthand the importance of program fidelity. All research must be critically examined to ensure that the programs studied also hold true to established best practice in dual language immersion. Program fidelity is vital (Collier & Thomas 2004; Howard et al., 2007) so program structures will be further explored in this paper.

Racialized Achievement Gap

The racialized achievement gap between students of color and White students has been widely studied by many different researchers and several researchers have clearly demonstrated that it is a systemic problem with many different causes (Lynn & Adams 2002; Noguera, 2012; Schaffer, 2012; Zamudio, Russel, Rios, & Bridgeman, 2011). While there are many different theories, beliefs, and opinions as to the origins and causes of the achievement gap, its existence is clear and well established.

For the purpose of this study, the population of color was Latino students. The curriculum in this study was designed for a multiracial classroom where approximately 60 percent of the students are classified by their parents as Latino and the rest are a mixture of White, Latino-White biracial students and Black-White biracial students.

Data-driven Mathematics Instruction

My experience in teaching math has shown me that data collection in mathematics education must be specific, aligned, and concise. Large, wide-reaching assessments may

overwhelm both the students and the teachers. Curriculum-based measurement can help focus the assessment and data-collection process. As defined by Fuchs and Fuchs (2002), "Curriculum-based measurement (CBM) is a set of methods for indexing academic competence and progress." I use the CBM model in my classroom and used this data-collection model to develop portions of the curriculum. Curriculum-based measurement will be explored further in chapter two.

Role of the Researcher

In the development of my curriculum, I researched and melded together best practice in DLI instruction, and best practice for students of color while using Critical Race Theory (CRT) to establish the existence of inequities in the school system as well as properly develop curriculum that addresses it. CRT will be explored further later in this paper. My role in this curriculum development process was to research which methods have been proven to be most effective for students of color and language immersion education. Little research is available for the convergence of these two areas, so my work was to converge what is available for each area independently in the curriculum that I developed. I also used this research as a guide to create more effective math learning environments for the math curriculum that I developed.

Summary

The convergence of the racialized achievement gap and dual language immersion brings together two highly-charged topics in the U.S. education system. This study focused on creating math curriculum that can help close the racialized mathematics performance gap within the context of Spanish-English dual language immersion where the native Spanish-speaking Latino students have a linguistic advantage, but on average

are performing below the native English-speaking students on Spanish language mathematics assessments. Although the research clearly establishes the effectiveness of language immersion education and also states that dual language immersion is the most effective of all language immersion models (Thomas & Collier, 2003), little research has been done on achievement gaps between the racial student groups within these programs.

In my current position, I work as part of the equity team where we guide the staff by helping them view data, events and other outcomes with a racial lens. While curricular, or technical solutions, in isolation will not close the achievement gap, they do form part of the solution. As an educator I am often overwhelmed with my responsibilities and as a DLI educator I spend significant amounts of time specializing curriculum to properly educate students in the DLI context. Adding the burden of closing the achievement gap between White students and students of color to the challenges of DLI instruction can seem overwhelming. The curriculum developed in this study aimed to imbed culturally responsive practice into data-driven, DLI best practice mathematics instruction. Chapter two will bring together research in the field of best practice with English Language Learners (ELLs), DLI, and culturally responsive instruction.

CHAPTER TWO

LITERATURE REVIEW

Introduction

The purpose of this research is to explore the intersection of dual language immersion, the racialized achievement gap, and mathematics instruction. I became interested in this topic while studying student mathematics data as part of an equity committee at my school six years ago. The mathematics instruction at my school is in Spanish for all students, which should place the Native Spanish-speaking Latino students at an advantage. However, the White and Black native English speakers, on average, outperform their Spanish-speaking, Latino peers in math assessments. In this research I sought to find which research strategies could be implemented into math curriculum to narrow and close the mathematics achievement gap between Latino bilinguals and Black bilinguals in the dual language immersion setting.

In this literature review I will first describe the dual language immersion model (DLI) and research in regards to best practice in DLI. I will then describe Critical Race Theory (CRT) and LatCrit Theory and its place in education and how both theories can be used to critically examine classroom practice and culture. The deficit model of education and racial stereotype threat will be described as tools for critically examining and improving classroom instruction and culture. Culturally responsive teaching and growth mindset will be developed as tools for transforming classroom instruction. Lastly, I will examine research in regards to mathematics instruction and data collection.

Dual Language Immersion

Dual language immersion (DLI) is an educational program structure that falls under the larger umbrella of bilingual education. Bilingual education is an educational setting where two languages are used for instruction (Hamayan, Genesee, & Cloud, 2013). Some bilingual models use students' native language as a tool to help them learn English, while others seek for students to remain bilingual and biliterate throughout their education (Hamayan, Genesee, & Cloud, 2013). Students in DLI programs learn through two languages with the goal of becoming academically and culturally proficient in both languages (Hamayan, Genesee, & Cloud, 2013; Howard et al., 2007). DLI is also called two-way immersion (TWI) or dual language education (Hamayan, Genesee, & Cloud, 2013). One key characteristic that must be in place in a program in order to be considered a dual language immersion model is a balance between native English speakers and native speakers of the target language (Howard et al., 2007; Thomas & Collier, 2003).

Student Population in DLI Programs

One central characteristic of DLI programs is the student population. DLI programs in the United States are comprised of speakers of the majority language, English, and speakers of the minority language. The minority or non-English language is also called the partner language. Speakers of both English and the partner language must be represented, with the ideal goal of approximately one-half of the group being native speakers of the partner language and the other half being native speakers of English (Hamayan, Genesee, & Cloud, 2013; Howard et al., 2007). Simultaneous bilinguals—students who have been bilingual since birth—also enroll in dual language immersion

programs, but the majority of learners are sequential bilinguals—students who learned one language first and are now acquiring a second (Gass & Selinker, 2008). The balancing of native speakers of both languages allows for language models for both populations of students and helps ensure that neither culture dominates the classroom climate (Hamayan, Genesee, & Cloud, 2013; Howard et al., 2007). For the purpose of this study, the partner language is Spanish.

Language Use in Dual Language Immersion

Students in the DLI model receive their instruction in two languages (Hamayan, Genesee, & Cloud, 2013). In well-implemented DLI programs at least fifty percent of the instructional day must be in the partner language and instruction in both languages must continue for at least six years (Howard et al., 2007). Preference must be shown for the partner language (Spanish, in this research) in order to combat the deficit view that ELL students experience outside of the school environment (Smith & Rodriguez, 2011).

DLI programs fall into two different models of language use—fifty-fifty and ninety-ten. In the fifty-fifty model students receive half of their instruction in English and half of their instruction in the partner language beginning in kindergarten and continuing at least through fifth grade (Hamayan, Genesee, & Cloud, 2013). In the ninety-ten model students receive ninety percent of their instruction in the partner language in kindergarten and first grade (Hamayan, Genesee, & Cloud, 2013; Howard et al., 2007). Starting in second grade, an additional ten percent of instruction is in English until fifth grade where students receive half of their instruction in English and half in the partner language (Hamayan, Genesee, & Cloud, 2013). In order to maintain their bilingual, biliterate, and bicultural skill set, students ideally continue to receive some

instruction in the partner language through high school (Collier & Thomas, 2004). The program model used in this study was the ninety-ten program structure.

Primary Goals of DLI programs

DLI programs are additive bilingual programs with the primary goal of developing bilingual, biliterate and multicultural individuals (Gonzalez, 2010; Howard et al., 2007). Both languages are viewed as an asset which is distinctive from subtractive programs such as transitional bilingual programs which use a student's native language as a tool to develop English, but does not encourage the development of biliteracy and bilingualism (Baralis, 2009; Howard et al., 2007; Smith & Rodriguez, 2011).

Research Findings in Dual Language Immersion

While philosophically people may disagree with DLI (Fortune & Tedick, 2011), research indicates that initially dual language immersion students may be somewhat behind their monolingual peers, but that they will meet and sometimes surpass the achievement of their monolingual peers by middle school, measured by English language, standardized tests. The research generally focuses on measurable skills like reading and math and does not include the difficult to measure benefits of being exposed to other cultures and what bilingualism means socially and psychologically for DLI students (Collier & Thomas 2004; Howard et al., 2007; Lindholm-Leary, 2012).

The research clearly shows that DLI immersion is the most effective program for English Language Learners (ELLs) to acquire academic English (Hamayan, Genesee & Cloud, 2013; Collier & Thomas, 2004; Thomas & Collier, 2002). Dual language immersion programs are the only program models that have successfully closed the achievement gap between ELLs and native English speakers (Collier & Thomas, 2004).

In DLI programs, the achievement gap between these two groups is typically closed by middle school (Collier & Thomas, 2004). The strongest indicator of proficiency in a student's second language is proficiency in a student's first language (Thomas & Collier, 2002). A meta-analysis of several studies conducted by the National Literacy Panel concluded that ELLs who are educated in both their native language and English are more successful in English when compared to ELL students who are taught only in English (Goldenburg, 2008).

The ninety-ten dual language immersion model has been proven to be the most effective of all bilingual education models (Thomas & Collier, 2003). The positive effect of any type of available bilingual model, however, is such that parents who refuse such services should be told that their choice will likely be detrimental to the academic success of their child (Thomas & Collier, 2002). ELL students educated in the DLI model achieve at higher rate than their non-DLI ELL peers. The DLI model is most effective when the program model is followed with fidelity (Howard et al., 2007).

Challenges in Dual Language Immersion

Fidelity in the DLI is the greatest challenge to its success (Howard et al., 2007). DLI educators must specialize the curriculum to meet the content standards while simultaneously meeting the language standards in two languages (Hamayan, Genesee, & Cloud, 2013). While planning for instruction DLI educators must ensure that both languages receive social and academic status, they must ensure that students can properly bridge between both languages, oral language development must be planned for as it is a basis for literacy development, authentic text must be acquired and used in both languages, and language instruction should be integrated in all content areas (Hamayan,

Genesee & Cloud, 2013, pp. 163-165). Content must be made comprehensible to those learning in their second language while still being challenging to those learning in their first language (Howard et al., 2007; Lindholm-Leary, 2001). DLI teachers need to help their students make connections between their native language and their second language to maximize both learning as well as instructional time (Beeman & Urow, 2013). DLI teachers must understand the cultural dynamics of the students they work with while immersing each group in the culture of their peers (Howard et al., 2007). Thus, curriculum development is a key factor in delivering a properly executed DLI education. Program fidelity is vital for the success of students enrolled in DLI programs (Howard et al., 2007).

Critical Race Theory in Education

Critical Race Theory (CRT) is "an examination of race and racism in the law and society" (Lynn & Adams, 2002, p. 87). CRT was first developed in the legal field as a way to explain the inequities in U.S. institutions, society, beliefs, and systems (Lynn & Adams, 2002). It shows that racism has become a permanent fixture in U.S. society and law, and exists to maintain the political and social power of White people (Lynn & Adams, 2002; Zamudio et al., 2011). Since the development of CRT in the legal field, the critical examination process has been applied to areas other than the law such as education (Lynn & Adams, 2002). A critical examination of the educational system demonstrates that its policies are not neutral, but rather serve as a way to maintain the status quo of racial dominance (Gillborn, 2005; Zamudio et al., 2011). CRT can be used to critically examine fields such as education to determine how race affects the system and those involved in it (Yosso, 2002). A CRT examination of the U.S. education system

demonstrates that racism is present in the U.S. education system in areas such as school funding, school culture and language, and standardized testing (Lynn & Adams, 2002; Zamudio et al., 2007), as well as curriculum and programming (Yosso, 2002; Zamudio et al., 2007).

Critical Race Theory and Latinos

Latinos are one of the quickest growing groups of color in the United States (Yosso 2002), making a critical examination of their experience in U.S. society even more urgent. LatCrit Theory has developed as a branch of Critical Race Theory that specifically addresses areas where Latino people often experience oppression (Solorzano & Yosso, 2001; Yosso, 2005). LatCrit Theory addresses how race interacts with factors that often marginalize Latinos such as language, accent, and immigration status (Solorzano & Yosso, 2001; Yosso, 2005). While the focus of Critical Race Theory often addresses the oppression experienced by Black people because they are not White, LatCrit addresses oppression that is specific to Latino people (Adams, 2002; Lynn & Adams, 2002; Yosso, 2005). The five main tenets of CRT are the "centrality of race and racism and their intersection with other forms for subordination…the challenge to dominant ideology…the commitment to social justice…the centrality of experiential knowledge…and...the transdisciplinary perspective" (Solorzano & Yosso, 2001, p. 472-473).

Critical Race Theory and the Education System

A Critical Race Theory critique of the education system reveals issues such as interest convergence and stereotype threat (Yosso, 2002). CRT in education, also termed critical pedagogy, demonstrates that while class and gender are factors that contribute to

the achievement gap, they are not sufficient enough to explain the large differences in school performance between students of color and White students (Ladson-Billings & Tate, 1995; Yosso, 2002). The critical impact race, culture, and accompanying stereotypes have on the education system and the students it serves can be a challenging topic for educators, heightening the importance of addressing and exploring how it plays out in the education system (Jackson, 2011). Interest convergence and stereotype threat are two issues that surface when making critical race evaluation of the education system.

Interest Convergence

Interest convergence describes cases where while an outcome, program, movement, or curriculum may benefit people of color, its primary purpose was made to benefit White people (Zamudio et al., 2011). Within the context of DLI, interest convergence refers to the concept that DLI programs are established not to serve students of color, but rather the desires and needs of White people (Cervantes-Soon, 2014). The Latino students DLI programs can benefit, but the program likely would have not been established solely to meet the needs of the Latino students (Palmer, 2010). The concept of interest convergence was used to establish the program I teach in. The program founder sought to establish the program to benefit Latino students, but used the concept of interest convergence to appeal to people to gain support to establish the program. The success and continuation of initiatives such as programming or political movements is dependent on whether it continues to benefit White people and does not threaten or lessen their political and social power (Zamudio et al., 2011). There is a tendency to treat native Spanish speakers as a resource used to create and maintain DLI programs with the purpose to serve the educational desires of the majority, White groups (Cervantes-Soon,

2014). It is important to be cognizant of interest convergence when examining schoolwide and classroom-specific practices and processes to ensure that students of color are being served as well as the White students.

Stereotype Threat

Stereotype threat occurs when people of color are worried or fearful that their actions may contribute to negative stereotypes held about their racial group (Jackson, 2011; Peart, 2006; Zamudio et al., 2011). Curriculum and the school environment can perpetuate stereotype threat (Solorzano & Solorzano, 1995). Stereotype threat can cause people of color to change who they are in order to better blend in with cultural and behavioral norms, creating stress and anxiety (Zamudio et al., 2011).

Consistently maintaining a heightened awareness of the negative stereotypes others may believe about you and working to combat any sign of them in oneself causes stress (Jackson, 2011). Neuroscience has demonstrated that the effects of stereotype threat are so strong that it can affect comprehension and the accompanying stress can negatively rewire the brain (Jackson, 2011). This rewiring can make it more difficult to do things such as make goals and can promote negative habits (Angier, 2009).

Teachers can help combat this by creating a classroom culture that regularly addresses race and culture and its impact on students' lives (Jackson, 2011). Teachers in DLI programs should maintain a critical view of which cultures hold power and dominance in their classroom as dominance can take over, even in DLI classrooms (Cervantes-Soon, 2014). In order to effectively create such a space, teachers need to understand their personal cultural frame of reference in order to more effectively address how their students view the world and help them make sense of themselves in it (Jackson,

2011). Having students write about their own personal strengths every day is one strategy that has been proven to help combat stereotype threat by closing the achievement gap between students of color and White students (Peart, 2006).

Deficit Theory

A critical race theory examination of U.S. school reveals that racism in U.S. schools and school systems is hidden in instructional, structural, and cultural practices as well as beliefs (Yosso, 2005). Deficit theory is also known as deficit thinking or subtractive schooling (Valenzuela, 1999). Deficit theory describes a racist viewpoint which asserts that students of color are not successful due to what they lack culturally, linguistically, and educationally instead of looking at causes of the achievement gap within the school and its structure (Núñez, 1999; Smith & Rodriguez, 2011; Yosso, 2005). Deficit theory also asserts that parents are to blame for their children's low achievement and that children of color arrive "empty" and must be properly "filled" by the school (Delpit, 2012; Valenzuela, 1999; Yosso, 2005). Statistics from sources such as standardized tests are used as well to focus on students' weaknesses instead of their strengths (Jackson, 2011).

This deficit view is also applied to families of color by concluding that parents and caregivers are not involved in their child's education because they are not showing up in the way most valued by the school or in the way most valued by the dominant culture (Yosso, 2002). White parents often are involved in more public ways such attending PTA meetings, volunteering in their child's classroom, or running a fundraiser. This typical, White experience has been normalized, and parents who are not involved in their child's education in a visible, public way are deemed as not caring about their

child's education. Parental caring by parents of color does not show up as publically and is not typically valued by the public educational system (Yosso, 2002).

Deficit Theory and Latinos

The LatCrit lens, which addresses oppression that is specific to Latino people (Adams, 2002; Lynn & Adams, 2002; Yosso, 2005), can be used to develop the concept of deficit or subtractive schooling as it applies to Latinos in the United States by describing how schooling looks in the context of Latino students in the U.S. both culturally and linguistically. The Mexican cultural and linguistic assets are typically devalued in the US school experience (Smith & Rodriguez, 2011) and are viewed as the cause of school difficulties (Núñez, 1999). Students who are bilingual are viewed as English language learners rather than having capabilities in two languages (Smith & Rodriguez, 2011; Yosso, 2005). Students' bilingual skills are often not valued and are instead classified as lacking sufficient English skills rather than taking the viewpoint that the school system has failed the students it serves. In this viewpoint, a Latino student's bilingual skills are viewed as a detriment rather than an asset. However, monolingual English-speaking Latino students are still not succeeding at the level of their White, English-speaking peers, demonstrating that the problem is the school system and its failures rather than linguistic skills of the students (Zamudio et al., 2011).

The cultural concept of *educación* is central to how Mexicans and Mexican-Americans view the education system. The idea of teaching children how to interact with the world, how to be a part of the community, how to be responsible, and how to be a respectful and kind person are central component of the concept of *educación* and are important values in the Latino community (Villenas & Deyhle, 1999; Yosso, 2002). This

value is people-centered, while the typical U.S. school is focused on learning standards, or object-centered (Valenzuela, 1999). These two concepts can interact, but the cultural discord happens when what Mexicans value most is devalued within the U.S. schools systems rather than melding the mainstream U.S. school norms with Mexican cultural values (Villenas & Deyhle, 1999).

Mexican and Mexican-American families generally place a large amount of trust in the U.S. school system in regards to a student's academic and social development (Valenzuela, 1999) and the structure of the U.S. school system can be intimidating to Latino families (Yosso, 2002). Families will typically want to know if their children are behaving and being responsible and respectful which are part of the border concept of *educación*, while the typical U.S. teacher will focus on standards and objectives (Villenas & Deyhle, 1999). Teachers may interpret this as not caring about education, especially when a student is performing below grade level and the parent is focused on the child's behavior, or *educación* (Villenas & Deyhle, 1999). Additionally, because of the value placed on interpersonal relationships in the Mexican culture, students have a high need of a positive teacher-student relationship (Valenzuela, 1999). If this is not properly cared for, students do not feel valued or connected and may not reach the academic standards (Valenzuela, 1999).

Teachers in DLI programs have the opportunity to use the program model to combat institutionalized and cultural racism that is found in the larger society by implementing a critical race curriculum that decenters whiteness and values bilingualism, and by accurately applying the DLI model in their classroom (Smith & Rodriguez, 2011).

Culturally Responsive Teaching

Critical race pedagogy critically examines how teachers teach and how students learn (Solorzano, 1998; Yosso 2002). Culturally responsive teaching, also called culturally relevant pedagogy, involves ensuring students experience academic success and also that teachers achieve and maintain cultural competence. It also ensures that teachers are critically conscious of the reality of institutionalized racism to be able to work to change the status quo (Cervantes-Soon, 2014; Jackson, 2011). A lack of self-awareness can make teachers prone to make assumptions based on stereotypes of students' cultural and racial background and then treat their students based on these negative assumptions (Noguera, 2002).

Critical race pedagogy can also be used to describe and identify the cultural capital or wealth that people of color have (Yosso, 2005). Yosso (2005) lists six forms of cultural capital as: "aspirational, navigational, social, linguistic, familial and resistant," which she terms "community cultural wealth" (p. 77). These six areas of cultural capital can be used to examine and positively access each student's culture in a way that is beneficial to them educationally and socially.

Language

Language can be examined through a LatCrit lens to demonstrate how language has historically marginalized Latinos, how it continues to marginalize them at the present, and how it has been used as a point of collective resistance and therefore cultural strength (Zamudio et al., 2011). Resistance to mainstream cultural norms and expectations is described by Yosso as an area of cultural strength (Yosso, 2005) and has been used by Latinos to promote their language and through language, their culture. Language and

immigration status is often used as a way to criticize Latinos as a racial group without appearing overtly racist (Zamudio et al., 2011). However, they can and has been used to help Latino students gather strength and pride. The culture and history of Latinos advocating against English-only policies and insisting on bilingual education programs for their children can be used as a point of pride and strength to combat the effects of systemic racism (Noguera, 2002; Yosso, 2002; Zamudio et al., 2011).

Classroom Structure

A main tenant of culturally responsive teaching is that the educational experience should be fit into the culture of the students rather than making the culture of the students fit into the educational experience (Ladson-Billings, 1995). Learning experiences should be relevant, real-life based and should be centered on the students' culture. One central tenant of culturally responsive teaching for Latino students is the concept of *cariño* (Valenzuela, 1999). This concept builds on Mexican cultural strengths by creating positive classroom community (Smith & Rodriguez, 2011). Culturally responsive instruction helps to validate each student's life experiences (Delpit, 2012; Jackson, 2011; Ladson-Billings, 1995; Smith & Rodriguez, 2011) and should be done by making space for counter-storytelling to help students validate who they are while also helping students develop a critical consciousness so they can more effectively resist hidden racism in school structure, culture and curriculum (Zamudio et al., 2011).

Relationships

Many students of color can be classified as school dependent, which means that their success is dependent on the quality of the school they are attending (Jackson, 2011). Culturally responsive teaching also recognizes and responds to the importance of

relationships for school dependent students (Jackson, 2011). Schools where students of color are successfully beating the odds are schools where there are solid, positive relationships between students and teachers (Noguera, 2012).

Schools and teachers must be careful with how they handle the data collection and classification of students (Jackson, 2011). Jackson also described how students can easily pick up on the negative, weakness-based evaluations of their achievement and are at risk of internalizing negative messages (Jackson, 2011). It is important to help students develop their confidence in their ability to grow their intelligence rather than their belief in a fixed mindset (Jackson, 2011).

Mindset

Another culturally responsive instructional strategy that can grow student achievement is teaching students growth mindset. Growth mindset is a frame of mind that believes that accomplishments are a result of hard work rather than innate abilities (Dweck, 2006). This frame of mind believes that while people are each born with unique characteristics, each person has the capacity to learn and grow and reach their goals through work (Dweck, 2006). This belief in the power of effort and application allows people to see failure as something they can work through rather than an innate characteristic, allowing them to persevere through challenging tasks (Dweck, 2006).

In one multi-year study, students who were taught and then implemented a growth mindset tended to be more likely to work hard which resulted in higher grades when compared with students who did not have a growth mindset (Blackwell, Trzesniewski, & Dweck, 2007). Another study demonstrated that teaching the growth mindset was far more beneficial than teaching about multiple intelligences (Aronson, Fried, & Good,

2002). The growth mindset focus can help teachers combat the effects of stereotype threat by focusing on learning as something that students are in control of through hard work and application rather than something that is part of their innate characteristics.

Collaborative Learning

Collaborative learning is also known as reciprocal teaching, cooperative learning and peer teaching. Collaborative learning refers to a classroom model or structure that allows for students to work collaboratively constructing knowledge. Students learn more deeply what they are able to teach others (Frankenstein, 2006). In this cooperative model, the teacher role is a facilitator of learning.

Cooperative learning is a key characteristics in DLI programs as well as culturally responsive teaching (Collier & Thomas, 2004; Howard et al., 2007). Students should be taught using thematic lessons and literature and language should integrated in all curriculum while also using cooperative learning (Beeman & Urow, 2013). While cooperative learning is highly valuable for language acquisition and development (Howard et al., 2007), it is also the most effective way to ensure for learning retention. Students who teach others are able to retain far higher amounts of what they learn than all other modalities (Kagan, 1992). Cooperative learning is ideal because it ensure a high amount of communicative interaction and requires students to rephrase what they learn in new ways in order to teach their peers. It also develops community by creating an environment where students depend on each other to learn (Kagan, 1992) which is particularly important for students of color (Gay, 2000). Collaborative learning has been proven to be effective at creating positive interactions and attitudes between diverse groups of students (Howard et al., 2007).

