LEVEL UP LEARNING LAB:

STEAM EDUCATION FOR

LOW-INCOME SCHOOLS

by

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DEDICATION

This work is dedicated to my father Perry Horn, Jr., who always encouraged me by saying, "Make A's!"

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ABSTRACT

The United States public education system is deeply segregated and unevenly balanced between socioeconomic classes and race. America's poor and minority students have much lower achievement levels than their affluent peers, especially when compared to other countries around the world. Minority students routinely populate the lowest performing schools in the nation. Racial inequality is evident in graduation rates with far fewer minority students receiving a high school diploma than their Caucasian peers. This paper investigates the causes behind educational inequality in America.

Schools found in these low-income areas typically lack the resources and experienced faculty needed to teach advanced courses in science, technology, and other fields. At the same time, most of these underperforming schools have eliminated the visual and performing arts in order to focus on core subjects like reading and math.

It has been proven repeatedly that the arts are a cost-efficient means of increasing student engagement and achievement levels in many subjects. This thesis proposes a delivery system that brings art education and advanced subjects such as technology and engineering to low-income areas. It devises a cost efficient supplemental education model that is capable of delivering sustainable science, technology, engineering, art, and math (STEAM) education to low-income areas. The overall goal is to reduce the achievement gap that is currently found between low-income and affluent schools by providing resources to those areas where they are needed the most. This project is based on immersive research with community stakeholders and an extensive literature review of

the current state of American public education. It investigates the causes behind educational inequality, offers an analysis of the current data, and describes the best possible local solution to this national crisis.

"Do what you can, with what you've got, where you are."

~ Theodore Roosevelt

I. OBJECTIVE

This thesis is a social design project that addresses a national problem by proposing a local solution. It focuses on the issues facing the American public education system today. It has been developed with community partners including local schools and teachers as well as parents and students in both low-income and affluent communities.

Public schools suffer budget constraints that have forced them to remove "nonessential items" like the visual and performing arts in order to focus on core subjects like reading and math. This approach is known as "back to basics." It has been used extensively in low-income schools for decades. These underperforming and largely underfunded schools can no longer afford courses that have proven to improve student achievement levels. It is precisely these "nonessential items" that make a well-rounded liberal arts education by promoting creative thinking, discipline, and increased engagement in the learning experience. The back to basics approach results in low student achievement levels, high dropout rates, and severely underperforming schools across the nation.

This thesis suggests an approach to help public schools improve their effectiveness at little extra cost. It is based on evidence from other schools and initiatives that have incorporated arts into the basic curriculum. It includes a prototype that schools can use as a template for building their own supplemental education models in order to improve students' learning experiences, particularly in low-income areas.

This thesis also calls attention to the larger problem of inequality between socioeconomic classes and racial segregation within the public education system. It focuses on reducing the achievement gap, i.e. the disparities in academic achievement

that are found in student assessments between low-income and affluent areas within the public education system.

The objective of this project is to bring educational resources to low-income schools where they are needed the most. It will test the participation results of educational activities on a general audience. The anticipated outcome is a supplemental education model that is capable of providing advanced course material in areas that lack the personnel and resources necessary to do so themselves. The largest gains stand to be made in reducing the overall achievement gap by providing these resources to low-income areas. This thesis is based on an extensive literature review and immersive community research. It is data driven and represents the result of a multiyear effort to investigate, interpret, and describe the best possible local solution to a national crisis.

II. THE PROBLEM

Inequalities in the American education system between socioeconomic classes clearly reveal how separate and unequal schools are. International student assessments show disparities between affluent and low-income schools in the United States that are much greater than other countries. These assessments are administered by the Organization for Economic Co-operation and Development (OECD) in the form of a two-hour test to more than half a million fifteen-year-old students, from 65 countries, every few years. The test is called the Program for International Student Assessment (PISA). PISA tests are unique in that they are not linked to school curriculum. According to the PISA website, "The tests are designed to assess to what extent students at the end of compulsory education, can apply their knowledge to real-life situations and be equipped for full participation in society. The information collected through background questionnaires also provides context which can help analysts interpret the results" (OECD).