Mathematics Instruction and the Achievement Gap

Math instruction and curriculum is often viewed as neutral, but is commonly geared towards middle-class experiences (Tate, 2006). Students can be taught to use a critical pedagogical mindset when accessing their mathematics curriculum. This can help empower them because it gives them a place in the school setting to acknowledge racism in curriculum and also address it (Zamudio et al., 2011).

Effective Math Instruction

Much of math is learned through social interactions in the classroom between students and between students and the teacher (Griffin, League, Griffin, & Bae, 2013), making collaborative learning structures highly ideal for learning mathematics. The amount of learning that a student achieves is also highly dependent on the quality of the instruction implemented by teacher (Griffin et al., 2013).

Another highly-effective math teaching tool is having students write their own math problems (Frankenstein, 2006). When students are asked to write their own math problems, they must use problem-solving skills to decide what type of questions to ask and what is most logical. Being able to do this, better prepares students for solving math problems created by other people (Frankenstein, 2006).

Fractions

It is important that elementary students have a solid base understanding of fractions so they are prepared for higher-level math skills at the secondary level (Barnett-Clarke, 2010; National Mathematics Advisory Panel, 2008). Important concepts in teaching fractions include relying on conceptual knowledge of sharing quantities,

building on meaning via discussion around solving word problems, and focusing on the relationship between fractions and numbers (Empson & Levi, 2011).

Need for Research

The percent of the U.S. school age population that are classified as ELLs continues to grow. While one in twenty students in public schools was identified as ELL in 1990, as of 2008 one in nine U.S. public school students were classified as ELL (Goldenburg, 2008). Even as this population continues to grow, the racialized achievement gap persists. It is urgent that I research and critically examine instructionally sound educational practices to implement when teaching fractions so that race does not predict my students' educational outcomes.

The lack of opportunity to develop strong biliteracy skills has been identified as part of the cause of the achievement gap between Latino students and White students (Valenzuela, 1999). However, this does not explain the mathematics achievement gap at my school since the Spanish-dominant Latino students all develop their Spanish language literacy skills before developing their English literacy skills and also all receive their mathematics instruction in Spanish. LatCrit indicates that a critical race curriculum (CRC) should address the dominance of the White culture and the English language in a school curriculum as well as directly address students' critical consciousness of the world they live in. A solid CRC also centralizes the knowledge base of people of color (Yosso, 2002). The DLI model is well-positioned to address racism in the school structure due to its model of giving preference to the partner language and decentralizing the non-Latino culture. Curriculum development that addresses how racism manifests in a DLI program is needed (Smith & Rodriguez, 2011).

Latino students in the United States have the highest dropout rate of all racial groups (Ortiz-Franco, 2006). Researchers have studied this problem to work towards changing the outcomes for Latino students (Ortiz-Franco, 2006). While research indicates that the use of home language can eradicate the achievement gap (Ladson-Billings, 1995), further resources are needed so that the gap is more consistently closed and closed earlier on in the elementary years. While DLI research demonstrates that DLI students generally catch up to their peers around middle school, work can still be done to work on closing this gap at an earlier age.

Summary

The research about program models indicates that the DLI ninety-ten model is the most effective model for English language learners to reach grade level standards in English. The research also shows that factors such as systemic racism, the dominance of whiteness in the school system as demonstrated by LatCrit and CRT, fixed mindset, and the deficit model of teaching are barriers to Latino students' academic success in school. Culturally responsive instruction that builds on the Mexican and Mexican-American and Latino cultural assets such as *educación* should be implemented along with collaborative and growth mindset instructional models. All this should happen within a program that is designed with best practice structures of DLI.

CHAPTER THREE

CURRICULUM DESIGN

Introduction

In my work as a dual language teacher, I expect native Spanish speakers to meet or exceed the performance of their native English-speaking peers in subjects that are taught in Spanish. This study acknowledges that a specific linguistic designation does not mean a specific racial designation follows and establishes that in this particular study all students parent-identified as Latino are also native Spanish speakers and all parent-identified native English speakers are parent identified as White or Black or biracial. Beginning in kindergarten, the language of instruction for mathematics is Spanish. Yet, a racialized mathematics achievement gap between the White and Black students and Latino students in my classroom remains and has been present with each group of students when they arrive to my classroom each year, with native English speakers (White and Black) outperforming the native Spanish-speaking Latino students. The purpose of my research was to develop curriculum which uses strategies that can be implemented to help close the mathematics achievement gap between Latino bilinguals and White bilinguals in the dual language immersion setting. I sought to implement research-backed best practice for culturally responsive teaching and for dual language instruction in order to develop curriculum that helps narrow and close the racialized achievement gap.

Advocacy-Participatory Worldview

The action research used in this study falls in the category of advocacy or participatory worldview as described by Creswell (2009). Advocacy or participatory worldview in research seeks to change the structures that marginalize and limit certain groups of people (Creswell, 2009). This curriculum was designed to empower those who it is developed for. This research approach is also termed participatory or transformative. Many different lens, or approaches, fall into this category. This research was guided by the critical race and critical pedagogy lens (Creswell, 2009).

This approach to action research is to change the classroom practices to create better outcomes for the people impacted by an unjust situation. It has also been termed critical action research or emancipatory action research. Key characteristics include the goal of empowering those who are hurt by structures, systems, and practices and allowing people to reach their full potential (Mills, 2014). This curriculum design was developed for a specific school site and with a specific population of students in mind. This focus allowed the curricular design process to be guided by the critical pedagogy process in order to create a curriculum that addresses issues affected by race, creating better student learning outcomes.

The primary purpose of this research was to develop better curriculum for learning fractions in order to improve the educational outcomes of the third-grade Latino students. These students form part of the often-marginalized Latino population in the United States. At the culmination of the research, it was my hope to have created a fraction unit that demonstrates how to create a culturally responsive math unit through changes in the classroom environment, teaching methods and curriculum delivery to help

close the achievement gap between Latino students and non-Latino students in my school.

Curricular Design Site

The curriculum was designed for a school that is located in a first-ring suburb and enrolls students from kindergarten to grade five. It is a public, parent-choice magnet school that enrolls students who live in the school district as well as students from surrounding school districts. Approximately 500 students attend the school. Slightly more than half of the school population has a free-or reduced-lunch designation.

Instructional Setting

This curriculum was designed for the 25 students in my third grade, mainstream classroom. It was designed for the natural setting of my classroom, which is a central component of school-based research (Mills, 2014). While the students receive thirty percent of their daily instruction in English and seventy percent in Spanish, one-hundred percent of the mathematics curriculum was written in Spanish as all mathematics instruction in this setting is in Spanish.

Target Audience

This curriculum was geared toward the 25 third-grade students currently in my classroom. The racial and linguistic categories that students are placed into are based on parent designations. There is some overlap due to biracial students and due to students who have been native speakers of both English and Spanish since birth, also called simultaneous bilinguals. While there continues to be a racialized achievement gap between Black students and White students in my school, the biggest gap is between the Latino students and the rest of the school population. Additionally, this curriculum was

designed around reversing the disconcerting fact the Latino students are performing at far lower levels than their native English-speaking Black and White peers, despite having a linguistic instructional advantage. In the interest of better describing the setting, I included the current racial and linguistic categories for my present students. This current group of third graders is typical of each group of third graders I have taught, making the curriculum developed relevant for future students. For this curriculum design process, the students were categorized based on their native language rather than their race, bearing in mind that nearly all the students in the Latino racial category in my classroom are also native speakers of Spanish while all the White and Black students are native speakers of English. As a reference and to give additional background information, students' racial designations were also included.

Race	Number of students	Percentage of class
Latino	13	52%
White	4	16%
Biracial (and Black)	4	16%
Biracial (and Latino)	4	16%
Total students of color	21	84%

Table 3.1 Student Race

Native language	Number of students	Percentage of class
Native English speakers	10	40%
Native Spanish speakers, including simultaneous bilinguals	15	60%

Table 3.2 Student Native Language

Type of Native Spanish Speaker	Number of students	Percentage of total Native Spanish speakers
Sequential bilinguals	13	87%
Simultaneous bilinguals	2	13%

Table 3.3 Breakdown of Native Spanish Speakers

Curriculum Focus

This curriculum focused on ensuring that students attain third-grade level mathematical benchmarks focused on fractions. Fractions are a central building block to higher-level algebraic math skills, which students need as they advance into secondary math (Barnett-Clarke, 2010). Fractions were chosen as the skill area of focus in this study due their importance as a foundational skill in mathematics understanding. Below is a list of the skill areas that were used as a focus in the curriculum development:

Understand that fractions are relative to the size of the whole.

Use models to order fractions with like denominators.

Use models to compare fractions with like with denominators.

Recognize that fractions can be used to represent distances on a number line.

Write fractions with words and symbols.

Recognize fractions can be used to represent parts of a whole.

Recognize that fractions can be used to represent parts of a set.

Curriculum Design

In this curriculum, I used curriculum-based assessment (CBM), or formative assessments (VanDerHeyden, 2005), as a basis to check how students are progressing in attaining grade level goals via short assessments that assess progress on one skill at a time. I used curriculum-based measurement, or summative assessments, to take an initial

inventory of student skills and a final measurement of student growth via a similar comprehensive inventory assessment.

Curriculum-based Assessment

Curriculum-based assessment (CBA) was used to establish the difference between the skills that students already possess and the skills they need to successfully access the classroom curriculum and also to indicate what possible instructional changes are needed. These assessments generally measure one skill at a time and are used to guide instruction (VanDerHeyden, 2005). CBAs can also be described as formative assessments. They are used on a regular basis to inform teacher instruction (Harlen & James, 1997). These formative assessments were implemented in the curriculum as short, daily assessments, which measure student growth on specific topics and skill areas and inform the teacher how to proceed with instruction during the fractions unit.

Curriculum-based Measurement

Curriculum-based measurement (CBM) tracks how effectively the curriculum is being delivered by assessing student growth over time (VanDerHeyden, 2005). CBM assessments measure the expected learning by the end of an instruction period such as the end of the school year (VanDerHeyden, 2005). These assessments are also called summative assessments (Harlen & James, 1997). The CBM, or summative, assessments in this curriculum were used at the onset of the fractions unit to make a summative diagnosis of what students are able to do with fractions. It can be described as summative in that it measures which third grade skills students have acquired prior to being exposed to the third grade math curriculum. The same summative assessment was

given at the end of the unit in order to give a final summary of each students' progress in attaining third grade level fraction skills.

Instructional Tools

The instructional tools used to develop the fractions curriculum include the third grade state mathematics standards, teacher-created assessments, and activities and also fraction circles, developed by the Rational Number Project at the University of Minnesota (Cramer, Behr, Post, & Lesh, 2013). I used the classroom structure as a tool to balance between independent and cooperative learning when developing the curriculum. Growth mindset, stereotype threat, and the classroom environment addressed the social-emotional needs of the students so they can be in the frame of mind that is most conducive to learning while participating the curriculum I designed.

Classroom Structure

The mathematics class begins with a five- to seven-minute warm-up session where students practice math calculation fluency independently. This is followed by a large-group mini-lesson that lasts five to fifteen minutes. Students then begin their cooperative learning session where they work with a group of three to six students to practice the focus skill. Some adults work with a specific group during the entire cooperative work session while I rotate between each student group working with needs that arise as well as working with students based on CBM results. This session is followed by a three- to five-minute movement break. Once finished with the movement break, the class reconvenes for another mini-lesson lasting a maximum of five to ten minutes. This mini-lesson is followed by either another cooperative work session or independent practice during, which I can target student needs per CBM results. The math

class ends with a CBM assessment that takes the students between one and seven minutes to complete.

Learning Environment

Much of my work as an anti-racist educator is focused on increasing my knowledge about critical race theory in education and increasing my own self-reflection so I more appropriately plan my instruction and work with my students (Jackson, 2011; Noguera, 2002). An increased self-awareness and increased knowledge about critical race theory and critical race pedagogy allow me to more critically examine my curriculum, my practices, and my classroom environment and helps me guide the interactions between students (Cervantes-Soon, 2014; Jackson, 2011; Noguera, 2002). The curriculum in this unit was designed to help its users critically examine their own teaching through post-lesson reflection questions.

To an observer of my elementary classroom, this work is most easily observable by the normalization of race in conversation, high focus on peer teaching and cooperative learning and the decentering of whiteness seen by interracial relationships between students.

Growth Mindset and Stereotype Threat

Stereotype threat and mindset go hand in hand since a student's mindset about her own perceived performance and abilities can be changed in order to combat stereotype threat. This was implemented in the curriculum by including intentional language to talk about student effort. Terms such as "do smart" should replace "you are smart." Teacher should recognize hard work by connecting successes to work that the students have done rather than the students' achieving success through innate characteristics. While this

approach helps with stereotype threat, it needs to be complemented by additional approaches.

Stereotype threat was be addressed by having students write in a journal about what they can do well specifically in math class and generally (Peart, 2006). Explicit conversations about race and skin color were implemented to help normalize conversations about race. Care was taken to decenter the dominance that can occur by students by intentionally placing Latino students in a position of leadership. This was done by designing lessons where Latino students who are strong in a skill are placed with a non-Latinos who needed help learning the skill.

Cooperative Learning

Much of the work of changing outcomes for the native Spanish-speakers is done by ensuring that Spanish, and therefore students of color, have a position of social and academic power in the classroom. This was done by intentionally forming groups so that each Latino student has the opportunity to show leadership within a small group or a dyad by either teaching his or her peers an academic skill or using their interpersonal skills to lead their peer group.

Assessment in the Curriculum

The data collection process used in the fraction unit included daily, short assessments to assess future instructional and practice needs during the remainder of the unit. The data collection process in the unit ended with a final, comprehensive fractions assessment. All assessments designed in the fraction unit curriculum were written in the language of instruction, Spanish.

Procedures

As is the practice with all mathematics assessments in my classroom, the curriculum was designed to allow the students to have the option to have assessments read to them in order to ensure that their math skills are being assessed rather than their math skills together with their reading skills. It was also designed to allow the option of an alternative setting such as a different space in the classroom or a space outside of the classroom such as the special education classroom.

Data Collection

The curriculum was designed with an initial pre-test to allow for the collection and interpretation of baseline data to help the teacher gauge learning needs and measure growth throughout the fractions unit. Throughout the fraction unit, data collection was also designed to be done via daily assessments. These assessments are short progress check-ins and are each specific to one skill and take each student 1-5 minutes to complete. One of these assessments will be used on a daily basis to measure student learning and direct teacher action and response to the results.

Final Assessment

At the conclusion of the fractions unit, the curriculum was designed for students to be given a final comprehensive, summative fraction assessment based on the third grade fraction skills chosen for this study. The assessment was written in the language of instruction, Spanish. Some questions were written in a word problem format and require grade level reading skills while others are written in calculation form. All assessment questions that were used in the fraction math unit were objective.

CHAPTER FOUR

CURRICULUM

Introduction

The third grade fraction study unit created for this study is centered on best practice for both students of color and dual language immersion students in order to work towards closing the racialized achievement gap between students of color and white students at the elementary level. This unit implemented several researched-backed techniques discussed in chapters wo and three such as curriculum-based measurement (CBM), common summative assessments (CSA), common formative assessments (CFA), best practice in dual language immersion, growth mindset, and culturally responsive instruction and research findings in regards to teaching fractions. In the following section these areas will be further discussed in regards to the fractions unit, which can be found in the appendices.

The chapter begins with an explanatory guide to better understand the format of the fraction study unit to help the reader attain a better understanding of the format used in the fraction unit. Following the guide, there is a description of each portion of the lesson and as well as the rationale behind the instructional choices made in the fraction unit.

Weekly Lesson Guide Example

Week 1: This section gives an overview to the week's focus

Overview:
This section will describe the overall goals for the week.

Standards

Standards-based instruction allows the teacher to track student progress in the classroom curriculum via common formative assessments which the teacher can use to properly plan instruction (VanDerHeyden, 2005). Using standards also assures students are meeting grade level goals and track the closure of the achievement gap.

Focus This section lists the grade level standards that are being practiced this week.

Extension Look here for related standards at a higher level for student who are ready to work beyond grade level standards.

Centers this week:

Centers are culturally responsive instruction because they allow students to work cooperatively (Beeman & Urow, 2013; Collier & Thomas, 2004; Frankenstein, 2006; Howard et al., 2007). They also allow students to practice productive language which is important for dual

Look in this section for ideas for math centers. Students do one center a day rather than rotating during the math lesson to reduce transition times. Be sure to balance between skill review, fluency practice and current standards. Some centers should be planned in such a way that little teacher guidance is needed in order to allow the teacher to focus on teaching new and difficult skills to small groups.

Tech tips:

This area includes ideas on how to implement technology in the classroom.

Vocabulary

Here is where to find important vocabulary words for the weeks' lessons. Large and small group explicit lessons to learn vocabulary will help students better implement the new words in their peer to peer and teacher-student discussions.

Sentence frames

Sentences frames help students use more academic language. Ideas found here are a place to begin, but teacher observations of her students is the best resource of which sentences structures they need to work on.

The focus on language will help the dual language students develop their language skills during math (Hamayan, Genesee, & Cloud, 2013). Ensuring the students use Spanish during math also helps decentralize whiteness and create more a culturally responsive environment (Howard et al., 2007).

FAQs this week: This section has potential questions or wondering and resources to find the answers.
further reading and resources: This section is meant to help the teacher find further information to extend their own learning and the learning of her students.

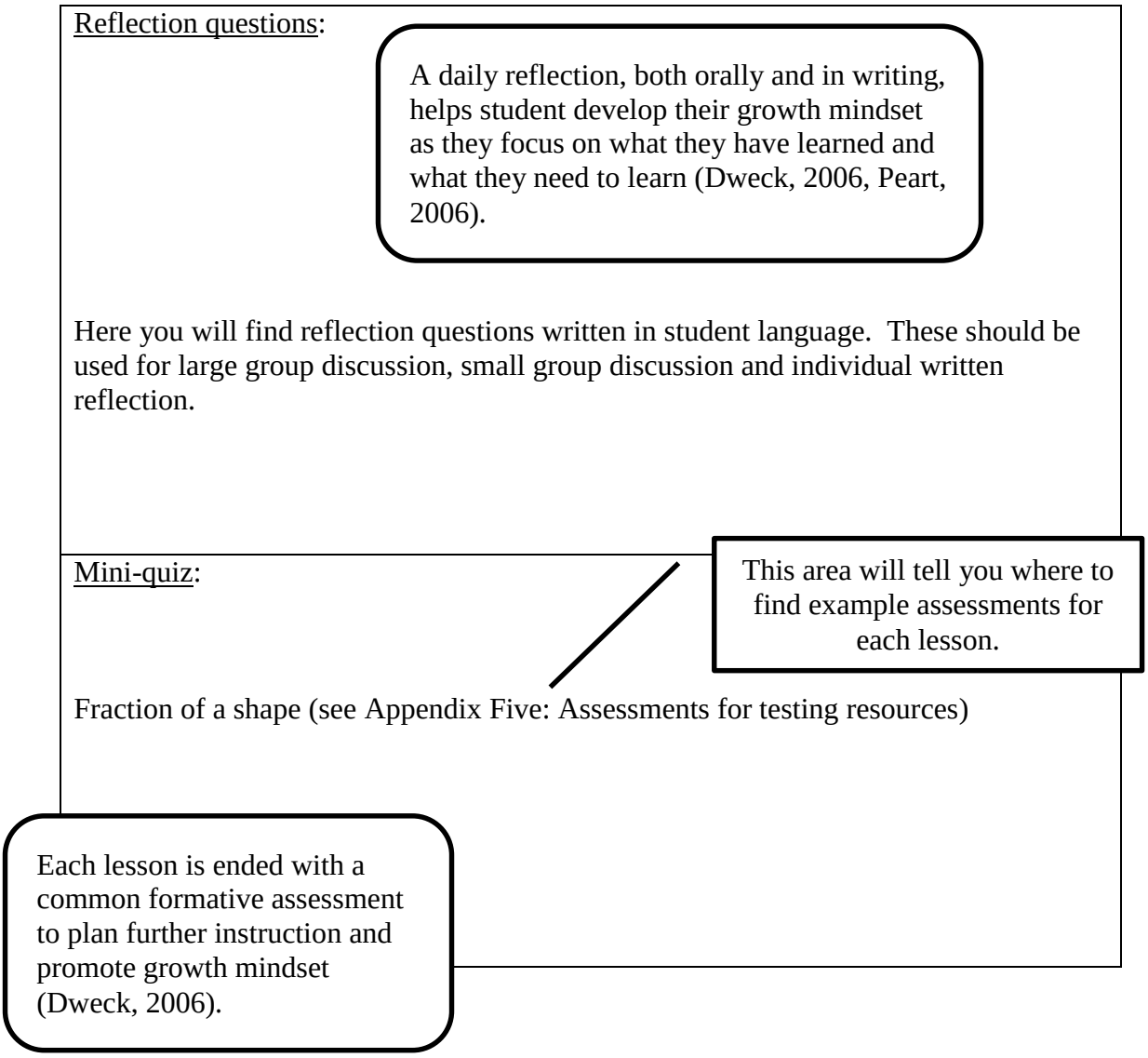
Daily Lesson Guide Example

Day 1 Fraction Circles

Large group lesson #1:	Large group lesson #2:
Use resources found in the appendices for example of activities that align with each lesson. After students complete their independent math warm-up they call with you for a large group lesson. This is the first large group instructional time during the math block. There are several planned out lessons for this part of the day in the fraction unit, but the teacher should primarily plan instruction based on student progress data collected on a daily basis.	This second large group instruction time is completed after centers near the end of the math block. This lesson should be based on student data and teacher observations. While the fractions unit has several planned out large group lessons, it is more important that the teacher plan lessons based on student data that is gathered daily.
Students work cooperatively in peer groups after this lesson.	Students work cooperatively in peer groups after this lesson.

Use the appendices to find example activities for each lesson.

Both lessons are followed by cooperative learning activities in carefully formed peer-led groups, helping to create a more culturally responsive classroom (Gay, 2000).



Lesson Structure

The lessons in the fraction unit need to follow a clear structure so that is both instructionally sound and predictable for students. The general flow is a large group lesson, group practice, a large group lesson, more group practice and then individual assessment to check for growth and understanding. Each lesson heavily relies on cooperative learning structures to creative a more culturally responsive classroom (Gay, 2000).

Independent Skill Practice

The independent skill practice time is student-driven meaning they choose what to work on and it is an independent practice time. The mathematics block begins with independent practice for several reasons. The initial independent works serves as a warm-up to get students thinking in numbers. Students who transition more quickly will already be working on math rather than sitting and waiting for students who transition more slowly. This time also serves as an opportunity for students to finish undone work. They should have a folder dedicated to this time which can be filled either with undone work or with worksheets specifically targeted for this time. Students are allowed to choose what they work on within their folder which can help with student engagement as some choice is involved. Music can be a helpful cue to help students transition by playing the same song daily to indicate it is time to begin math. This is not listed in each lesson outline, but should be included to ensure that students are getting time for daily skills practice. A website such as Xtramath.org is an excellent addition to daily independent math practice ensure math fact fluency.

First Large-group Lesson

This is the first large group lesson for the math block. If team teaching, each teacher can teach one part of the class, allowing for differentiation within each group. This large group lesson should be differentiated as needed based on student results on the daily mini-quizzes. Care should be taken to make conversations about race a regular part of the classroom. They need not be part of the mathematics block, but the concept of race should be normalized during the school day for students. After the initial large

group lesson students are dismissed into their center groups for the day. See the example below for ideas on how to organize this portion of the mathematics block:

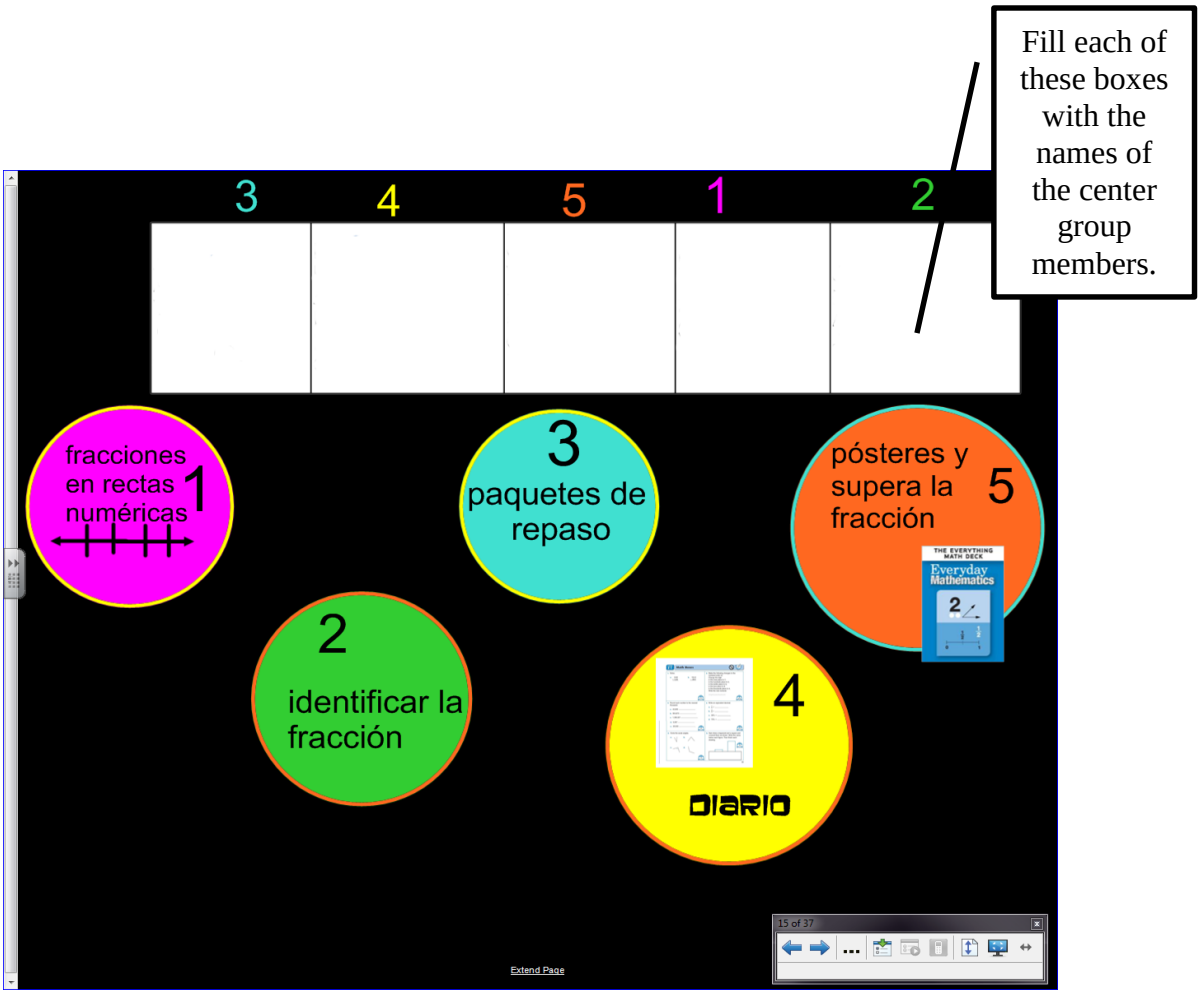


Figure 4.1 Math Center Organization

Students work in a different center each day, rather than rotating multiple times in one day. This time is interactive and relies on students teaching each other. Conversation and discussion around math is encouraged and supported. Vocabulary and sentence frames should be easily accessed by students in the classroom to help them facilitate discussions, written reflections, and peer teaching. The time spent here should be around thirty minutes although this will vary depending on your students. There are

several purposes to this time such as to practice review skills, to strengthen and gain confidence in new skills, and to teach and learn from peers to create a more culturally responsive environment (Collier & Thomas, 2004; Frankenstein, 2006; Howard et al., 2007). This time also allows the teacher to rotate between groups as needs arise and for a push-in model with special education, English as a Second Language services, Title I math interventionist services, and to increase productive, also termed interactive, student language (Beeman & Urow, 2013). It is helpful to keep at least two centers as predictive as possible to cut down on transition and non-productive time and to allow the teacher to focus on students in centers where new skills are being learned. For example, one center may be fact practice using dice in dice where students throw the dice and multiply or add the inner and outer numbers. Another predictable and student-friendly center is to work on math workbook pages that accompany the district adopted math curriculum.

Second Large-group Lesson

After practicing with their peers during math centers the class comes together for a large-group lessons. This second lesson may reinforce something challenging being learned during centers, it may be a large-group practice time where students participate in guided practice to learn more complicated math skills or may serve as an introduction and modeling for peer led practice. The daily mini-quizzes should be used to guide instructional choices for this time. This lesson generally lasts five to ten minutes.

Focused Peer-led Practice

After specific-skill focused practice with the teacher during the second large group lessons, students are dismissed to their peer-led small groups practice sessions (Beeman & Urow, 2013; Collier & Thomas, 2004; Frankenstein, 2006; Howard et al.,

2007). All students work on the same skill in their small groups. Groups should be based on assessment results with students who are fluent in a skill paired with students who are not. Care should be taken to give students of color a position of academic leadership whenever possible. These groups should be made up of two to four students and the make-up should change as the skill focus changes as it is based on skill attainment in a particular skill.

Daily Reflection and Assessment

During this final portion of the math lesson the class regroups and students complete an individual, written reflection about their work in math and then take mini-quiz which is used to tailor next day's focus. The reflection can begin as a small-or large-group discussion which helps students work with ideas and language that they can then write down individually to complete a written reflection. This time allows students to extend and practice language and math learning as well as develop confidence in themselves. Chapter two described research that reflection on learning helped students of color accelerate their learning (Peart, 2006).

Rationale for Curricular Choices

Introduction

In this section, the rationale supporting the curricular choices in the fraction unit will be described. This includes describing how dual language instructional techniques have been imbedded in the unit, how growth mindset it addressed, the reasoning behind the assessments in the unit and why specific decisions in the fraction unit are culturally responsive instructional techniques. This section also includes figures that demonstrate

classroom visuals that can be used to help teach growth mindset as well as an example of how to organize math centers.

Dual Language Students

Dual language students (DLI) need heavy exposure to language including explicit vocabulary instruction (Beeman & Urow, 2013). The lesson guides in the fraction unit include specific math vocabulary and sentence frames and teachers should implement explicit vocabulary instruction while teaching the math lessons. Bridging is a research-backed method (Beeman & Urow, 2013) that helps students make connections between the languages they speak. The teacher should make time to help students make linguistic connections between terms and concepts in the two focus languages while learning math.

Growth Mindset

The research in chapter two demonstrated the importance of growth mindset while working with students and particularly students of color. There are several ways that the fraction unit implements growth mindset in the classroom. Students track their data on a daily basis via the student friendly visual chart. Each day the students take a mini-quiz, the teacher assesses and records the results and then the next day the mini-quizzes are returned to the students so they can record their results. The chart allows them to track their progress. The multiple spaces on the chart sends the message to the students that learning does not occur automatically and mastery is something that develops over time. Growth mindset can also be visualized for students in a poster such as the example below which demonstrates that all students learn and that the path learning does not look the same for others. Posters such as the following send the

message that work creates results rather than innate abilities. Students' choice to focus, ask questions and participate will change their future.

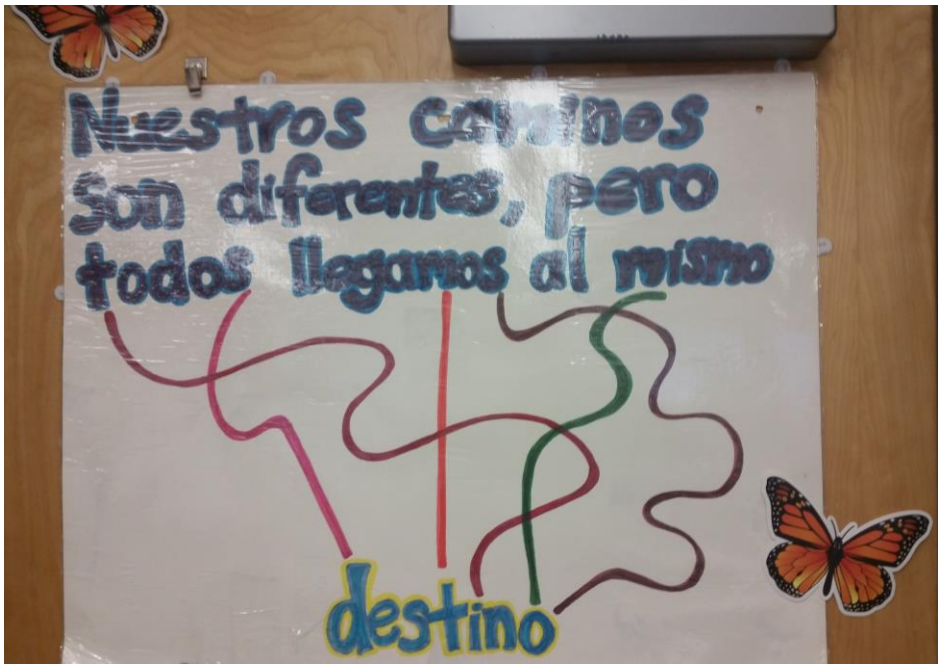


Figure 4.2 Growth Mindset Poster

Proper teacher talk is also a vital part of growth mindset. When students demonstrate success phrases such as, "you worked really hard," or, "you did well because you stayed focused" should replace phrases like, "you are so smart," or "good job." Teachers should also work to change their language when discussing students such as saying, "she learns quickly" instead of "she is really smart." Changing the way a teacher talks about learning both in the classroom and among colleagues is part of the process of changing how a teacher views learning. Growth mindset that is embraced by the teacher will also be embraced by the students.

Assessments

The different assessment structures described in chapters two and three are used in the fraction unit to methodically and accurately track student growth and learning. The pretest is vital in order to properly plan out the large group instruction for the unit. The fraction unit has a plan for an average group of third graders, but the pretest will give the teacher a better view of how to plan for her class. Some classes more need more initial introductory lessons while other classes will need more extension lessons than go behind the third grade fraction standards. Students should be given the opportunity for alternative settings when taking assessments and should also be given the option of having their math test read to them if needed.

The standards-based instructional plan helps insure that the math experiences that students receive align well with the rest of their math experience both before third grade and beyond it. They also are used to organize the curriculum-based measurement done via both common formative assessments and a final common summative assessment. The common formative assessments are the daily, short assessments that allow the teacher and students to track progress. These are used to make instructional decisions. The final unit assessment is a common summative assessment that demonstrates what students learned during the fraction unit. This should be compared against the initial pretest to gauge what students actually learned.

The assessments included in this unit are not exhaustive of what you may need. They serve as a guide and as examples and it is likely more will be needed when using the unit. Since each child and each class is different, the teacher should respond to the

daily data taken about the students to make instructional and evaluative decisions for the class.

Culturally Responsive Instruction

The research on culturally responsive instruction in chapter two described the importance of group-orientation for students of color. Creating a regular, daily space for cooperative learning is an essential component of culturally responsive instruction (Beeman & Urow, 2013; Collier & Thomas, 2004; Frankenstein, 2006; Gay, 2000; Howard et al., 2007). This can be accomplished by properly establishing group work norms for the class such as how to teach each other and how to ask each other for help. Space should be provided to help create classroom community and to allow for students to create community before each group work session (Gay, 2000). Voice-level expectations need be clear and the teacher needs to be comfortable with an active, louder room. Peer teaching does not look or sound like a typical whiteness-dominated classroom. Students are actively discussing math and helping each other and are sitting in formations that are productive for group work such as in a circle on the floor. The structure may be challenging at first, especially for white students who may be accustomed to working independently and quietly. Posters such as the following can help keep students focused on learning by reminding them that their own actions affect not only themselves, but also their classmates. Group-oriented work time will make the classroom more inviting for students of color, therefore more conducive to learning (Gay, 2000).

Students should can also be encouraged by posters such as the following that demonstrate that individual actions not only change the future of each individual, but that

they also affect and change the future of each person in the classroom community. By reminding students that they are all part of the classroom community and that their choices affect both them and their classmates is another technique to develop and promote a cooperative, culturally responsive, classroom.

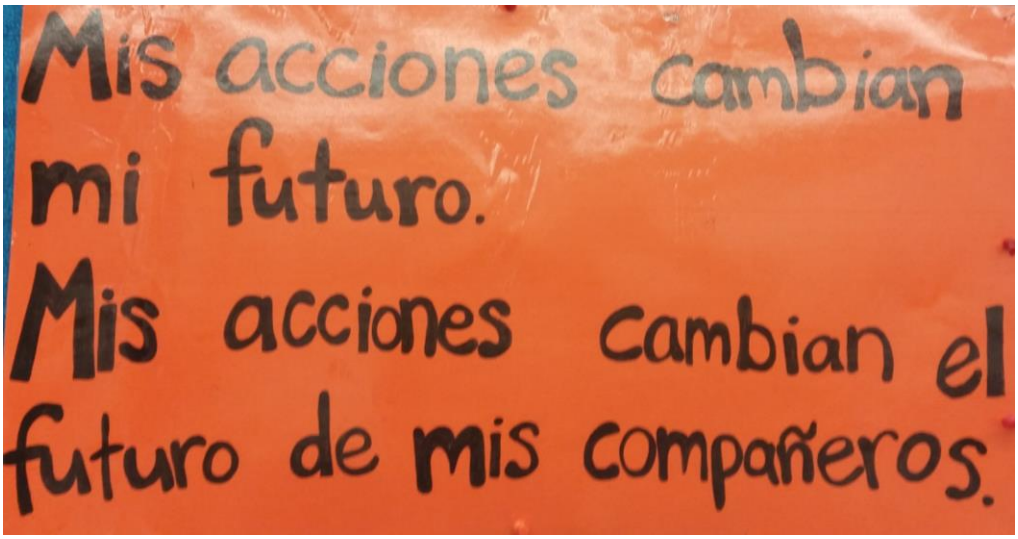


Figure 4.3 Cooperative Learning Mindset Poster

Student groupings need to be made carefully in order to balance dominant culture, dominant language, skill level and interpersonal relationships as well as student focus and behavior. Teacher-student talk should focus on student strengths as well as their capacity to teach each other. Students should explicitly be taught that being able to teach others is the best way to retain what they learn and also that it helps them develop their language skills. The teacher should continuously monitor student language to ensure that students remain in Spanish while interacting. While this serves to develop their Spanish language skills, it also helps decentralize whiteness and demonstrate the importance of the culture of the students of color in the classroom.

Summary

A clear and predictable structure is an important component when planning for math instruction. The daily math block should include time for large group lessons for both math and language development purposes, independent practice to develop math fluency and cooperative learning time to deepen learning and to foster a more culturally responsive classroom. Students should complete a daily, written reflection for the purpose of developing growth mindset and expanding language skills. Giving students feedback about their growth and having them track their progress via daily mini-assessments will also help develop their growth mindset and confidence in their abilities to achieve.

CHAPTER FIVE

CONCLUSION

Introduction

In the writing of this curriculum, I attempted to create a curriculum that implemented researched back strategies, which can help narrow and close the mathematics achievement gap between Latinos bilinguals and White bilinguals in the dual language immersion setting. This process involved researching the best practice for teaching in the dual language immersion setting, describing how racism is present in schools in the United States, describing what research shows can help combat the effect of racism in schools, describing effective techniques for mathematics instruction, and also demonstrating how culturally responsive classroom teaching techniques can create a better learning experience and outcome for all students.

Curriculum Development

The process of creating culturally responsive curriculum was not challenging, but describing how it is culturally responsive to others was challenging. Changing teaching techniques to be more responsive to students of color can be a sensitive area for some people because most educators seek to do the best for those they work with but are unequipped with the best approaches needed to effectively educate students of color. The first step of the process is realizing that one's own teaching practice is perpetuating the racialized achievement gap which can be challenging to teachers who are already working very hard and are doing the best they can with what they know. The process of writing out what has become innate to me in a clear, organized way so that others can use

it while also aligning curricular choices to research allowed me to create curriculum that is more than just my opinion, my experience or my teaching style, but is also aligned with research in the education field.

Culturally Responsive Teaching and Dual Language Immersion

While my teaching experience in dual language immersion has demonstrated that students of color often thrive in the dual language setting, the research process demonstrated that my experiences at the micro level of the classroom align well with what researchers in the field have found out. My research into what has been demonstrated by experts in the fields of DLI and culturally responsive instruction confirmed that DLI is an excellent fit with core elements of culturally responsive teaching as researchers in both fields have arrived at the same conclusions as to what culturally appropriate instruction looks like and why it is important. Integrating culturally responsive instruction and best practice in DLI in my fractions unit is most evident in the cooperative structures which both allow for an increased amount of oral and receptive language development as well as for cooperative learning structures which are culturally responsive.

Advice to Others

Changing classroom practice involves a teacher making an individual decision to reflect on her own practice and to weigh it against best practice for the student population that she works with. The process of making a classroom more culturally responsive, of implementing best practice for dual language students and for providing appropriate math experiences for students goes hand in hand with reflective teaching. In order to decide which changes may be needed, a teacher's current practice must be weighed against best

practice for students of color, best practice for mathematics instruction and best practice for dual language education. In order to effectively go through the process of changing the outcomes of students, teachers must be willing to embrace their responsibility in ensuring the best possible outcomes for their students. Well-researched techniques are readily available to help teachers, but the willingness to accept responsibility and not being afraid to be held accountable for the educational outcomes of the students they serve is the most important step to beginning the process of changing teaching techniques and classroom environments. The willingness to be held accountable for student learning will make teachers the most open to reflect on their own practice and weigh it against current research into best practice for students of color and for dual language students.

Challenges

Much of the research that is available in regard to race, racism, and U.S. schools is at an analysis level, which demonstrates racism in the school system, but does not always give practical solutions to help educators change this. Self-awareness is helpful and important so that each individual teacher can self-reflect on her own practices to ensure that she is not perpetuating things such as stereotype threat, but more research is needed on how to change classroom practices once they are self-identified by teachers.

Another challenge is centered on the lack of research that combines equitable teaching practices with specific content areas at the elementary level, research on how immigration status changes culture, and what culturally responsive instruction looks like within the dual language immersion setting. This is further addressed below.

Further Research

Further research in this area could address culturally responsive teaching within specific content areas and specific to cultures. Much of the research available around culturally responsive teaching is still focusing on the difference between White students and Black students and more is needed that focuses on Latino students. How do second- and third-generation immigrant Latino students approach school different than first-generation Latinos? Does the research showing the Latino students are more successful in the dual language setting mean that the language opportunities help them to be successful or is the dual language setting more likely to be culturally responsive?

Summary

This process of researching and writing curriculum has made me a more competent resource for my co-workers as work towards creating a more equitable place for students of color. Being better versed in current research makes me a more effective communicator as I work with families of my students and my co-workers. I can better advocate for dual language education and better advocate for my students of color because of this research and curriculum writing process.

To share what I have learned, I will continue to write curriculum for my colleagues, but will be able to do so in a clearer and more organized fashion so that they can more readily use it and understand the rationale behind the curricular choices. I will also share what I have learned by citing research as I write curriculum and teach them what I have learned in our collaborative planning time. This will be done through grade level meetings, grade level professional learning community meetings, cross-grade level professional learning community meetings and meetings with the equity team at my

building. As a teacher who is passionate about creating an equitable environment for my students, it is important that I continue to create spaces to share what I have learned to create better opportunities for the students I work with and the students that my colleagues work with.

REFERENCES

Angier, N. (2009). Brain is a co-conspirator in a vicious stress loop. Retrieved December 29, 2014. Retrieved from: http://www.nytimes.com/2009/08/18/science/18angier.html?_r=0

Aronson, J., Fried, C. B., & Good, C. (2002). Reducing the effects of stereotype threat on Black college students by shaping theories of intelligence. *Journal of Experimental Social Psychology*, *38*, 113-125.)

Baralis, C. L. (2009). The long-term effects of a K-5 dual language program on middle school student achievement and biculturalism. Unpublished doctoral dissertation, Hofstra University, Hempstead, NY.

Barnett-Clarke, C. (2010). *Developing essential understanding of rational numbers for teaching mathematics in grades 3/5*. Reston, VA: National Council of Teachers of Mathematics.

Beeman, K. & Urow, C. (2013). *Teaching for biliteracy: Strengthening bridges between languages*. Philadelphia, PA: Caslon.

Blackwell, L.S., Trzesniewski, K.H., & Dweck, C.S. (2007). Implicit theories of intelligence predict achievement across an adolescent transition: A longitudinal study and an intervention. *Child Development*, 78, 246-263, Study 1.

Cervantes-Soon, C. G. (2014). A critical look at dual language immersion in the new latin@ diaspora. *Bilingual Research Journal*, *37*(1), 64-82. doi:10.1080/15235882.2014.893267

Collier, V.P., & Thomas, W. P. (2004). The astounding effectiveness of dual language education for all. *NABE Journal of Research and Practice,* 2:1 Winter 2004, 1-14.

Cramer, K., Behr, M., Post T., Lesh, R., (2013) Rational number project: Initial fraction ideas - abridged for grade three. Retrieved from: http://www.cehd.umn.edu/ci/rationalnumberproject/rnp1-13-grade3.html

Creswell, J. W. (2009). *Research design: Qualitative, quantitative, and mixed method approaches* (3rd ed.). Thousand Oaks, CA: Sage Publications.

Delpit, L. D. (2012). *Multiplication is for white people: Raising expectations for other people's children*. New York: New Press.

Dweck, C. S., 1946. (2008). *Mindset: The new psychology of success*. New York: Ballantine Books.

Dweck, C. S. (2010). Mind-sets and equitable education. *Principal Leadership, 10*(5), 26-29.

Empson, S., & Levi, L. (2011). *Extending children's mathematics: Fractions and decimals*. Portsmouth, NH: Heinemann.

Frankenstein, M. (2006). Reading the world with math: Goals for a critical mathematical literacy curriculum. In E. Gutstein & B. Peterson (Eds.), *Rethinking mathematics: Teaching social justice by the numbers* (pp. 19-30). Milwaukee, WI: Rethinking Schools.

Fortune, T., & Tedick, D. (2012). Pathway to multilingualism: Evolving perspectives on immersion education. *Applied Linguistics, 33/1*, 99–111.

Fuchs, L. S., & Fuchs, D. (2002). Curriculum-based measurement: Describing competence, enhancing outcomes, evaluating treatment effects, and identifying treatment nonresponders. *Peabody Journal of Education, 77*(2), 64-84. doi:10.1207/S15327930PJE7702_6

Gas, S., & Selinker, L. (2008). *Second language acquisition*. New York: Routledge.

Gay, G. (2000). *Culturally responsive teaching: Theory, research and practice.* New York: Teacher's College Press.

Gillborn, D. (2005). Education policy as an act of white supremacy: Whiteness, critical race theory and education reform. *Journal of Education Policy, 20*(4), 485-505. doi:10.1080/02680930500132346

Goldenburg, C. (2008). Teaching English language learners: What the research does—and does not—say. *American Educators*, *32*(2), 8-23.

Gonzalez, M. L., (2010). The critical role of all educators in the school success of Latino children. *Leadership and Policy in Schools, 9*(4), 479-494.

Griffin, C. C., League, M. B., Griffin, V. L., & Bae, J. (2013). Discourse practices in inclusive elementary mathematics classrooms. *Learning Disability Quarterly, 36*(1), 9-20. doi:10.1177/0731948712465188

Hamayan, E. V., Genesee, F., & Cloud, N. (2013). *Dual language instruction from A to Z: Practical guidance for teachers and administrators*. Portsmouth, NH: Heinemann.

Harlen, W., & James, M. (November 01, 1997). Assessment and learning: Differences and relationships between formative and summative assessment. *Assessment in Education: Principles, Policy & Practice, 4,* 3, 365-379.

Howard, E. R., Sugarman, J., Christian, D., Lindholm-Leary, K. J., & Rogers, D. (2007). *Guiding principles for dual language education* (2nd ed.). Washington, DC: Center for Applied Linguistics.

Jackson, Y. (2011). *The pedagogy of confidence: Inspiring high intellectual performance in urban schools*. New York: Teachers College Press.

Kagan, S. (1992). *Cooperative learning*. San Juan Capistrano, CA: Resources for Teachers, Inc.

Ladson-Billings, G. (1995). But that's just good teaching!: The case for culturally relevant pedagogy. *Theory into Practice, 34*(3).

Ladson-Billings, G., & Tate, W. F., IV. (1995). Toward a critical race theory of education. *Teachers College Record, 97*(1), 47-68.

Lindholm-Leary, K. J. (2001). *Dual language education.* Tonawanda, NY: Multilingual Matters.

Lindholm-Leary, K. (2012). Success and challenges in dual language education. *Theory into Practice, 51*(4), 256-262.

Lynn, M., & Adams, M. (2002). Introductory overview to the special issue critical race theory and education: Recent developments in the field. *Equity & Excellence in Education, 35*(2), 87-92.

Mills, G. E. (2014). *Action research: A guide for the teacher researcher*. Boston: Pearson.

National Mathematics Advisory Panel. (2008). Foundations for success: *The final report of the National Mathematics Advisory Panel*. Washington, DC: USDOE.

Noguera, P. A. (2003). The trouble with Black boys: The role and influence of environmental and cultural factors on the academic performance of Black males. *Urban Education, 38*(4), 431-459. doi:10.1177/0042085903038004005

Noguera, P. A. (2012). Saving Black and Latino boys: What schools can do to make a difference. *The Phi Delta Kappan, 93*(5), 8-12. doi:10.1177/003172171209300503

Núñez, R. (1999). The validity of Latcrit: History, race, and the education of the Mexicano/Chicano child. *Harvard Latino Law Review, 3*, 1-163.

Ortiz-Franco, L. (2006). Chicanos have math in their blood: Pre-Colombian mathematics. In E. Gutstein & B. Peterson (Eds), *Rethinking mathematics: Teaching social justice by the numbers*. (pp. 70-75). Milwaukee, WI: Rethinking Schools.

Pacific Educational Group, Inc. (2008). Developing a systematic equity/anti-racism professional learning community: Strategies for addressing racial disparities in achievement [PowerPoint slides]. Retrieved from: http://principals.mpls.k12.mn.us/sites/ee869d27-88e5-478a-97e1-b5e41772b8f7/uploads/Feb_21_Powerpoint.pdf

Palmer, D. (2010). Race, power, and equity in a multiethnic urban elementary school with a dual-language "strand" program. *Anthropology & Education Quarterly, 41*(1), 94-114.

Peart, K. (2006). Racial achievement gap dramatically altered with affirmation exercise. *Science*, 313(5791). Retrieved from: http://news.yale.edu/2006/08/31/racial-achievement-gap-dramatically-altered-affirmation-exercise.

Schaffer, H. (2012). Closing the culture gap in public education: A commentary. In E. G. Kugler (Ed.), *Innovative voices in education: Engaging diverse communities* (pp. 3-7). Lanham, MD: Rowman & Littlefield Education.

Smith, M. D., & Rodriguez, A. (2011). A critical foundation for bilingual education. *Journal for Critical Education Policy Studies, 9*(2), 186-198.

Solorzano, D. G., & Solorzano, R. W. (1995). The Chicano educational experience: A framework for effective schools in Chicano communities. *Educational Policy, 9*(3), 293-314.

Solorzano, D., & Yosso, T. (2001). Critical race and LatCrit theory and method: Counterstorytelling. *International Journal of Qualitative Studies in Education, 14*(4), 471-495.

Tate, W. (2006). Race, entrenchment, and the reform of school mathematics. In E. Gutstein & B. Peterson (Eds.), *Rethinking mathematics: Teaching social justice by the numbers*, (pp. 31-42). Milwaukee, WI: Rethinking Schools.

Thomas, W. P., & Collier, V. P. (2002). *A national study of school effectiveness for language minority students' long-term academic achievement*. Washington, DC: Center for Research on Education, Diversity & Excellence.

Thomas, W. P., & Collier, V. P. (2003). The multiple benefits of dual language. *Educational Leadership, 61*(2), 61-64. Retrieved from http://ezproxy.hamline.edu:2052/login.aspx?direct=true&db=keh&AN=11868888&site=ehost-live

Valenzuela, A. (1999). *Subtractive schooling: U.S.-Mexican youth and the politics of caring*. Albany: State University of New York Press.

VanDerHeyden, A. M., & Burns, M. K. (2005). Using curriculum-based assessment and curriculum-based measurement to guide elementary mathematics instruction: Effect on individual and group accountability scores. *Assessment for Effective Intervention, 30,* 3, 15-31.

Villenas, S., & Deyhle, D. (1999). Critical race theory and ethnographies challenging the stereotypes: Latino families, schooling, resilience and resistance. *Curriculum Inquiry, 29*(4), 413-445. doi:10.1111/0362-6784.00140

Yosso, T. J. (2002). Toward a critical race curriculum. *Equity & Excellence in Education, 35*(2), 93-107. doi:10.1080/713845283.

Yosso, T. J. (2005). Whose culture has capital? A critical race theory discussion of community cultural wealth. *Race, Ethnicity & Education, 8*(1), 69–91.

Zamudio, M., Russel, C., Rios, M.A., & Bridgeman, J. L. (2011). Critical race theory matters: Education and ideology. *British Journal of Educational Studies, 59*(3), 348-350. doi:10.1080/00071005.2011.611282

APPENDIX ONE

WEEK ONE INTRODUCTION AND FRACTION MODELING

<table>
<tr><td colspan="2">Overview
During this introductory week, students will be introduced to the concept of fractions via multiple manipulatives such as the fraction circles, the Everyday Math card deck and paper folding activities and will also learn how to care for fraction manipulatives. They will play a fraction game and practice making fraction models.</td></tr>
<tr><td>Standards

<u>Focus</u>
-write fractions with words and symbols
-recognize the fractions can be used to represent parts of a whole
-understand that fractions are relative to the size of the whole

<u>Extension</u>
-represent equivalent fractions using fraction models</td><td>Centers This Week

<u>fact fluency</u>:
Use daily mini-quizzes and end of unit assessments from previous math units to choose activities based on the current practice needs of your students. Typical third grade fluency practice includes all operations of math facts, three digit addition, subtract and multiplication and working with money and clocks.

<u>skill review</u>:
Choose activities for this center based on student needs from previous math units.

<u>Fraction circles:</u></td></tr>
</table>

<table>
<tr>
<td>Tech Tips

A document camera works well to demonstrate to students how to correctly organize and store the fraction circles. It can also used to demonstrate how to accurately compare the fractions circles and to demonstrate to students how to correctly cut and fold fraction strips.

See the resources section for website suggestions that can be used to visually represent fractions for use during large group instruction as well as accessed by individual students on other devices to further fraction understanding.</td>
<td>Students assigned to this center continue to work on the Fraction Circles: Color-coding and Fraction Circles: Comparing that were begun during #1 day which can be found in Appendix Seven: Fraction Circles.

<u>Supera la fracción</u>:
If you have the Everyday Mathematics card decks, students play the Supera la Fracción game. Instructions and resources for this game can be found in the Further reading and resources section and a recording sheet called Supera la Fracción: Visual Recording Sheet and Supera la Fracción: Recording Sheet Without Visuals in Appendix Eight: Supera la Fracción.

Alternatively, computer and tablet based fraction games can be used. See Further reading and resources.

<u>fraction models</u>:
Formulate the groupings and order for the centers so that the more advanced groups start here as the large group instruction for this center does not start until day 3. The student recording sheets for Supera la Fracción can be found in Appendix Eight: Supera la Fracción and are called Visual Recording Sheet and Supera la Fracción: Recording Sheet Without Visuals.</td>
</tr>
<tr>
<td>Vocabulary

fracción, fracciones, divider, partes iguales, modelos de fracciones, círculos de fracciones, mayor, menor, igual, superar, comparar, concept of “-avo” when naming fractions, medio, media, tercio, cuarto, quinto, sexto, séptimo, octavo, noveno</td>
<td>Sentence Frames

____ es mayor que _____.
_____es menor que _____.
_____ es equivalente a _____.</td>
</tr>
<tr>
<td colspan="2">FAQs This Week

What if I don’t have fraction circles?</td>
</tr>
</table>

Fraction circles can be made by students or volunteers. See Appendix Seven: Fraction Circles for a printable version and http://www.cehd.umn.edu/ci/rationalnumberproject/flash/circles.swf for an electronic version.

Why should I use manipulatives in my fraction lessons?
Work by the Rational Number Project at the University of Minnesota has shown that children need extensive practice with manipulative in order to develop a solid and functional knowledge of fractions (Cramer, K., Behr, M., Post T., & Lesh, R., 2013).

How can I help students keep the materials organized?
Modeling and clear instructions are very important to keep the multiple pieces of fraction circles organized and readily available for use. Reserve extra time to demonstrate and to allow students time to practice.

What can I use if I don't have the Everyday Math deck?
You can purchase the card decks (see further reading and resources) or alternatively students can use electronic sources to practice.

Teacher Professional Development This Week

As students worked through difficult tasks, what kind of language did you use? When they were successful, what kind of language did you use to recognize their success?

The use of growth mindset language when interacting with students will help them connect work with success rather than innate abilities (Dweck, 2006). Use challenging tasks as an opportunity to help work with each other. Cooperative learning is an especially powerful way for students of color to learn (Beeman & Urow, 2013; Collier & Thomas, 2004; Frankenstein, 2006; Howard et al., 2007).

Further Reading and Resources

The Rational Number project: http://www.cehd.umn.edu/ci/rationalnumberproject/RNP1-09/RNP1-09_TG.pdf
Everyday Math card deck: https://www.mheonline.com/programMHID/view/0076020312
Fraction Top-it: https://www.youtube.com/watch?v=SriywsY9L0Q
Computer and tablet-based games and activities:
http://www.funbrain.com/fract/index.html
http://math.rice.edu/~lanius/fractions/frac.html
http://fractionbars.com/InteractiveGames.html
http://www.mathsisfun.com/equivalent_fractions.html
http://illuminations.nctm.org/Activity.aspx?id=4148
http://www.cehd.umn.edu/ci/rationalnumberproject/flash/circles.swf

Day 1: Fraction Circles

Large group lesson #1: *How to use and care for fraction circles* Demonstrate how to take out and put away the fraction circles. Demonstrate how to use the fraction circles and the accompanying worksheet to compare the different fractions using the circles using resources from *Appendix Seven: Fraction Circles* called *Fraction Circles: Color-coding, Fraction Circles: Equivalency* and *Fraction Circles: Comparing*. Students practice comparing fractions with you. They will not finish this activity with you. It will be one of the centers for this week. Dismiss class to begin assigned centers.	Large group lesson #2: *How to play "Supera la Fracción"* This is the first day that students have used the *Everday Mathematics* card deck to play a game with fractions. Demonstrate techniques for comparing the fractions on the cards and connect the rules for "Supera la suma" with "Supera la Fracción." Demonstrate how to use the recording sheets from *Appendix Eight: Supera la Fracción* called *Visual Recording Sheet* and *Supera la Fracción: Recording Sheet Without Visuals*. Dismiss class to begin practicing in assigned groups. Use data from the pre-test to form students group of 2-4 students. These groups should stay the same for at least 5 instructional days to allow students to get to know each other and how to work together. This practice session should not last longer than 15 minutes.
Reflection questions: ¿Qué aprendiste hoy?" ¿Cómo puedes comparar fracciones? ¿Cómo sabes cuál fracción as mayor?	
Mini-quiz: *Fraction of a Shape: Thirds* in *Appendix Six*	

Day 2: Fraction Circles

Large group lesson #1: *How to use and care for fraction circles* Ask students to talk with their neighbors about what they learned yesterday about fraction circles. Review yesterday by demonstrating how to take out and put away the fraction circles. Together, practice using the fraction circles. For example, 2 light blues are 2/9 of the	Large group lesson #2: *Review how to play "Supera la Fracción"* Review together rules for the game. Elicit challenges or conflicts that arose while playing the game yesterday and how to work through those for today. Demonstrate techniques for comparing the fractions on the cards and connect the rules for "Supera la suma" with "Supera la Fracción." Review how to use the

whole. Dismiss class to begin assigned centers. .	recording sheet in *Appendix Seven: Fraction Circles*. Dismiss students to play the game in assigned groups.
Reflection questions: ¿Qué aprendiste hoy?" ¿Cómo puedes comparar fracciones? ¿Cómo sabes cuál fracción as mayor? ¿Cómo sabes cuál fracción es menor? ¿Cómo sabes cuando dos fracciones son equivalentes?	
Mini-quiz: *Fraction of a Shape: Fourths* in *Appendix Six*	

Day 3: Paper Folding and Equivalent Fractions

Large group lesson #1: *Folding a sheet of paper to construct fraction models* Pass out a standard sheet of paper (such as an 8.5x11 sheet) and ask the students to demonstrate ways of folding it into four equal pieces. Pick different examples to share with the entire class via a document camera or drawing the models on the board. Ask students to explain their thinking behind their model. Incorrect models can also be used to demonstrate why they do not work. If this task is particularly challenging and students continue to create incorrect models, have them cut out their folded models so they can lay the pieces on top of each other to visually see that they are not the same shape. Dismiss students to their assigned centers.	Large group lesson #2: *Folding a sheet of paper to construct fraction models* Repeat a shorter version of lesson #1, this time using a more challenging fraction such a dividing into eights or fourths. Otherwise, choose to review fourths if you class needs additional practice and reinforcement.
Reflection questions: ¿Qué aprendiste hoy?" ¿Cómo puedes comparar fracciones? ¿Cómo sabes cuál fracción as mayor? ¿Cómo sabes cuál fracción es menor? ¿Cómo sabes cuando dos fracciones son equivalentes?	
Mini-quiz: *Fraction of a Shape: Draw Fourths* in *Appendix Six*	

Day 4: Fraction Circles

Large group lesson #1: *Making and using fraction strips* Ask students to talk with their neighbors about what they learned yesterday about fraction circles. Model how to record and put away from circles using resources from *Appendix Seven: Fraction Circles*. Demonstrate how to take out and put away the fraction circles. Today they entire class will practice taking out and putting away the fraction circles in partners, at the same time. Dismiss class to begin assigned centers.	Large group lesson #2: *Paper folding a given fraction* Students are given a list of fraction models they need to make in their small group using paper folding. This activity can be adjusted according to the progress of your individual class. Fractions with denominators that are multiples of two are easier to create while fractions with prime numbers as denominators are more challenging.
Reflection questions: ¿Qué aprendiste hoy?" ¿Cuáles fracciones son más fáciles modelar usando papel? ¿Por qué? ¿Qué método usas para dividir un papel o una forma en partes iguales? ¿Cuáles fracciones son más fáciles para ti? ¿Por qué?	
Mini-quiz: *Fraction of a Shape: Sixths* in *Appendix Six*	

Day 5: Fraction Circles

Large group lesson #1: *Fraction strips, paper folding and finding equivalent fractions* This lesson serves both as reinforcement for students who need to continue to practice paper folding to model fractions as well as an extension lesson for those who are ready to learn about equivalent fractions. Begin with a model of an 8.5x11 paper folder in two halves. Color one half. Fold the paper again, creating four equal spaces to demonstrate that ½ is equivalent to 2/4. Continue into 4/8 etc. After modeling to the class, pass out the materials and practice the process together. Dismiss class to begin assigned	Large group lesson #2: *Review of lesson #1* Demonstrate paper folding for creating equivalent fractions again. The challenge for the group is to choose a fraction and create at least two more additional models are equivalent to their chosen fraction. For example, if the small group choses 1/3, they must create a folded and colored paper model for 1/3 and then also for at least two more additional equivalent fractions such as 2/6 and 3/9. Come back together as a group for share and discuss via the reflection questions.

centers. The centers should be shorter today to allow additional time for lesson #2 and the subsequent activity.	
Reflection questions: ¿Qué era difícil para tu grupo and cómo resolvieron el problema? ¿Cuáles fracciones son más fáciles modelar usando papel? ¿Por qué? ¿Qué método usas para dividir un papel o una forma en partes iguales? ¿Cuáles fracciones son más fáciles para ti? ¿Por qué?	
Mini-quiz: *Fraction of a Shape: Eighths* in *Appendix Six*	

APPENDIX TWO

WEEK TWO FRACTIONS ON A NUMBER LINE

<table>
<tr><td colspan="2">Overview

This week students will explore and practice how to place fractions on a number line. The focus standard is for students to correctly place fractions with like denominators on a number line with a known and with an unknown denominator. Students will learn methods for accurately dividing a number line according to the denominator when given as well as determining the denominator based on the number of spaces given on a blank number line. This can be extended for students to include correctly comparing fractions with unlike denominators.</td></tr>
<tr><td>Standards

<u>Review standards</u>
-write fractions with words and symbols
-recognize the fractions can be used to represent parts of a whole

<u>Focus standards</u>
-use models to order and compare fractions with like denominators.
-recognize that fractions can be used to represent distances on a number line.

<u>Extension standards</u>
represent equivalent fractions using fraction models</td><td rowspan="2">Centers This Week

<u>fact fluency</u>:
Use daily mini-quizzes and end of unit assessments to choose activities based on the current practice needs of your students. Typical third grade fluency practice includes all operations of math facts, three digit addition, subtract and multiplication and working with money and clocks.

<u>skill review</u>:
Choose activities for this center based on student needs from previous math units. Central third grade skills include three digit addition, three digit subtraction, three digit multiplication and calculating change.

<u>paper folding/equivalent fractions:</u>
Lesson #1 this week serves as an initial introduction and practice for this center.

<u>fractions on a number line</u>:
For this center, formulate the groupings and order for the centers so that the more advanced groups start here as the large group instruction for this center occurs later in the week. See number line resources in Appendix Nine: Number Lines called Fraction Number Lines One for an example activity.</td></tr>
<tr><td>Tech Tips

A document camera works well to demonstrate to students how to place fractions on a number line. If you don’t have a document camera, try projecting a video that demonstrate the process or cut and laminate a long strip using butcher paper to model the process. Once laminated, you can reuse the butcher paper strip.

Use a projector or a Smartboard to demonstrate fraction concepts via interactive websites. A short of such</td></tr>
</table>

<table>
<tr><td>websites is listed in Further reading and resources.</td><td><u>fraction models</u>:
For this center, formulate the groups and order for the centers so that the more advanced groups start here since the instruction for this center occurs later this week.</td></tr>
<tr><td>Vocabulary

denominador, espacios, recta numérica, numerador, mayor, menor, doblar, dividir, partes fraccionarias, medio, media, tercio, cuarto, quinto, sexto, séptimo, octavo, novena</td><td>Sentence frames

Para calcular el denominador, debo_____.
Si hay ____espacios en una recta numerica, el denomindar es ____.
Para poder comparar fracciones necesito ___.
_____ es mayor que _____ porque _____.</td></tr>
<tr><td colspan="2">Teacher Professional Development This Week

Where are places in this week's lessons that you can create opportunities for bridging with English and Spanish? As you plan this week's lessons, what are some language objectives that your students need to focus on? What did you learn from last week as you interacted with them in Spanish? Which sentences frames will they need to focus on and which vocabulary is most challenging?

DLI students need teachers who integrate language learning in all that they do, including content areas such as mathematics (Beeman & Urow, 2013). Planning ahead as well as making time to observe student language during academic work will allow you to properly plan for language instruction within mathematics. DLI teachers also need to be mindful of where and when to fit in bridging lessons which also students to make connections between concepts learned in one language to the term for that concept in the partner language (Beeman & Urow, 2013). This will also help prepare your students for standardized assessments in English without taking away Spanish language mathematics instructional time.</td></tr>
</table>

FAQs This week

How can I imbed growth mindset when teaching fractions and number lines?
Students should be given data on their performance every day. This should begin with the results of their pre-assessment which they should record in their chart. Each day, share with each student their results of the mini-quiz taken the previous day. Teacher-talk should include phrases such as "You worked carefully and focused to learn _____"or "Remember how you were frustrated when learning _____? Now you can solve _____ without help because you worked hard to learn it."

What should I do if my students have having trouble working cooperatively? Why should I allow students to do so much group work? How can they learn math well if they working with others?
Moderate group discussions about the importance of being peer teachers and how being able to teach others demonstrates how well you know the material (Beeman & Urow, 2013; Collier & Thomas, 2004; Frankenstein, 2006; Howard et al., 2007
Have students reflect on the jobs their parents have and how they need to interact and work with others when they group up.

What is the purpose of using a number line to understand fractions?
Students need to work with fractions using multiple modalities (Cramer, Behr, M., Post, & Lesh, 2013).

Further Reading and Resources

Fractions on a number line:
Khanacademy.org has a video that demonstrates the use of fractions on a number line which can be found at
https://www.khanacademy.org/math/arithmetic/fractions/understanding_fractions/v/plotting-basic-fractions-on-the-number-line

Fraction concepts interactive websites:
http://www.funbrain.com/fract/index.html
http://math.rice.edu/~lanius/fractions/frac.html
http://fractionbars.com/InteractiveGames.html
http://www.mathsisfun.com/equivalent_fractions.html
http://illuminations.nctm.org/Activity.aspx?id=4148
http://www.cehd.umn.edu/ci/rationalnumberproject/flash/circles.swf

Day 1: Dividing a Number Line Given a Fraction

Large group lesson #1: *How to divide a number line when given a fraction*	Large group lesson #2: *Using a shape to illustrate a fraction*

Begin the large group lesson by demonstrating how to place ½ on a fraction line by first marking the location of zero and the location of 1. Continue demonstrating using fractions such as 1/3, 3/4 and 4/6. After you have demonstrated some fractions, guide students in additional examples alongside with you. This works well with a document camera, but can be done with a whiteboard as well. Leave enough time to explain the math centers for this week. Dismiss students to work in assigned centers. See *Fraction Number Lines Two* in *Appendix Nine: Fraction Number Lines* for an example activity**.**	Briefly review how to using a 2D shape to illustrate a fraction and then dismiss students to practice this together for up to ten minutes with their cooperative small groups. Students can make their own problems or you can provide them with a worksheet. *Note: Continue with the same groups from the previously week if they work well together, otherwise adjust groups as needed to ensure a high level of interaction between students.*
Reflection questions: ¿Cómo es el proceso de dividir una recta numérica en partes fraccionarias? ¿Cómo puedes comparar fracciones? ¿Cómo sabes cuál fracción as mayor? ¿Cómo sabes cual fracción es menor? ¿Cómo calculas una parte fraccionaria de un grupo?	
Mini-quiz: *Number Line: Sevenths* in *Appendix Six: Daily Mini-Assessments*	

Day 2: Fractions and Number Lines Day One

Large group lesson #1: *Counting spaces (jumps) on a number line to determine denominator* Demonstrate, using your preferred medium, how to count spaces between marks on a fraction number line to determine the denominator. For today, using fractions number lines that are labeled with zero and one only. View the resources located in Appendix Nine: Number Lines for further ideas.	Large group lesson #2: *Review lesson #1* After reviewing the process learned in lesson #2, students work on their assigned small groups on a number line fraction page such as a worksheet from *Appendix Nine: Number line* called *Fraction Number Lines Three*. Dismiss students to work in their assigned groups.

Reflection questions: ¿Cómo es el proceso de dividir una recta numérica en partes fraccionarias? ¿Cómo puedes comparar fracciones? ¿Cómo sabes cuál fracción as mayor?
Mini-quiz: *Number Line: Fifths 1* in *Appendix Six: Daily Mini-Assessments*

Day 3: Fractions and Number Lines Day One

Large group lesson #1: *Demonstration using students standing on a number line* Students often are challenged by the idea that the number of marks on a number line is not the same as the denominator. For example, a number line with four marks that starts at zero and ends at one will be divided into thirds rather than fourths even though there are four marks. Today, draw the number line including the fractions for the students to see. See the example below.      Then, using a string and have four students stand holding the string at equal intervals. Each student should have a nametag identify them as 0, 1/3, 2/3, or 1. Continue to do this with other fractions. This demonstration will take longer, so there will be no additional lesson after centers.
Large group lesson #2: *none today due to longer initial lesson*
Reflection questions: ¿Qué aprendiste hoy?" ¿Cómo puedes comparar fracciones? ¿Cómo divides una recta numérica?
Mini-quiz: *Number Lines: Fifths 2* in *Appendix Six: Daily Mini-Assessments*

Day 4: Extending the Number Line: Mixed Numbers and Improper Fractions

Large group lesson #1: *Making and using fraction strips*	Large group lesson #2: *Paper folding a given fraction*

Model efficient processes for making and using fraction strips. Students first watch you and then practice with you. Dismiss students to assigned center activities.	Students are given a list of fraction models they need to make in their small group using paper folding. This activity can be adjusted according to the progress of your individual class. Fractions with denominators that are multiples of two are easier to create while fractions with prime numbers as denominators are more challenging. Assigning some of each to the small groups can then be following by a large group discussion about which easier and which are harder and why.
Reflection questions: ¿Qué aprendiste hoy?" ¿Cuáles fracciones son más fáciles modelar usando papel? ¿Por qué? ¿Qué método usas para dividir un papel o una forma en partes iguales? ¿Cuáles fracciones son más fáciles para ti? ¿Por qué?	
Mini-quiz: *Fraction Number Line: Sixths* in *Appendix Six: Daily Mini-Assessments*	

Day 5: Fraction Strips, Paper Folding, and Equivalent Fractions

Large group lesson #1: *Fraction strips, paper folding and finding equivalent fractions* This lesson serves both as reinforcement for students who need to continue to practice paper folding to model fractions as well as an extension lesson for those who are ready to learn about equivalent fractions. Begin with a model of an 8.5x11 paper folder in two halves. Color one half. Fold the paper again, creating four equal spaces to demonstrate that ½ is equivalent to 2/4. Continue into 4/8 etc. After modeling to the class, pass out the materials and practice the process together. Dismiss class to begin assigned centers. The centers should be shorter today to allow additional time for lesson #2 and the subsequent activity.	Large group lesson #2: *Review of lesson #1 or base this lesson on recent mini-assessment results per the needs of your students* Demonstrate paper folding for creating equivalent fractions again. The challenge for the group is to choose a fraction and create at least two more additional models are equivalent to their chosen fraction. For example, if the small group choses 1/3, they must create a folded and colored paper model for 1/3 and then also for at least two more additional equivalent fractions such as 2/6 and 3/9. Come back together as a group for share and discuss via the reflection questions.

Reflection questions: ¿Qué era difícil para tu grupo and cómo resolvieron el problema? ¿Cuáles fracciones son más fáciles modelar usando papel? ¿Por qué? ¿Qué método usas para dividir un papel o una forma en partes iguales? ¿Cuáles fracciones son más fáciles para ti? ¿Por qué?
Mini-quiz: *Fraction of a Shape: Twelfths* in *Appendix Six: Daily Mini-Assessments* or teacher chosen assessment

APPENDIX THREE

WEEK THREE FRACTIONS ARE RELATIVE

Overview

This week the focus is on exploring the relativity of fractions. Students will be challenged with the concept that 1/3 of twelve apples is different than 1/3 of 15 apples. They will use manipulatives and visuals on paper to explore this topic. They will continue to practice the number line and shape concepts they have applied to fractions. Methods for solving word problems using fractions will also be taught and practice.

Standards	**Centers This week**
<u>Review standards</u> Write fractions with words and symbols Recognize the fractions can be used to represent parts of a whole Use models to order and compare fractions with like denominators. Recognize that fractions can be used to represent distances on a number line. <u>Focus standards</u> Recognize that fractions can be used to represent parts of a set recognize that fractions can be used to represent parts of a whole write fractions with words and symbols recognize that fractions can be used to represent distances on a number line <u>Extension standards</u> represent equivalent fractions using fraction models	<u>Fractions on a number line</u>: This center is a review from earlier in the unit. See *Fraction Number Lines Four* in *Appendix Nine: Number Lines* as an example activity. <u>skill review:</u> Choose activities for this center based on student needs from previous math units. Central third grade skills include three digit addition, three digit subtraction, three digit multiplication and calculating change. <u>fractions and shapes</u>: Students practice dividing shapes into fractional parts. See *Fraction of a Shape: Rectangles* in *Appendix Thirteen: Fraction of a Shape* for an example activity. <u>Writing fraction word problems:</u> In this center students will be writing fraction word problems that their classmates will solve. Formulate the groupings and order for the centers so that the more advanced groups start here so students needing more instruction get it before working at this center. This activity is called *Student Written Fraction Word Problems* and can be

	found in *Appendix Eleven: Writing Word Problems.* <u>fractional parts of a set</u>: Formulate the groupings and order for the centers so that the more advanced groups. See *Fraction of a Group: Stars* in *Appendix Ten: Fraction of a Group* for an example activity.
Vocabulary Fracciones equivalentes, modelos de fracciones, parte fraccionaria, recta numérica, medio, media, tercio, cuarto, quinto, sexto, séptimo, octavo, novena	**Sentence Frames** ____ del grupo es _____. Para calcular una parte fraccionaria del grupo debo _____.

Teacher Professional Development This Week

What did you do this week to combat stereotype threat for your students? When and how did you take about race? What did you do this week to decentralize whiteness in your classroom?

In order to combat stereotype threat and decentralize whiteness, you first must acknowledge its existence. Students need their teachers to normalize conversations about race (Jackson, 2011). The format of the worktime in this unit allows for a large amount of cooperative learning which helps to decentralize whiteness by making the environment more naturalize for students of color, who tend to come from collectivist cultures (Smith & Rodriguez, 2011). This can also be done by making time for students to socialize and interact with each other (Gay, 2000) such as the use of a daily classroom meeting in the morning or time to socialize during breakfast or snack time. Students of color may benefit from a change of pattern of discourse in the classroom (Gay, 2000) so instead of following the traditional pattern of asking a question and calling on volunteers, try using other methods such as asking a question and having students tell the answer to their neighbors.

Tech Tips	**FAQs This Week**
None additional this week	None additional this week

Further Reading and Resources

Equivalent fractions: Khan Academy has several videos about equivalent fractions such as https://www.khanacademy.org/math/arithmetic/fractions/visualizing-equivalent-fractions/v/visualizing-equivalent-fractions

Day 1: Fractions Are Relative Modeling with 1/3

<table>
<tr><td>Large group lesson #1: Demonstrations of 3/4 of various materials

Show 3/4 of a $1.00, 3/4 of $10.00 and 3/4 of $100.00 and discuss with students whether they think 3/4 always means the same thing. Demonstrate the same concept with crackers or a similar snack, asking whether they would like to 3/4 of a group of 12 or 3/4 of a group of 24. For this lesson, students do not need their notebook or a worksheet. Allow time to introduce and describe new centers. Dismiss students to do their assigned centers.</td><td>Large group lesson #2: Demonstrate how to write fraction word problems.

Students write fraction word problems in their small groups. These will be refined over the next few days and used next week to practice solving fraction word problems.

This activity is called Student Written Fraction Word Problems and can be found in Appendix Eleven: Writing Word Problems.</td></tr>
<tr><td colspan="2">Reflection questions:

¿Era fácil o difícil escribir historias de números con fracciones? ¿Por qué?
¿Cómo puedes comparar fracciones?
¿Cómo sabes cuál fracción es menor?
¿Si tienes hambre prefieres tener 1/3 de un sesenta papitas o 1/3 de 20 papitas? ¿Por qué?
¿Qué era difícil para tu grupo and cómo resolvieron el problema?</td></tr>
<tr><td colspan="2">Mini-quiz: Fraction of a Group: Goldfish in Appendix Six: Daily Mini-Assessments</td></tr>
</table>

Day 2: Fractions Are Relative

<table>
<tr><td>Large group lesson #1: relativity of fractions

Follow the same procedure as the lesson on Day 1. Additionally, model with classroom manipulatives such as plastic coins or paperclips. Dismiss students to do their assigned centers.</td><td>Large group lesson #2: Demonstrate how to write fraction word problems or base this lesson on recent mini-assessment results per the needs of your students

Students write fraction word problems in their small groups. These will be refined over the next few days and used next week to practice solving fraction word problems. This activity is called Student Written Fraction Word Problems and can be found in Appendix Eleven: Writing Word Problems.</td></tr>
</table>

Reflection questions: ¿Era fácil o difícil escribir historias de números con fracciones? ¿Por qué? ¿Cómo puedes comparar fracciones? ¿Cómo sabes cuál fracción es menor? ¿Si tienes hambre prefieres tener 1/3 de un sesenta papitas o 1/3 de 20 papitas? ¿Por qué?
Mini-quiz: *Fraction of a Group: Soccer Balls* in *Appendix Six: Daily Mini-Assessments*

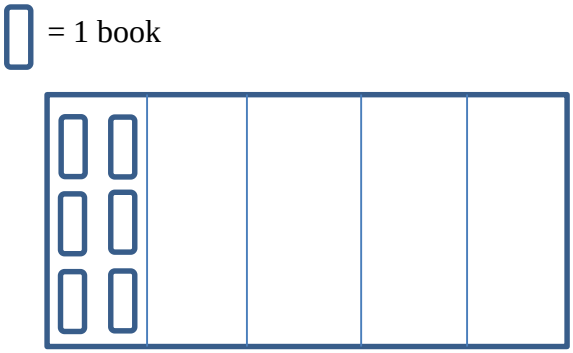
Day 3: Modeling Fractional Parts of a Set on Paper

Large group lesson #1: *fraction of a group on paper* Work together on paper-based practice to calculate a fraction of a group using visual model. Examples of worksheets can be found in Appendix Ten: Fraction of a Group.	Large group lesson #2: *Demonstrate how to write fraction word problems* Students write fraction word problems in their small groups. These will be refined over the next few days and used next week to practice solving fraction word problems. This activity is called *Student Written Fraction Word Problems* and can be found in *Appendix Eleven: Writing Word Problems.*
Reflection questions: ¿Era fácil o difícil escribir historias de números con fracciones? ¿Por qué? ¿Cómo puedes comparar fracciones? ¿Cómo sabes cuál fracción es menor? ¿Si tienes hambre prefieres tener 1/3 de un sesenta papitas o 1/3 de 20 papitas? ¿Por qué?	
Mini-quiz: *Fraction of a Group: Triangles* in *Appendix Six: Daily Mini-Assessments*	

Day 4: Calculating the Total Based on Given Fractional, Part One

Large group lesson #1: *Demonstration of calculating the total based on a given fraction* Use visual representations of the process involved in word problems where students are asked to calculate a total based on the number represented by a given fraction. For example:

Mariana brought six books to school. The group of six books represents 1/5 of all the books that Mariana owns. How many books does she have?

example 1:	Example 2:
6 books = 1/5 12 books = 2/5 18 books = 3/5 24 book = 4/5 30 books = 5/5	

Large group lesson #2: *Teacher decision based on student data*

Reflection questions

¿Era fácil o difícil escribir historias de números con fracciones? ¿Por qué?
¿Cómo puedes comparar fracciones?
¿Cómo sabes cuál fracción es menor?
¿Si tienes hambre prefieres tener 1/3 de un sesenta papitas o 1/3 de 20 papitas? ¿Por qué?

Mini-quiz: *Fraction of a Group: Happy Faces* in *Appendix Six: Daily Mini-Assessments*

Day 5: Calculating the Total Based on a Fractional, Part Two

Large group lesson #1: *See instructions from Day 4 above*	Large group lesson #2: *Base this lesson on recent mini-assessment results*

Reflection questions:

¿Qué era difícil para tu grupo and cómo resolvieron el problema?
¿Cuáles fracciones son más fáciles modelar usando papel? ¿Por qué?
¿Qué método usas para dividir un papel o una forma en partes iguales?
¿Cuáles fracciones son más fáciles para ti? ¿Por qué?

Mini-quiz: *Fraction Word Problems: Pizza* in *Appendix Six: Daily Mini-Assessments* or a teacher chosen assessment based on student data

APPENDIX FOUR

WEEK FOUR PARTS OF A SET AND WORD PROBLEMS

<table>
<tr><td colspan="2">Overview
The focus on this week of the fractions unit is to model and practice solving fraction word problems and to allow the teacher to modify and design lessons that are based on the instructional needs of the students, using the daily mini-quizzes for data.</td></tr>
<tr><td>Standards

<u>Focus standards</u>
-understand that fractions are relative to the size of the whole
-use models to order and compare fractions with like denominators
-recognize that fractions can be used to represent distances on a number line
-recognize fractions can be used to represent parts of a whole
-recognize that fractions can be used to represent parts of a set
-write fractions with words and symbols

<u>Extension standards</u>
-represent equivalent fractions using fraction models</td><td>Centers This Week

<u>Skill review center (previous units)</u>:
Teacher chose based on student data

<u>skill review (this unit)</u>:
teacher chosen based on student data

<u>fractions on a number line:</u>
Use Number Lines Five in Appendix Nine: Number Lines.

<u>fraction word problems:</u>
Example activities such as Fraction Word Problems: Karate found in Appendix Twelve: Fraction Word Problems.

<u>fractional parts of a set</u>:
Use activities such Fraction of a Group: Arrows from Appendix Thirteen: Fraction of a Group.</td></tr>
<tr><td>Vocabulary

Historias numéricas fraccionarias, recta numérica, modelo fraccionario, denominador, numerador, representar, medio, media, tercio, cuarto, quinto, sexto, séptimo, octavo, noveno</td><td>Sentence Frames

____ del grupo es _____.

Para calcular una parte fraccionaria del grupo debo _____.

Sé que la respuesta es _____ porque _____.</td></tr>
<tr><td>Tech Tips

Fraction word problems are often challenging for third graders. Using a document camera, tablets, computers or an interactive board will all help your</td><td>FAQs This Week

Why are there fewer specific lesson this week?
By this point in the unit, you have a lot more data on each of your students. This</td></tr>
</table>

students better internalize the models you teach them to solve fraction word problems.	will help you make the best instructional decision for your class.

Teacher Professional Development This Week

Which language do students use when they interact with their peers during different parts of the day? Who do you observe to be the leaders among the students and what is their race and native language? Do cross-linguistic and cross-cultural friendships exist in your classroom? Have you noticed a change in how students work and interact during math since creating a more cooperative learning environment during this fractions unit? What kind of fraction problems do students create? Do you notice cultural differences among students when they create their own fraction word problems?

By changing the classroom environment to be more inclusive through culturally responsive teaching techniques, you should begin to see your students of color being academic and social leaderships in your classroom (Gay, 2000). You can note changes or lack of changes by being more aware of cross-racial, cross-linguistic and cross-cultural friendships in the classroom. If students are using more Spanish than English in their peer-to-peer interactions, this is another sign that the cultural environment has shifted in your classroom. By preferring Spanish, you are also elevating the status of the Latino culture and the students who are Latino (Howard, et al.; Smith & Rodriguez, 2011).

Further Reading and Resources

Barnett-Clarke, C. (2010). *Developing essential understanding of rational numbers for teaching mathematics in grades 3/5*. Reston, VA: National Council of Teachers of Mathematics.

Gay, G. (2000). *Culturally responsive teaching: theory, research & practice.* New York: Teacher's College Press.

Smith, M. D., & Rodriguez, A. (2011). A critical foundation for bilingual education. *Journal for Critical Education Policy Studies, 9*(2), 186-198.

Day 1: Using Models to Solve Word Problems, Part One

Large group lesson #1: *Fraction word problems* Model different methods to be able to solve fraction word problems. See	Large group lesson #2: *Base this lesson on recent mini-assessment results*

Fraction Word Problems: Socks in *Appendix Twelve: Fraction Word Problems* for an example activity.	
Reflection questions: ¿Qué aprendiste hoy?" ¿Cómo puedes comparar fracciones? ¿Cómo sabes cuál fracción as mayor?	
Mini-quiz: *Fraction Word Problems: Pizza* in *Appendix Six: Daily Mini-Assessments*	

Day 2: Using Models to Solve Word Problems, Part Two

Large group lesson #1: *Fraction word problems* Model different methods to be able to solve fraction word problems. An example activity would be *Fraction Word Problems: Eggs* from *Appendix Twelve: Fraction Word Problems.*	Large group lesson #2: *Base this lesson on recent mini-assessment results*
Reflection questions: ¿Qué aprendiste hoy?" ¿Cómo puedes comparar fracciones? ¿Cómo sabes cuál fracción as mayor? ¿Cuáles métodos usas para resolver historias de números de fracciones?	
Mini-quiz: *Fraction Word Problems: Quarters* in *Appendix Six: Daily Mini-Assessments* or teacher chosen based on student data	

Day 3: Using Models to Solve Word Problems, Part Three

Large group lesson #1: *fraction word problems* Use *Fraction Word Problems: Cupcakes* in *Appendix Twelve: Fraction Word Problems.*	Large group lesson #2: *skill review: dividing a shape into fractional parts or teacher-chosen review* Use *Fraction of a Shape: Various* found in *Appendix Thirteen: Fraction of a Shape.*

Reflection questions: ¿Qué aprendiste hoy?" ¿Cómo puedes comparar fracciones? ¿Cómo sabes cuál fracción as mayor?
Mini-quiz: *Fraction Word Problems: Sandwich* in *Appendix Six: Daily Mini-*Assessments or teacher chosen based on student data

Day 4: Unit Review

Large group lesson #1: *skill review based on recent mini-assessment results*	Large group lesson #2: *skill review: based on recent mini-assessment results*
Reflection questions: ¿Qué aprendiste hoy?" ¿Cuáles fracciones son más fáciles modelar usando papel? ¿Por qué? ¿Qué método usas para dividir un papel o una forma en partes iguales? ¿Cuáles fracciones son más fáciles para ti? ¿Por qué?	
Mini-quiz: *Fraction Word Problems: Donut* in *Appendix Six: Daily Mini-Assessments* or teacher chosen based on student data	

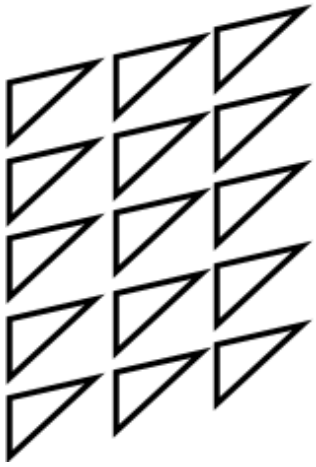
Day 5: Review and Assessment

Large group lesson #1: *skill review: per mini-assessment results* Review skills based on student needs before having students take the final assessment.	Large group lesson #2: *none* Students will take the final unit assessment which is located in *Appendix Five: Assessments.*
Reflection questions: ¿Qué era difícil para tu grupo and cómo resolvieron el problema? ¿Cuáles fracciones son más fáciles modelar usando papel? ¿Por qué? ¿Qué método usas para dividir un papel o una forma en partes iguales? ¿Cuáles fracciones son más fáciles para ti? ¿Por qué?	
Mini-quiz: none today (end of unit assessment instead)	

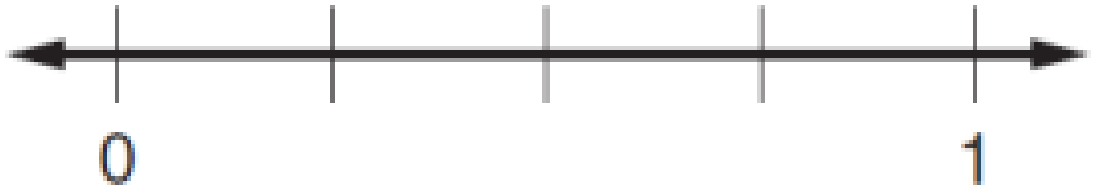
APPENDIX FIVE: ASSESSMENTS

Pre-Assessment

Nombre: _____ fecha: _____ Pre-examen

Encierra en un círculo 7/8 de los helados. 	Sombrea 2/3 de los triángulos. 
Divide el rectángulo para mostrar ¾. 	Tacha 2/5 de las pelotas. 

Escribe las fracciones que faltan en la recta numérica.



Dos personas se reparten 10 dulces.

¿Cuántos dulces recibe cada persona? _____ dulces

¿Qué fracción del total de dulces recibió cada persona? ____

Una niña tiene 5 libros en su mochila. Es un tercio de todos sus libros. ¿Cuántos libros tiene en total?

La niña tiene _____ libros en total.

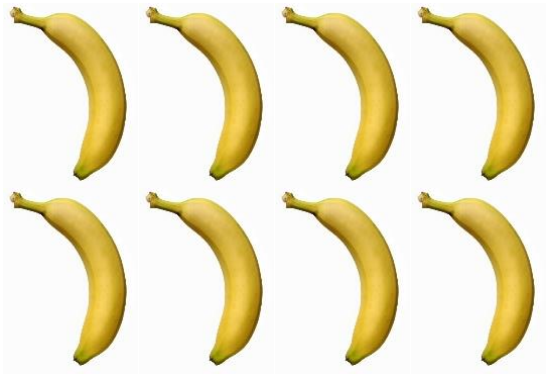
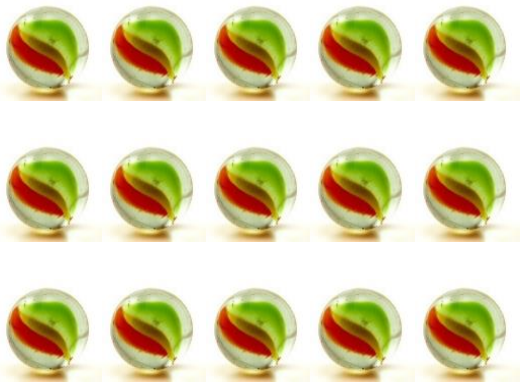
¿Qué fracción de todos los libros tiene en su mochila? _____

Extensión:

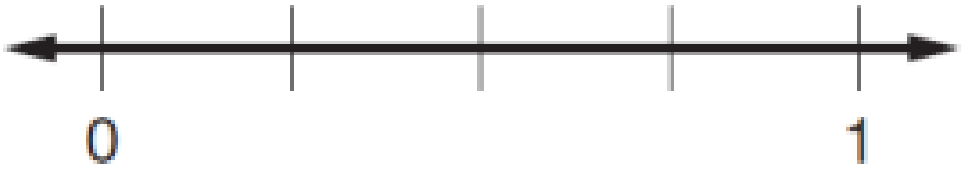
Nate, Blaise y Talitha tenían dos barras de chocolate para compartir entre los tres. ¿Cuál fracción de las barras recibirá cada niño?

Post-Assessment

Nombre: _____ fecha: _____ Examen Final

Encierra en un círculo 5/8 de los helados. 	Sombrea 2/3 de las estrellas. 
Divide el rectángulo para mostrar 2/4. 	Tacha 1/5 de las canicas. 

Escribe las fracciones que faltan en la recta numérica.



Dos personas se reparten 12 galletas.

¿Cuántas galletas le toca a cada persona? _____ galletas

¿Qué fracción del total de las galletas recibió cada persona? _____

Uno niño tiene 4 libros en su mochila. Es un tercio de todos sus libros. ¿Cuántos libros tiene en total?

El niño tiene _____ libros en total.

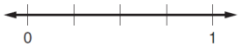
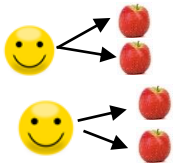
¿Qué fracción de todo los libros tiene un su mochila? _____

Extensión:

Mary-Rachel, Miriam y Archer tenían dos bolsas de papitas para compartir entre los tres. ¿Cuál fracción de las dos bolsas de papitas recibirá cada niño?

Progress Tracker for Student Use

Nombre: _____ fecha: _____

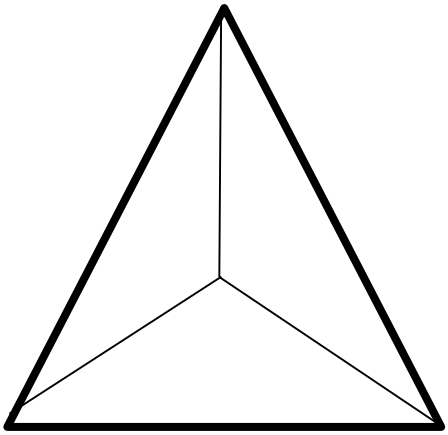
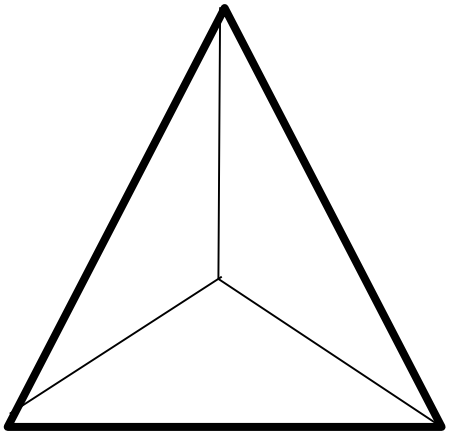
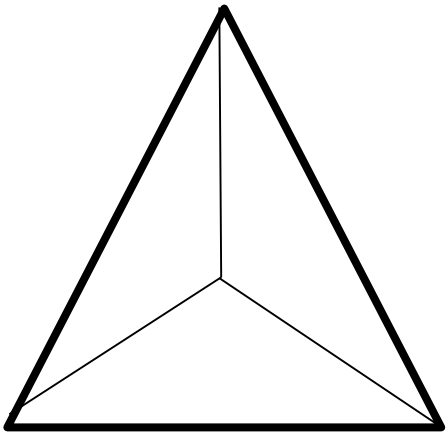
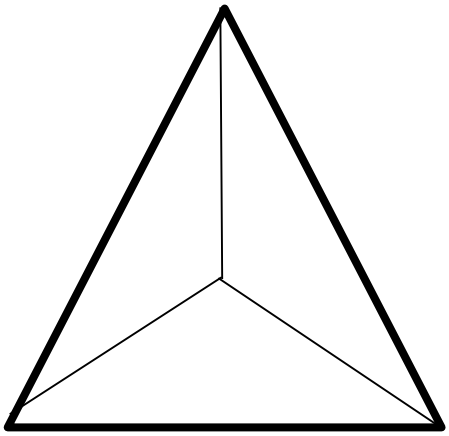
	pre-examen	mini-prueba	mini-prueba	mini-prueba	mini-prueba	mini-prueba	examen final
dividir una forma 							
fracción de un grupo 							
recta numérica 							
Historia de números de fracciones: 							
historias de números de fracciones: 1/3 = 4 2/3 = 8 1/1 =12							

Progress Tracker for Teacher Use

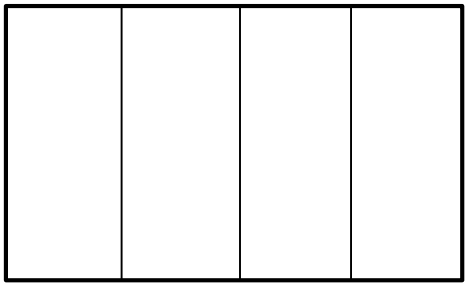
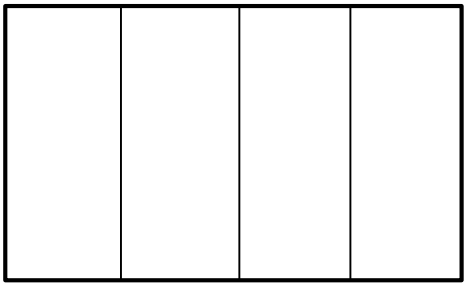
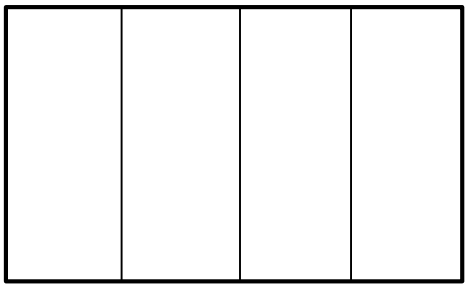
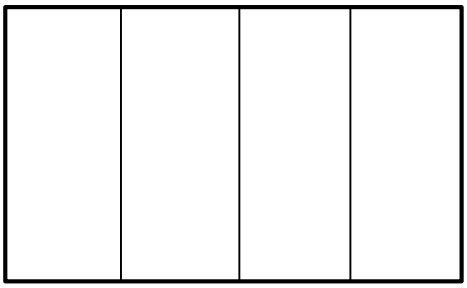
	dividir una forma					fracción de un grupo					recta numérica					Historias: compartir en grupos iguales					Historias: fracción de un grupo				

APPENDIX SIX: DAILY MINI-ASSESSMENTS

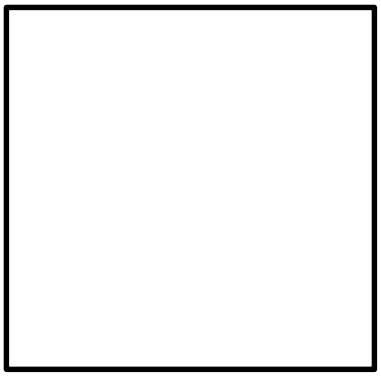
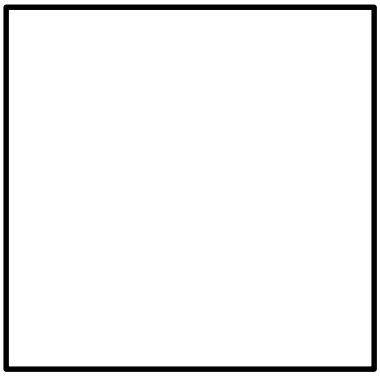
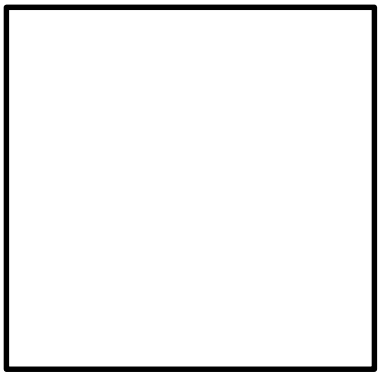
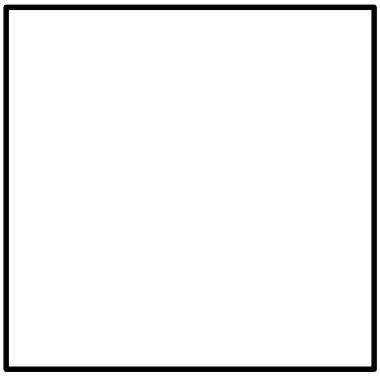
Fraction of a Shape: Thirds

Identifica la parte fraccionaria de cada sección de la forma.  Nombre _____	Identifica la parte fraccionaria de cada sección de la forma.  Nombre _____
Identifica la parte fraccionaria de cada sección de la forma.  Nombre _____	Identifica la parte fraccionaria de cada sección de la forma.  Nombre _____

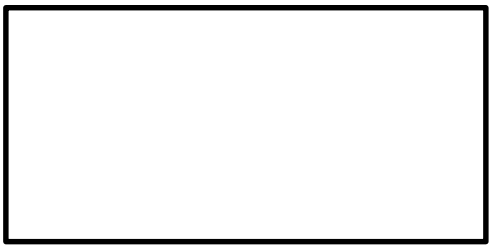
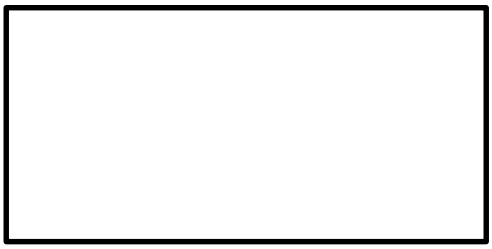
Fraction of a Shape: Fourths

Identifica la parte fraccionaria de cada sección de la forma.  Nombre _____	Identifica la parte fraccionaria de cada sección de la forma.  Nombre _____
Identifica la parte fraccionaria de cada sección de la forma.  Nombre _____	Identifica la parte fraccionaria de cada sección de la forma.  Nombre _____

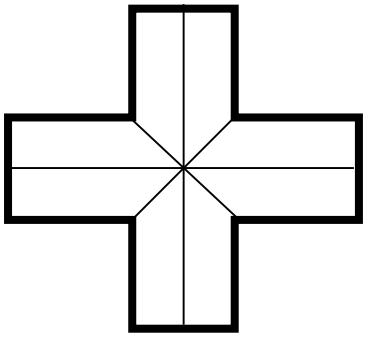
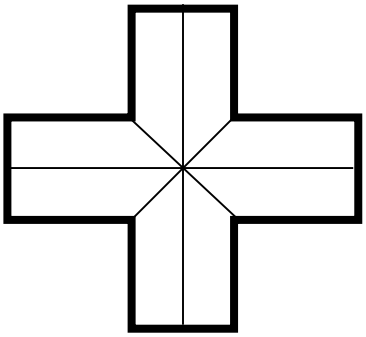
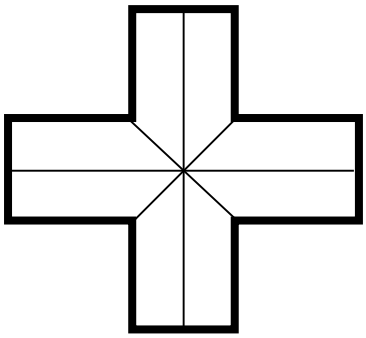
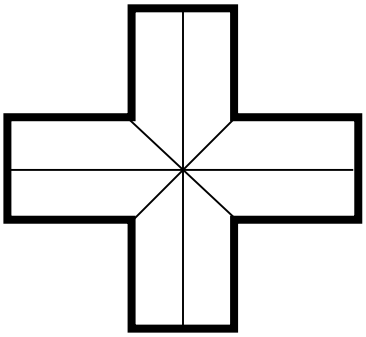
Fraction of a Shape: Draw Fourths

Usa la forma para mostrar ¾.  Nombre: _____	Usa la forma para mostrar ¾.  Nombre: _____
Usa la forma para mostrar ¾.  Nombre: _____	Usa la forma para mostrar ¾.  Nombre: _____

Fraction of a Shape: Sixths

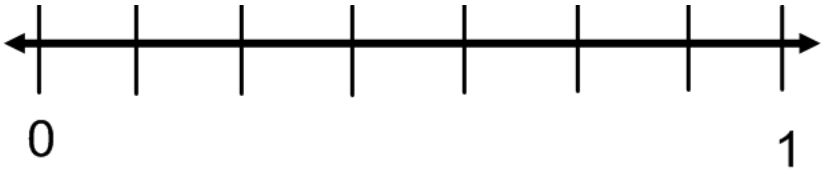
Divide el rectángulo en sextos.  Nombre: _____	Divide el rectángulo en sextos.  Nombre: _____
Divide el rectángulo en sextos.  Nombre: _____	Divide el rectángulo en sextos.  Nombre: _____

Fraction of a Shape: Eighths

Indica que fracción representa cada parte de la forma.  Nombre: _____	Indica que fracción representa cada parte de la forma.  Nombre: _____
Indica que fracción representa cada parte de la forma.  Nombre: _____	Indica que fracción representa cada parte de la forma.  Nombre: _____

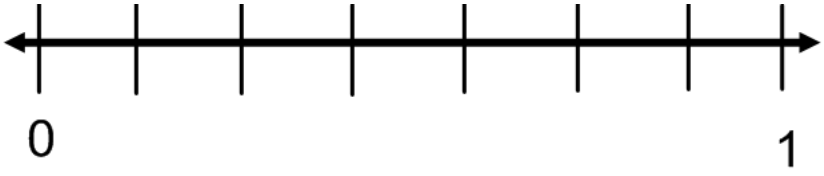
Number Line: Sevenths

Llena las fracciones que faltan.



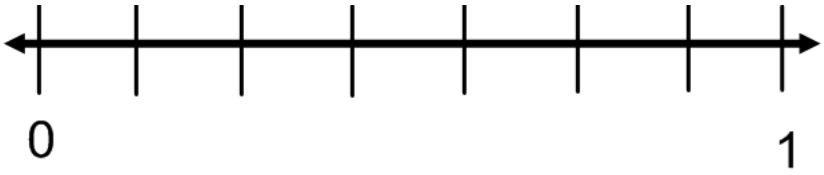
Nombre: _____

Llena las fracciones que faltan.



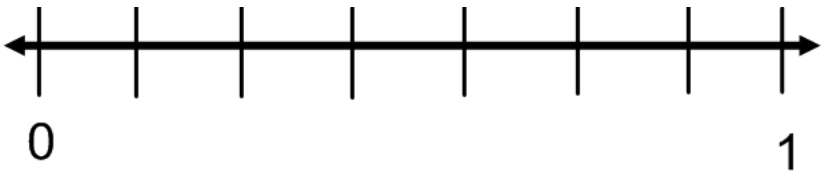
Nombre: _____

Llena las fracciones que faltan.



Nombre: _____

Llena las fracciones que faltan.



Nombre: _____

Number Line: Fifths 1

Divide la recta numérica en quintos. Nombre: _____

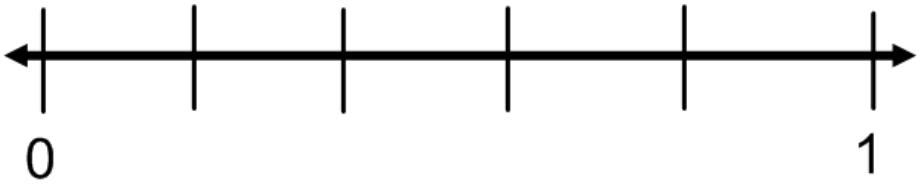
Divide la recta numérica en quintos. Nombre: _____

Divide la recta numérica en quintos. Nombre: _____

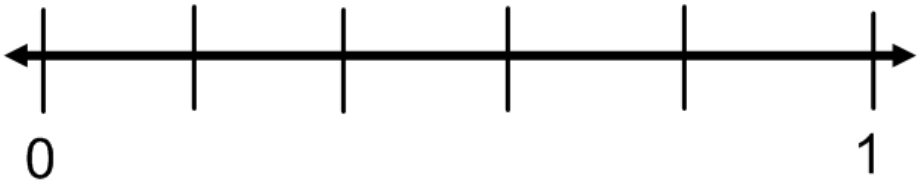
Divide la recta numérica en quintos. Nombre: _____

Number Line: Fifths 2

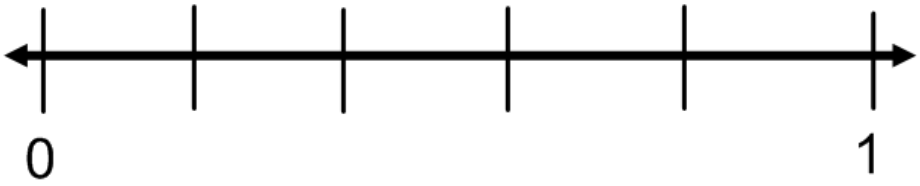
Llena las fracciones que faltan. Nombre: _____



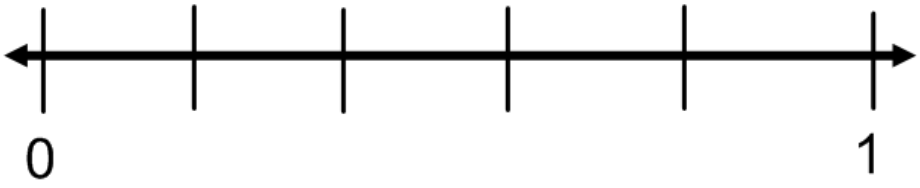
Llena las fracciones que faltan. Nombre: _____



Llena las fracciones que faltan. Nombre: _____

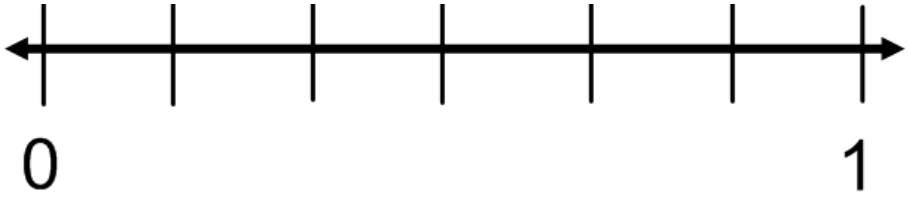


Llena las fracciones que faltan. Nombre: _____

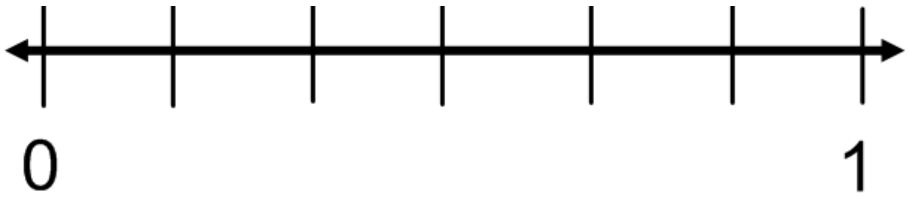


Number Line: Sixths

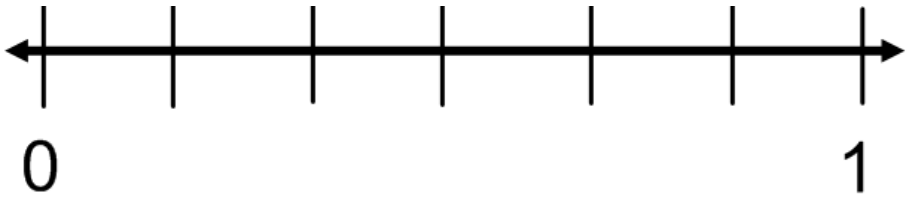
Llena las fracciones que faltan. Nombre: _____



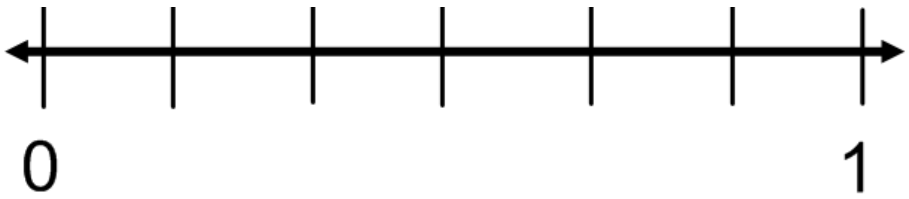
Llena las fracciones que faltan. Nombre: _____



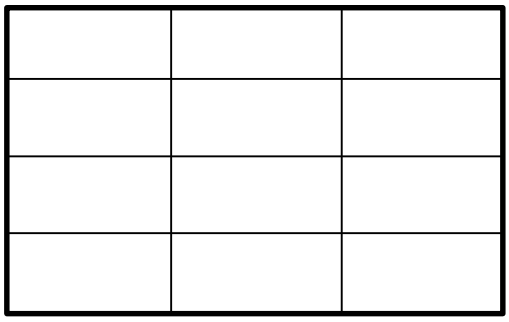
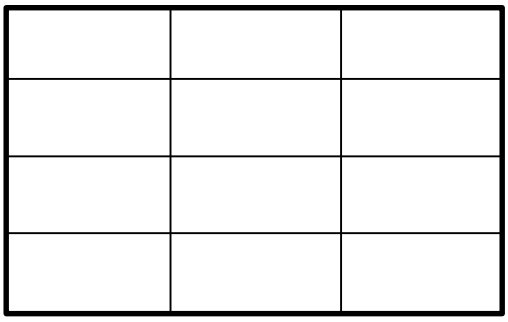
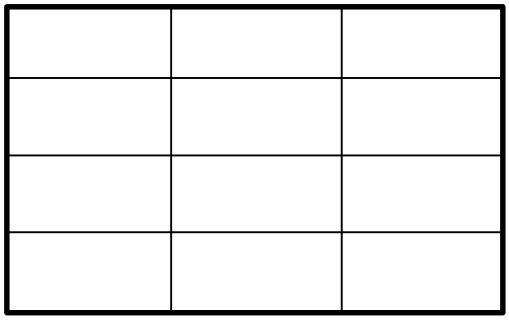
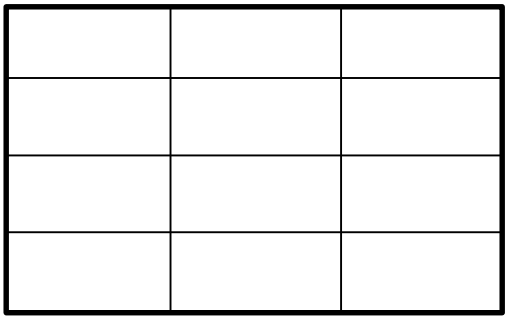
Llena las fracciones que faltan. Nombre: _____



Llena las fracciones que faltan. Nombre: _____



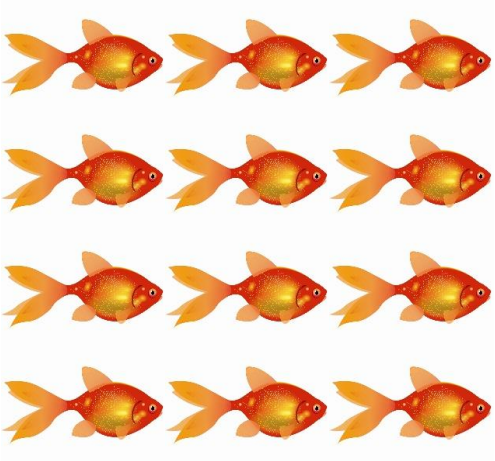
Fraction of a Shape: Twelfths

Indica que fracción representa cada parte de la forma.  Nombre: _____	Indica que fracción representa cada parte de la forma.  Nombre: _____
Indica que fracción representa cada parte de la forma.  Nombre: _____	Indica que fracción representa cada parte de la forma.  Nombre: _____

Fraction of a Group: Goldfish

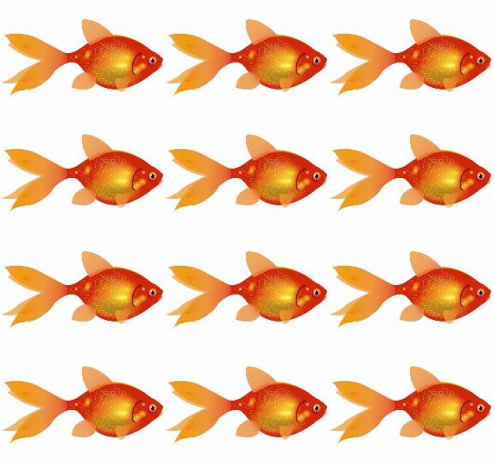
Nombre: _____

Encierre en círculo ¾ de los peces.



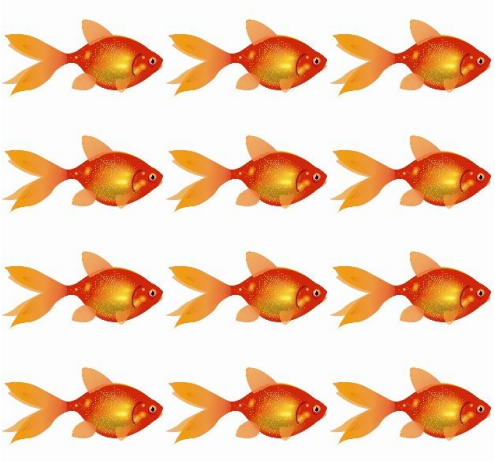
Nombre: _____

Encierre en círculo ¾ de los peces.



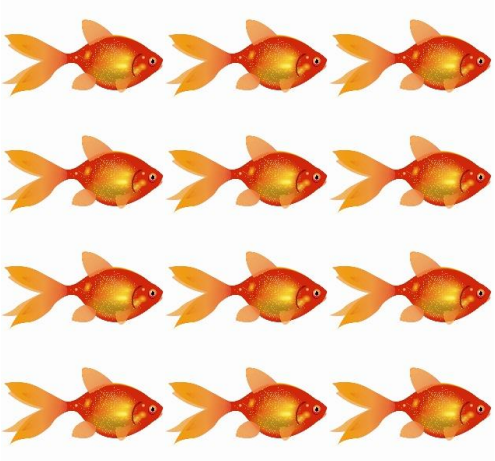
Nombre: _____

Encierre en círculo ¾ de los peces.

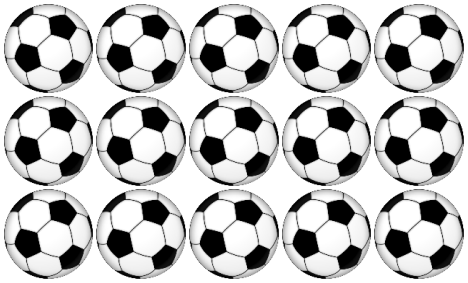
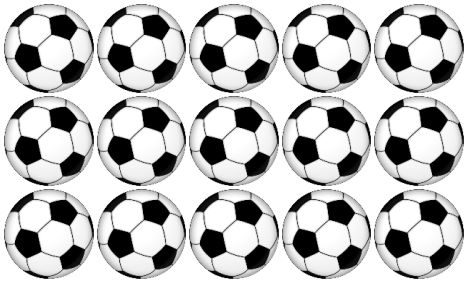
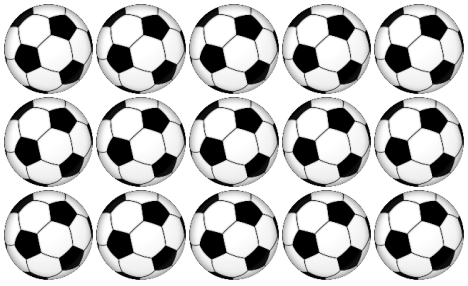
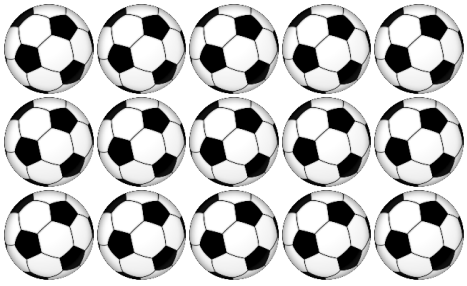


Nombre: _____

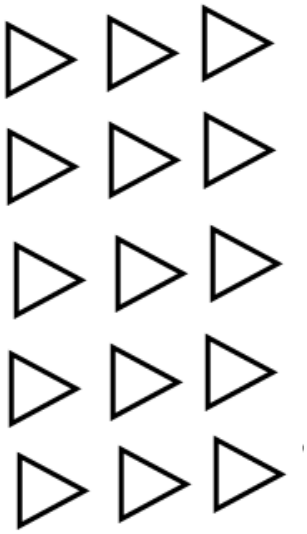
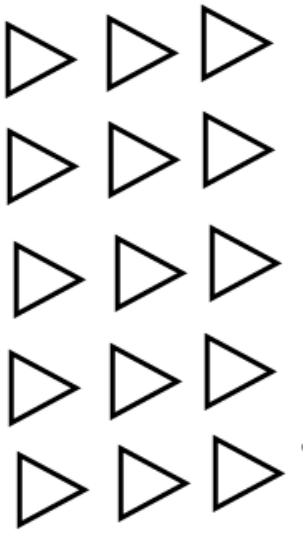
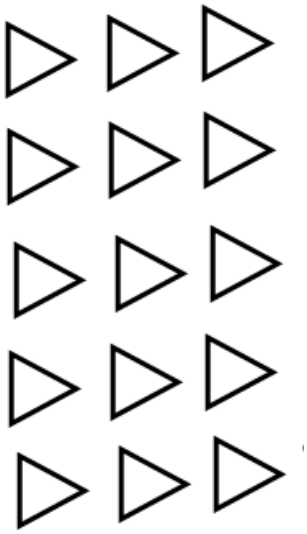
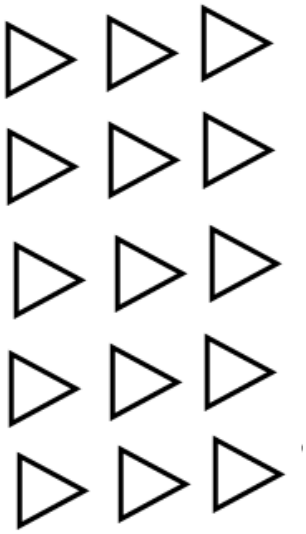
Encierre en círculo ¾ de los peces.



Fraction of a Group: Soccer Balls

Encierra en círculo 2/5 de las pelotas.  Nombre: _____	Encierra en círculo 2/5 de las pelotas.  Nombre: _____
Encierra en círculo 2/5 de las pelotas.  Nombre: _____	Encierra en círculo 2/5 de las pelotas.  Nombre: _____

Fraction of a Group: Triangles

Sombrea un tercio de los triángulos.  Nombre: _____	Sombrea un tercio de los triángulos.  Nombre: _____
Sombrea un tercio de los triángulos.  Nombre: _____	Sombrea un tercio de los triángulos.  Nombre: _____

Fraction of a Group: Happy Faces

Nombre: _____ Encierra en círculo 3/5 de las caritas felices. 	Nombre: _____ Encierra en círculo 3/5 de las caritas felices. 
Nombre: _____ Encierra en círculo 3/5 de las caritas felices. 	Nombre: _____ Encierra en círculo 3/5 de las caritas felices. 

Fraction Word Problems: Pizza

Cora invitó a 5 amigos a comer pizza. Los 6 repartieron 1 pizza en partes iguales. ¿Qué fracción de la pizza recibió cada persona? Nombre: _____ 	Cora invitó a 5 amigos a comer pizza. Los 6 repartieron 1 pizza en partes iguales. ¿Qué fracción de la pizza recibió cada persona? Nombre: _____ 
Cora invitó a 5 amigos a comer pizza. Los 6 repartieron 1 pizza en partes iguales. ¿Qué fracción de la pizza recibió cada persona? Nombre: _____ 	Cora invitó a 5 amigos a comer pizza. Los 6 repartieron 1 pizza en partes iguales. ¿Qué fracción de la pizza recibió cada persona? Nombre: _____ 

Fraction Word Problems: Quarters

Esteban y sus tres primos estaban jugando afuera. Encontraron una pila de quarters. Había 8 quarters en total. ¿Qué fracción de los quarters recibirá cada niño si dividen los quarters en partes iguales? Nombre: _____ 	Esteban y sus tres primos estaban jugando afuera. Encontraron una pila de quarters. Había 8 quarters en total. ¿Qué fracción de los quarters recibirá cada niño si dividen los quarters en partes iguales? Nombre: _____ 
Esteban y sus tres primos estaban jugando afuera. Encontraron una pila de quarters. Había 8 quarters en total. ¿Qué fracción de los quarters recibirá cada niño si dividen los quarters en partes iguales? Nombre: _____ 	Esteban y sus tres primos estaban jugando afuera. Encontraron una pila de quarters. Había 8 quarters en total. ¿Qué fracción de los quarters recibirá cada niño si dividen los quarters en partes iguales? Nombre: _____ 

Fraction Word Problems: Sandwiches

Liliana, Santiago y Graham tenían dos sándwiches para compartir entre los tres. ¿Qué fracción de cada sándwich debe recibir cada persona? Nombre: _____ 	Liliana, Santiago y Graham tenían dos sándwiches para compartir entre los tres. ¿Qué fracción de cada sándwich debe recibir cada persona? Nombre: _____ 
Liliana, Santiago y Graham tenían dos sándwiches para compartir entre los tres. ¿Qué fracción de cada sándwich debe recibir cada persona? Nombre: _____ 	Liliana, Santiago y Graham tenían dos sándwiches para compartir entre los tres. ¿Qué fracción de cada sándwich debe recibir cada persona? Nombre: _____ 

Fraction Word Problems: Donuts

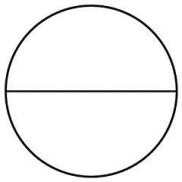
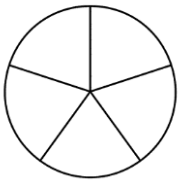
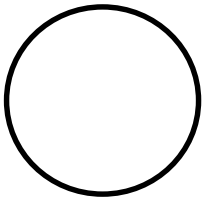
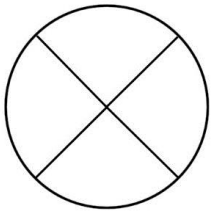
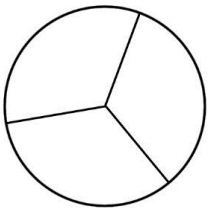
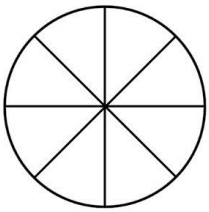
Seis niños fueron a su clase de lectura. En la clase, la maestra había comprado dos donas gigantes para los seis niños. ¿Cuál fracción de las donas recibir cada niño? Nombre: _____ 	Seis niños fueron a su clase de lectura. En la clase, la maestra había comprado dos donas gigantes para los seis niños. ¿Cuál fracción de las donas recibir cada niño? Nombre: _____ 
Seis niños fueron a su clase de lectura. En la clase, la maestra había comprado dos donas gigantes para los seis niños. ¿Cuál fracción de las donas recibir cada niño? Nombre: _____ 	Seis niños fueron a su clase de lectura. En la clase, la maestra había comprado dos donas gigantes para los seis niños. ¿Cuál fracción de las donas recibir cada niño? Nombre: _____ 

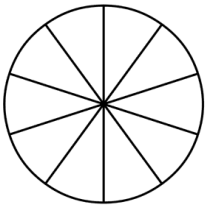
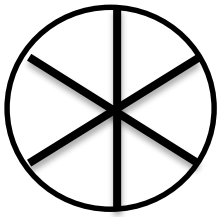
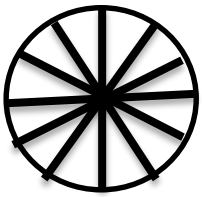
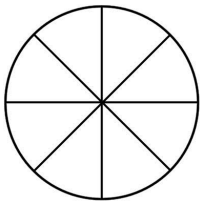
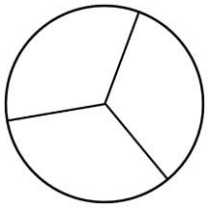
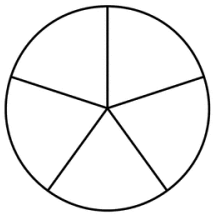
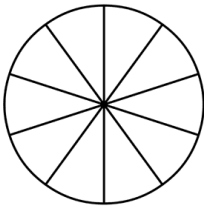
APPENDIX SEVEN: FRACTION CIRCLES

Fraction Circles: Color-Coding

Nombre: _____ Fecha: _____

Colorea una parte de cada fracción del color que le corresponde.

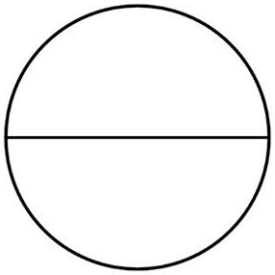
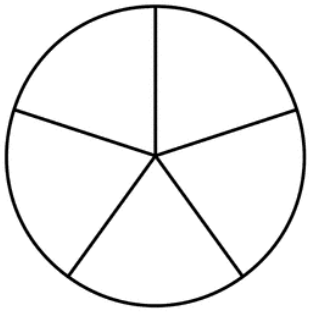
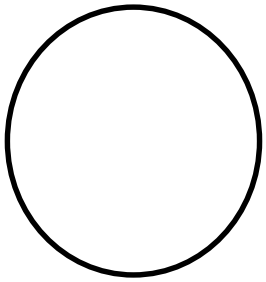
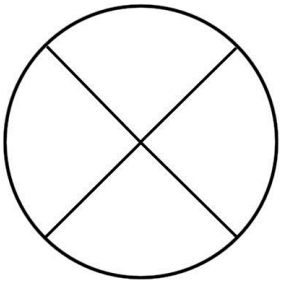
	_____partes iguales Cada parte es _____ de un entero.
	_____partes iguales Cada parte es _____ de un entero.
	_____partes iguales Cada parte es _____ de un entero.
	_____partes iguales Cada parte es _____ de un entero.
	_____partes iguales Cada parte es _____ de un entero.
	_____partes iguales Cada parte es _____ de un entero.

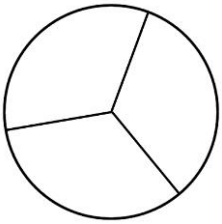
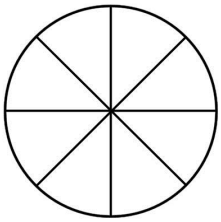
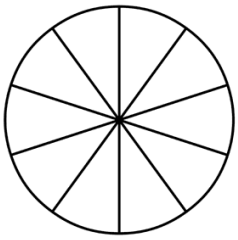
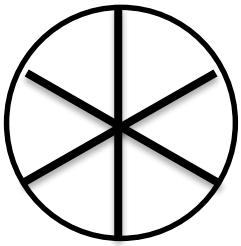
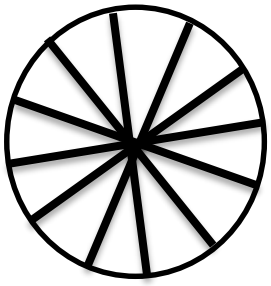
	_____partes iguales Cada parte es _____ de un entero.
	_____partes iguales Cada parte es _____ de un entero.
	_____partes iguales Cada parte es _____ de un entero.
	_____partes iguales Dos partes son _____ de un entero.
	_____partes iguales Dos partes son _____ de un entero.
	_____partes iguales Dos partes son _____ de un entero.
	_____partes iguales Dos partes son _____ de un entero.

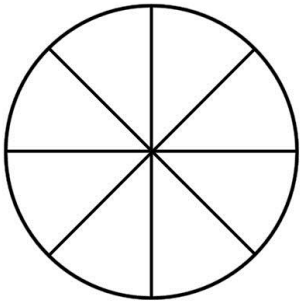
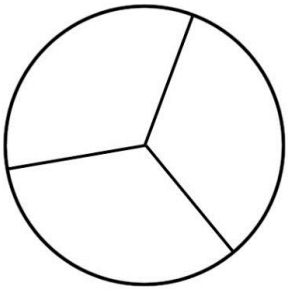
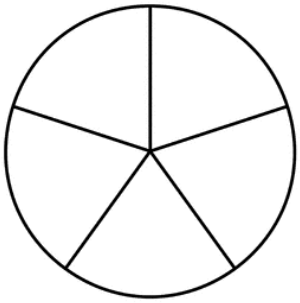
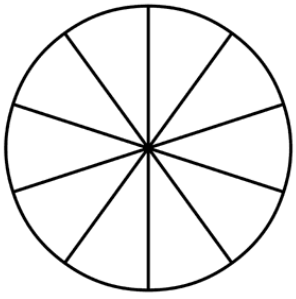
Fraction Circles: Comparing

Nombre: _____ Fecha: _____

Colorea una parte de cada fracción del color que le corresponde.

	_____partes iguales Cada parte es _____ de un entero.
	_____partes iguales Tres partes son _____ de un entero.
	_____partes iguales Cada parte es _____ de un entero.
	_____partes iguales Tres partes son _____ de un entero.

	_____partes iguales Dos partes son _____ de un entero.
	_____partes iguales Cinco partes son _____ de un entero.
	_____partes iguales Ocho partes son _____ de un entero.
	_____partes iguales Cuatro partes son _____ de un entero.
	_____partes iguales Diez partes son _____ de un entero.

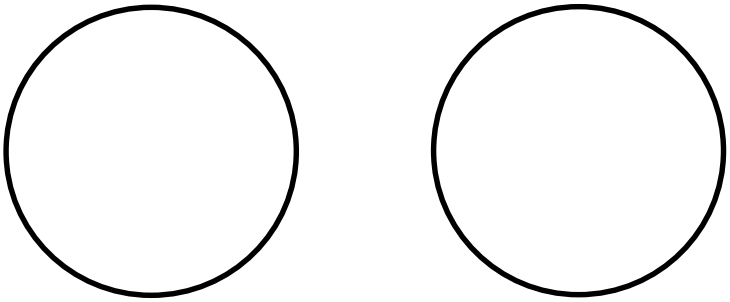
	_____partes iguales Tres partes son _____ de un entero.
	_____partes iguales Dos partes son _____ de un entero.
	_____partes iguales Cuatro partes son _____ de un entero.
	_____partes iguales Siete partes son _____ de un entero.

Fraction Circles: Equivalency

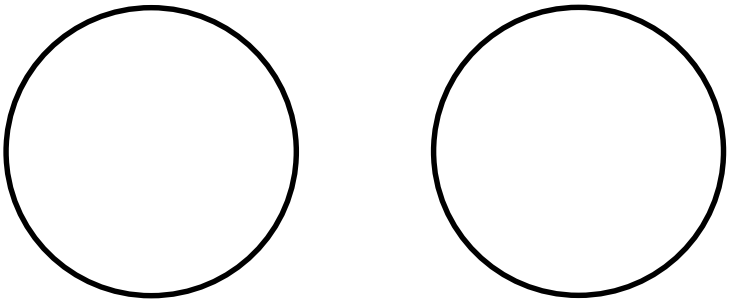
Nombre: _____ Fecha: _____

Encuentra fracciones equivalentes usando los círculos fraccionarios. Usa el color que responda a cada fracción para colorear.

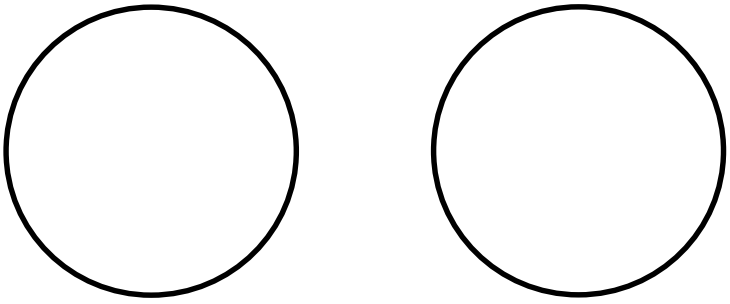
_____ es equivalente a _____



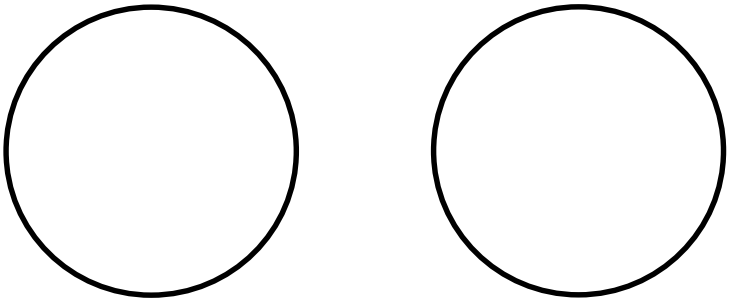
_____ es equivalente a _____



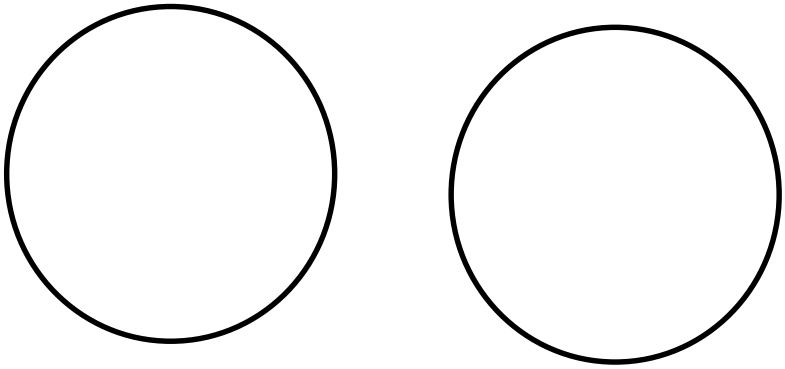
_____ es equivalente a _____



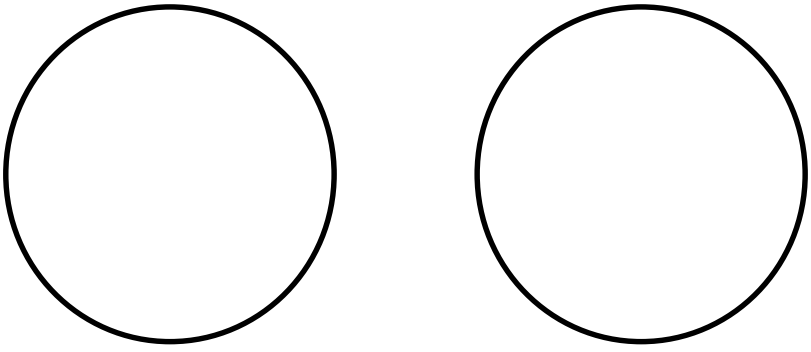
_____ es equivalente a _____



_____ es equivalente a _____



_____ es equivalente a _____



APPENDIX EIGHT: SUPERA LA FRACCIÓN

Supera la Fracción: Visual Recording Sheet

Supera la fracción Nombre: _____

<table>
<tr><td colspan="2">Ejemplo:
<u>1/4 es mayor que 1/8</u>
  </td></tr>
<tr><td>_____ es mayor que _____.</td><td>_____ es mayor que _____.</td></tr>
<tr><td>_____ es mayor que _____.</td><td>_____ es mayor que _____.</td></tr>
<tr><td>_____ es mayor que _____.</td><td>_____ es mayor que _____.</td></tr>
<tr><td>_____ es mayor que _____.</td><td>_____ es mayor que _____.</td></tr>
</table>

Supera la Fracción: Recording Sheet Without Visuals

Supera la fracción Nombre: _____

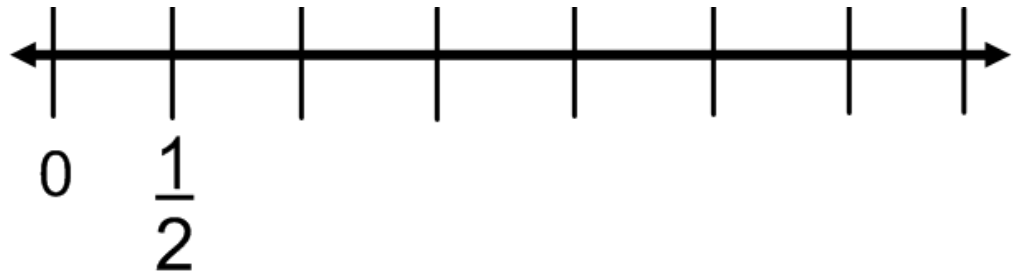
_____ es mayor que _____.	_____ es mayor que _____.
_____ es mayor que _____.	_____ es mayor que _____.
_____ es mayor que _____.	_____ es mayor que _____.
_____ es mayor que _____.	_____ es mayor que _____.
_____ es mayor que _____.	_____ es mayor que _____.
_____ es mayor que _____.	_____ es mayor que _____.
_____ es mayor que _____.	_____ es mayor que _____.
_____ es mayor que _____.	_____ es mayor que _____.
_____ es mayor que _____.	_____ es mayor que _____.
_____ es mayor que _____.	_____ es mayor que _____.

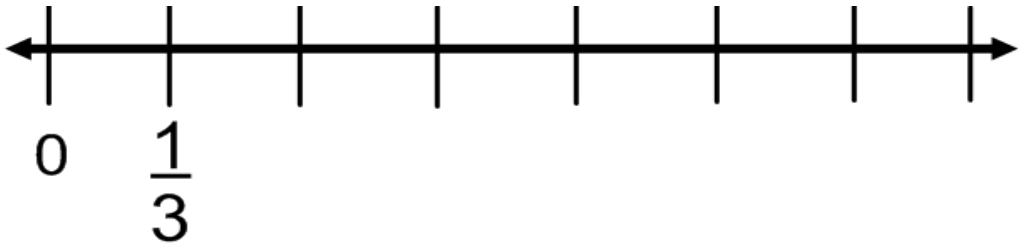
APPENDIX NINE: NUMBER LINE

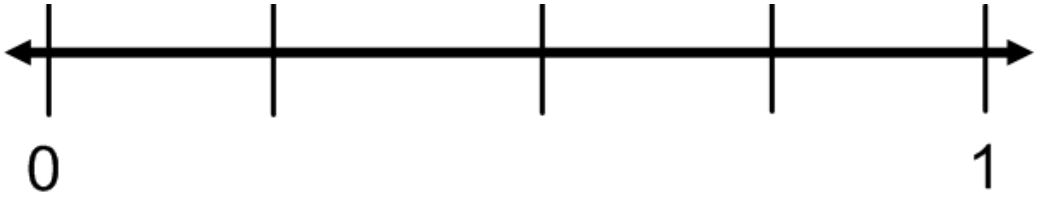
Fraction Number Lines One

Nombre: _____ Fecha: _____

Escribe las fracciones que faltan.



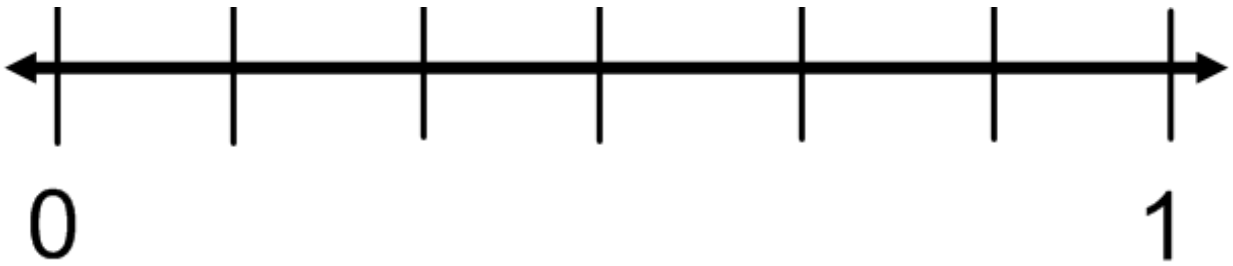


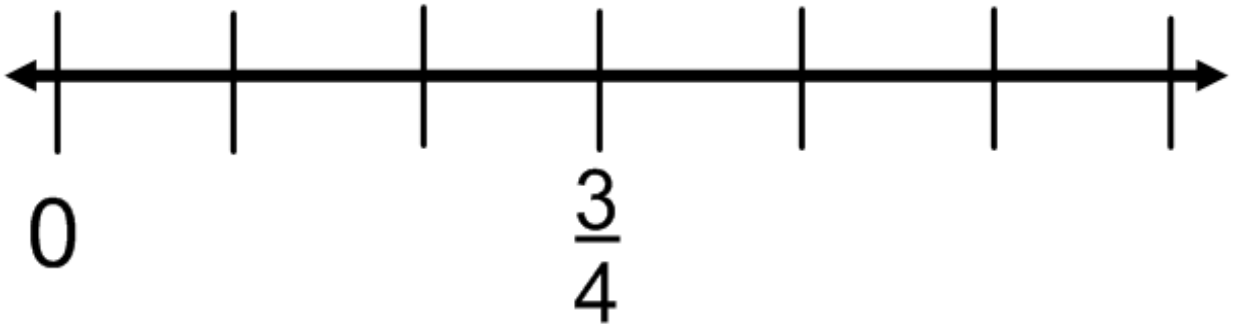


Divide la recta numerica en séptimos.

Divide la recta numérica en octavos.

Divide la recta numérica en cuartos.

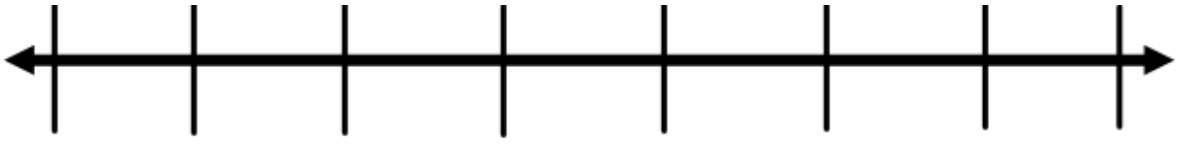


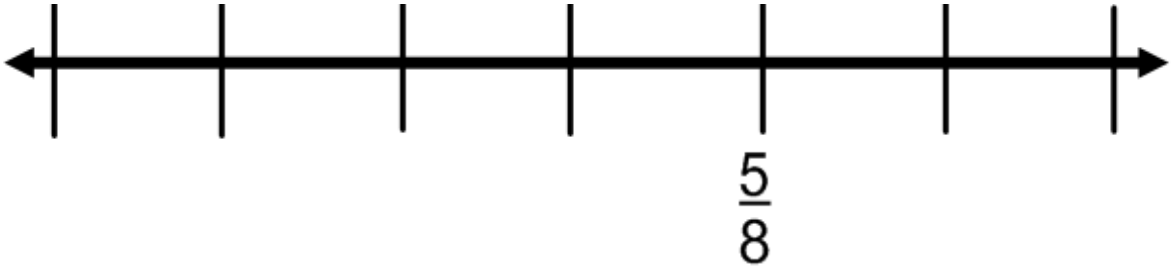


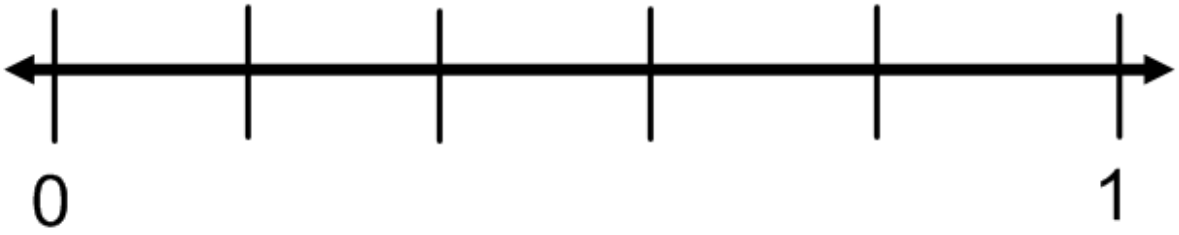
Fraction Number Lines Two

Nombre _____ Fecha: _____

Escribe las fracciones que faltan.



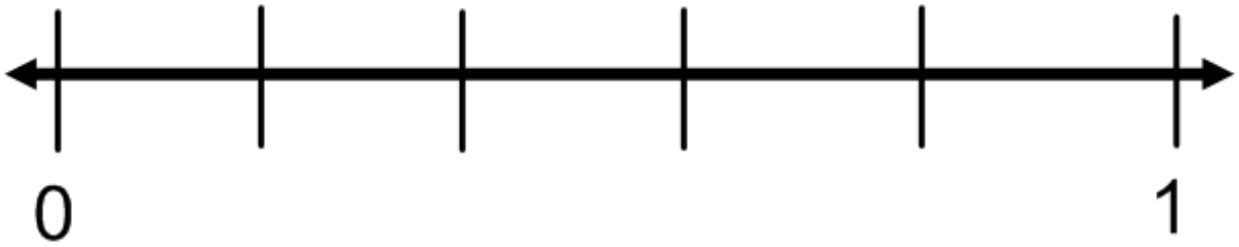


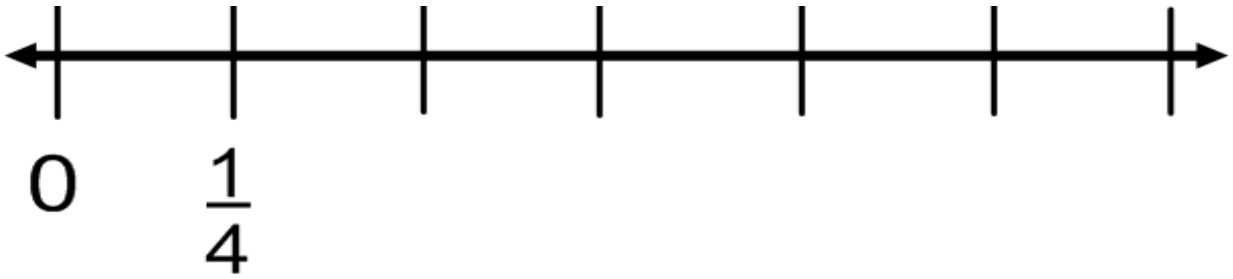


Divide la recta numérica en sextos.

Divide le recta numérica en tercios.

Divide le recta numérica en novenos.

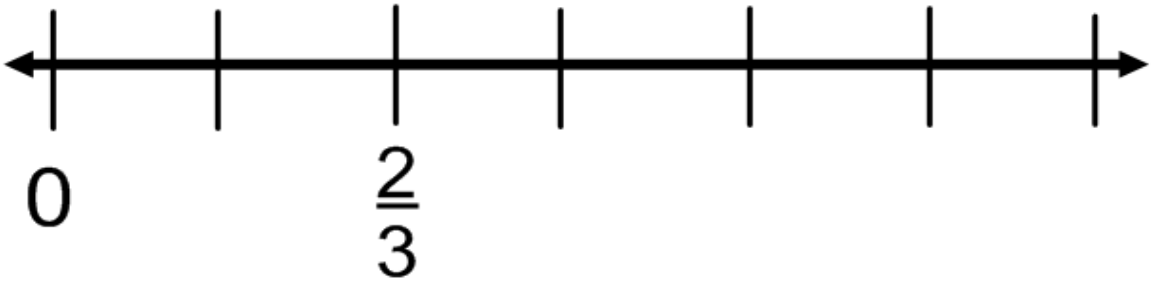


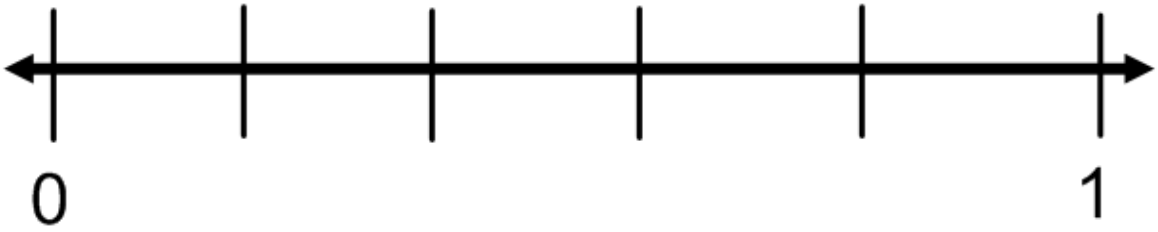


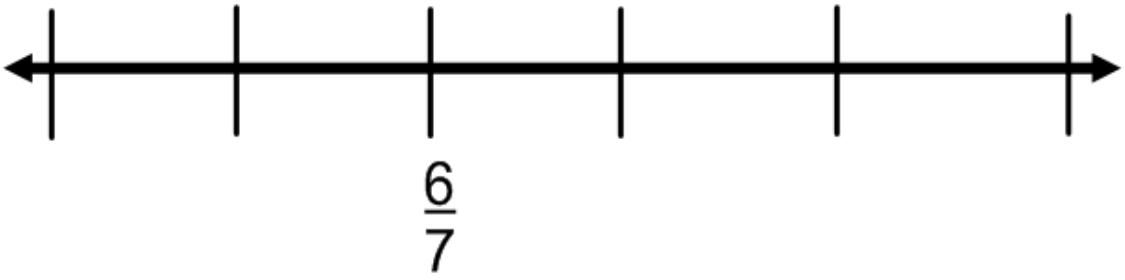
Fraction Number Lines Three

Nombre: _____ Fecha: _____

Escribe las fracciones que faltan.



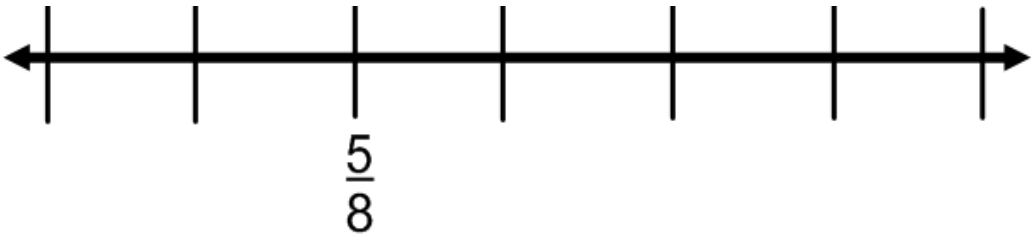


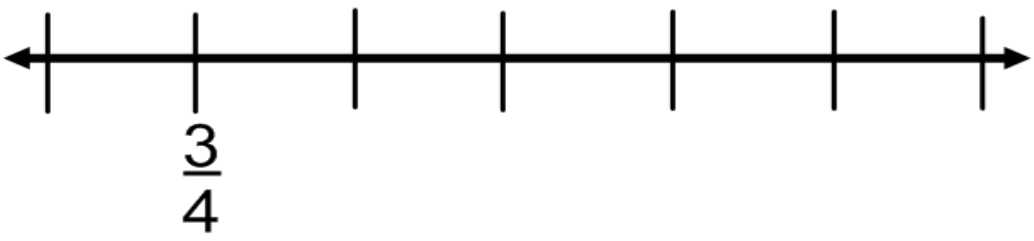


Divide le recta numérica en novenos.

Divide le recta numérica en octavos.

Divide le recta numérica en quintos.





Fraction Number Lines Four

Nombre: _____ Fecha: _____

Escribe tres quintos con dígitos. _____

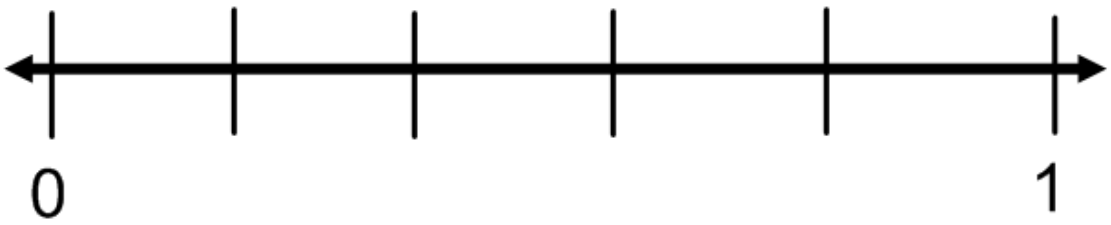
Escribe dos sextos con dígitos. _____

Escribe cuatro novenas con dígitos. _____

Escribe un tercio con dígitos. _____

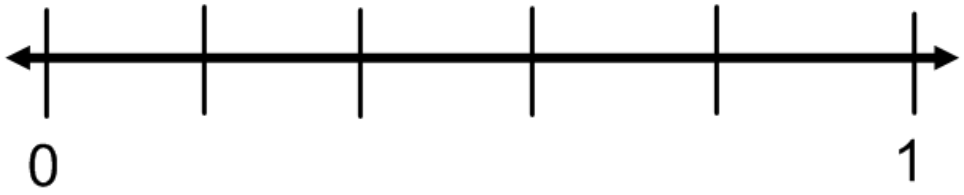
Divide la recta numérica en quintos.

Divide la recta numérica en séptimos

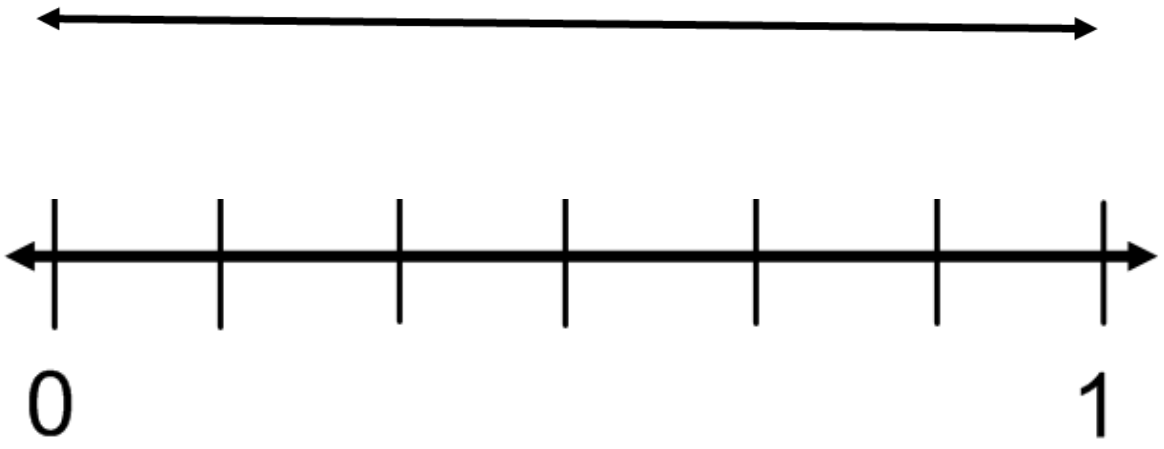


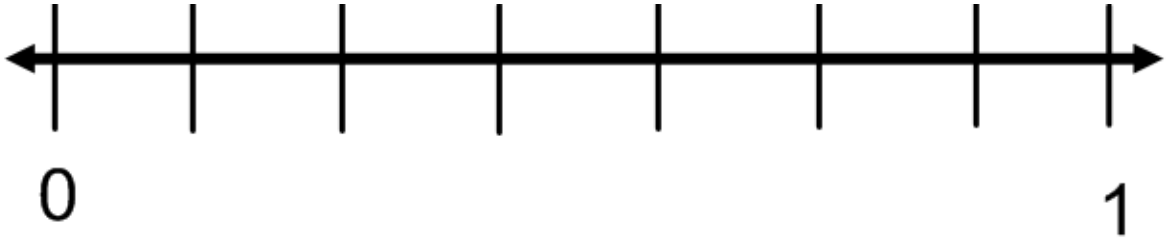
Fraction Number Lines Five

Nombre: _____ Fecha: _____



Divide la recta numérica en octavos.

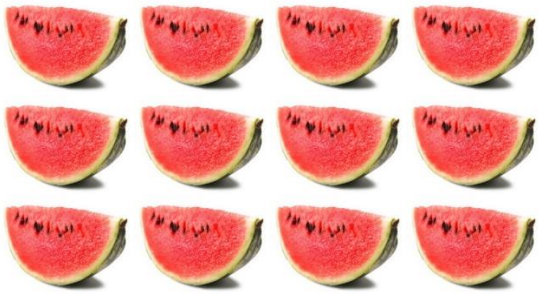
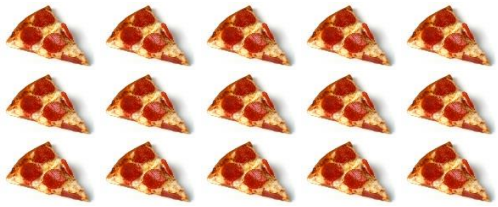
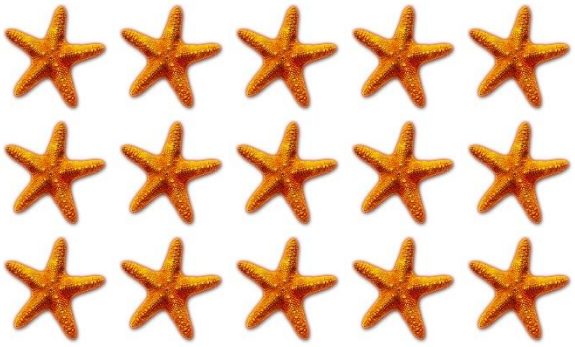




APPENDIX TEN: FRACTION OF A GROUP

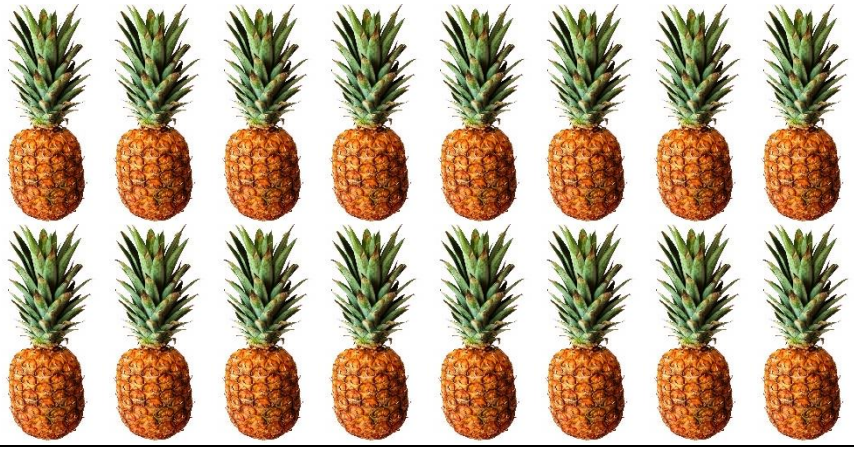
Fraction of a Group: Limes

Nombre: _____ Fecha: _____

¿Cuántos son 1/3 del grupo? _____ 	¿Cuántos son 4/7 del grupo? _____ 
¿Cuántos son 4/5 del grupo? _____ 	¿Cuántos son 1/2 del grupo? _____ 
¿Cuántos son 1/5 del grupo? _____ 	¿Cuántos son 2/3 del grupo? _____ 

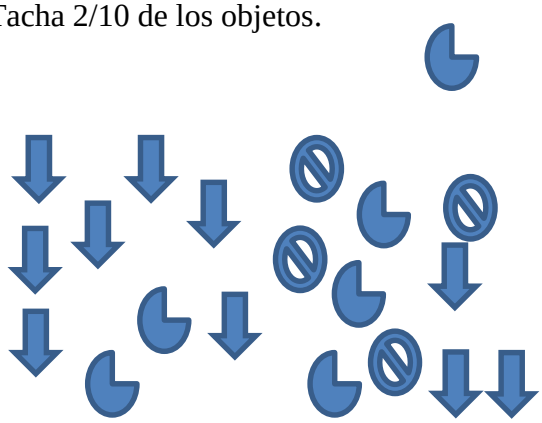
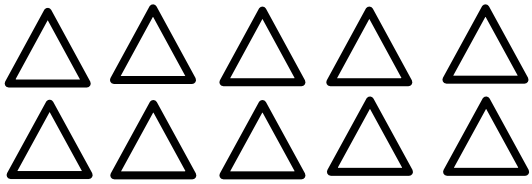
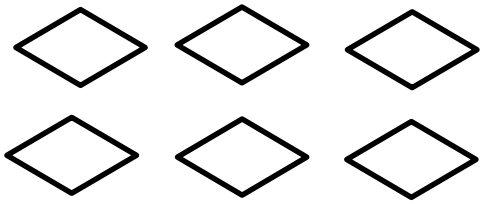
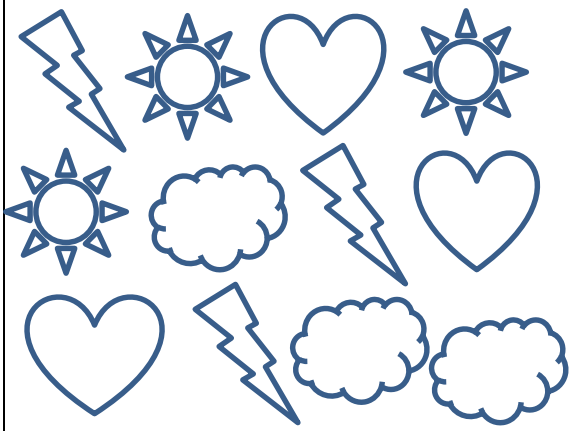
Fraction of a Group: Stars

Nombre: _____ Fecha:_____

¿Cuántos son 6/7 del grupo? _____ 	¿Cuántos son 3/5 del grupo? _____ 
¿Cuántos son 2/3 del grupo? _____ 	¿Cuántos son 2/9 del grupo? _____ 
¿Cuántos son 3/8 del grupo? _____ 	

Fraction of a Group: Arrows

Nombre: _____ Fecha: _____

Tacha 2/10 de los objetos. 	Tacha 3/5 de los objetos. 
Sombrea 4/6 de los objetos. 	Sombrea 2/3 de los objetos. 
Sombrea 1/3 de los objetos. 	Indica ¾ del grupo. 

APPENDIX ELEVEN: WRITING WORD PROBLEMS

Student Written Fraction Word Problems

Nombre: _____ Fecha: _____

Escribe historias de números de fracciones. Usa el banco de palabras para poder ayudarte con la escritura.

compartir	dividir	partes iguales	grupos	cada
fraccionaria	quien	quería	compartía	compartir
quieren	le toca			

Escribe tu historia de números aquí.

Resuelve tu historia de números aquí.	Pide a un compañero resolverla aquí. Nombre: _____

APPENDIX TWELVE: FRACTION WORD PROBLEMS

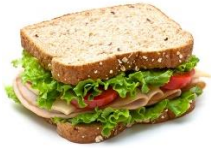
Fraction Word Problems: Karate

Nombre: _____ fecha: _____

Un tercio de la clase de karate pasó su examen para cambiar de cinturón. Había 24 niños en la clase en total. ¿Cuántos niños pasaron su examen de karate? 	Alicia, Anastasia, Ángel y Ana-María juntaron su dinero para comprar dos pasteles en la panadería de la esquina. ¿Cuál fracción de un pastel tendrá cada niño? 
La abuelita de Giovanna le dio 1/5 de los chicles de su bolsa. En total le dio a Giovanna 5 chicles. ¿Cuántos chicles tenía en total en su bolsa? 	En su examen de ortografía Felipe sacó ¾ de las palabras correctas. Había 12 palabras en su examen. ¿Cuántas palabras tenía incorrecta? 

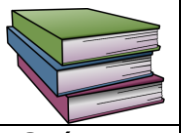
Fraction Word Problems: Socks

Nombre: _____ fecha: _____

Hay una pila de calcetines en el piso. Siete de los calcetines son azules y representan ¼ del grupo. ¿Cuántos calcetines no son azules? 	Tostino, Tolentino, Tomasina y Tatiana compraron tres pizzas para compartir. ¿Cuál fracción de cada pizza puede tener cada niño? 
El tío de Eddie le regaló 1/5 de su sándwich de jamón y queso. ¿Qué fracción del sándwich le quedó para su tío? 	En su examen de ortografía Felipe sacó 3/5 de las palabras correctas. Había 10 palabras en su examen. ¿Cuántas palabras tenía incorrecta? 

Fraction Word Problems: Eggs

Nombre: _____ Fecha: _____

Estella iba a ir a la tienda para comprar huevos. Ya tenía 2 huevos. Era 1/3 de los huevos que necesitaba para su receta. ¿Cuántos huevos van a comprar? 	Jonathan tiene 12 peluches en su cuarto. Va a regalar ½ de sus peluches a su primito. ¿Cuántos peluches tendrá después de regalar los peluches a su primito? 
Ulises, Coni, Ollie y Esmeralda van a compartir un pastel. ¿Qué fracción del pastel le tocará a cada persona si quiere dividirlo en partes iguales? 	Un quinto de la clase de tercer grado fue a ayudar en la clase de kínder. Si seis niños fueron a ayudar en kínder, ¿Cuántos niños en total hay en la clase de tercer grado? 
Mathias tiene 20 cajas de bloques. Regaló 2 cajas de bloques a su vecina. ¿Qué fracción de las cajas de bloques tiene ahora? Nombre: _____ 	

Fraction Word Problems: Cupcakes

Nombre: _____ Fecha: _____

Eduardo, sus tres primos y sus dos hermanos juntaron su dinero para comprar algunos pastelitos. Pudieron comprar dos pastelitos para comprar entre todos. ¿Cuál fracción de los pastelitos recibieron cada persona? 	Un tercio de los niños de la clase de tercer decidieron jugar fútbol durante el recreo. Ocho niños fueron al campo de la escuela para jugar fútbol. ¿Cuántos niños de le clase de tercer grado no fueron al campo para jugar fútbol? 
Osiris tenía diez flores de colores diferentes. Tres flores eran de color amarillo y dos eran de color blanco. El resto de las flores eran del color azul. ¿Qué fracción de las flores eran azules? 	Tres quintos de la clase comieron de la comida de la cafetería de la escuela y dos quintos trajeron comida de su casa. En total había treinta estudiantes en la clase. ¿Cuántos niños trajeron comida de su clase y cuántos niños comieron de la comida de la cafetería? 
Manuel tenía una bolsa de 12 canicas. Perdió 1/3 de las canicas. ¿Cuántas canicas perdió?  Nombre: _____	

APPENDIX THIRTEEN: FRACTION OF A SHAPE

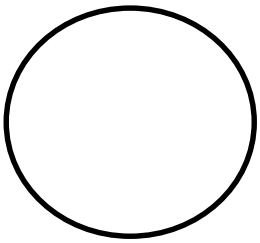
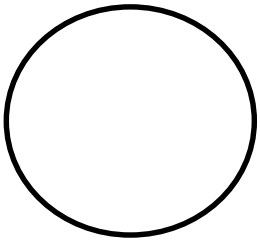
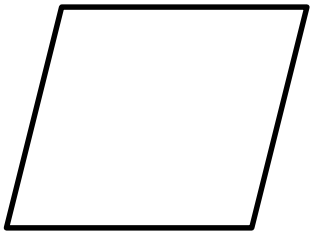
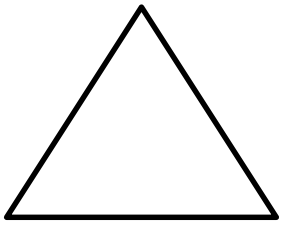
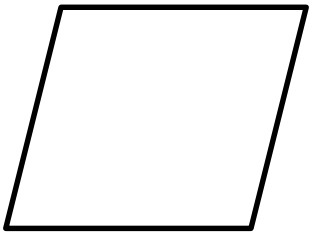
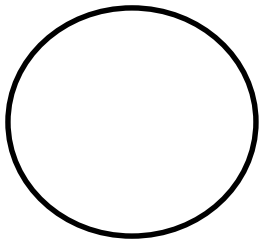
Fraction of a Shape: Rectangles

Nombre: _____ fecha: _____

Divide la forma en cuartos. 	Divide la forma en quintos. 
Divide la forma en sextos. 	Divide la forma en tercios. 
Divide la forma en mitades. 	Divide la forma en octavos. 
Divide la forma en séptimos. 	Divide la forma en novenos. 

Fraction of a Shape: Various

Nombre: _____ fecha: _____

Divide la forma en cuartos. 	Divide la forma en quintos. 
Divide la forma en sextos. 	Divide la forma en tercios. 
Divide la forma en mitades. 	Divide la forma en octavos. 
Divide la forma en séptimos. 	Divide la forma en novenas.