These international assessments suggest that low-income students in America have much lower performances than their peers globally. Poverty plays a large role in student achievement levels around the world but the results are more distinct in the United States. The lowest performing schools in the nation are found in high-poverty rural areas and inner cities. These schools significantly lower the national average on international rankings because of their high dropout rates and underperforming student achievement levels in general.

The Educational Crisis

The United States of America sits in the middle of international student assessment rankings. In an article written by Megan Coleman she states, "when it comes to math, reading, and science, teens in the U.S. rank 36th in the world" (Coleman). The American public educational system spends far more money per student than any other country. "In 2010, the U.S. spent 39 percent more per full-time student for elementary and secondary education than the average for other countries in the Organization for Economic Cooperation and Development, according to the National Center for Education Statistics" (Cook).

Data from their research suggests that larger budgets do not equal better education systems as poor economies sometimes outscore more affluent societies. "Even our strongest schools are unable to compete globally. Our top students rank below even average students in Shanghai and our best performing state, Massachusetts, ranks lower than 16 other developed nations in math" (StudentsFirst). It is evident in the numbers that the public education system is failing its students despite increased spending. "Students at the 90th percentile in the United States—the very top—are below the *average* student in Shanghai. Top U.S. students scored 600 in math. The *average* score in Shanghai was 613" (Barshay).

It is believed that the American public education system fails to improve on international student assessments because the lowest-performing schools substantially reduce the national average. These low performing schools are located in low-income inner-city and rural areas. "Average scores in the U.S. are dragged down by a large number of poor minority students" according to Education Secretary Arne Duncan

(Coleman). The U.S. has had some measure of success in the past few years. Duncan called it "a profound milestone" when the country reached its highest graduation rate in history (Layton). In fact, 80 percent of students received a high school diploma in 2012. But drastic inequalities between socioeconomic classes, as well as race and ethnicities are clearly visible behind that number.

The Achievement Gap

There is a large disparity in school performance between low-income and affluent schools known as an achievement gap. "It is absolutely true that we have large, troubling, deeply unacceptable achievement gaps in America" Duncan said, "and these gaps are painfully evident on this PISA assessment" (Coleman). These gaps are traceable by race and ethnicities more than sixty years after Brown vs. The Board of Education desegregated public schools. "In many states one-third of students from low-income did not graduate. Black students had a 69 percent graduation rate and Hispanic students had a 73 percent rate, while 86 percent of white students and 88 percent of Asian students earned high school diplomas. English language learners and special education students had below-average rates of 59 and 61 percent, respectively" (Layton).

The achievement gap is found in low-performing schools that serve mostly minority students in low-income areas. "The highest concentrations of these underperforming schools are found in large cities or in high-poverty rural areas. Most of the schools have high minority populations" (AP). Students who live in these low-income areas struggle with a multitude of problems that are associated with poverty.

Poverty

Around the world, poverty has a significant impact on student performances on international assessments, but the disparities that exist in socioeconomic status in the U.S. are more exaggerated when compared to other comparably developed nations and economies. “Socioeconomic disadvantage has a notable impact on student performance in the United States: 15% of the variation in student performance in the United States is explained by students’ socioeconomic status, similar to the OECD average, but with some improvement since 2003. This contrasts with less than 10% in a number of countries/economies, including Finland, Hong Kong-China, Japan and Norway. In other words, in the United States, two students from a different socioeconomic background vary much more in their learning outcomes than is normally the case in these other countries/economies” (OECD).

Poverty creates a culture of low expectations for both teachers and students. “These lowest-performing schools are characterized by high teacher and principal turnover, low levels of trust among adults, significant disciplinary issues, and low attendance” (PCAH). “Disadvantaged students show less engagement, drive, motivation and self-beliefs than advantaged students” (OECD).

Some students exhibit behavior known as resiliency, or the ability to thrive despite socioeconomic setbacks. But again the U.S. is behind other countries when it comes to this measure. “In the United States, 5 percent of students can be considered resilient, meaning that they are among the 25 percent most socioeconomically disadvantaged students but nevertheless perform much better than would be predicted by their socioeconomic status. This is below the OECD average of 7 percent and is only

around one-third (33 percent) of the proportion observed in in Hong Kong-China, Macao-China, Shanghai-China and Viet Nam" (OECD).

When compared to their peers, impoverished students often struggle with social issues such as behavioral problems, risky sexual behavior, and self-directed violence that often carry over into their classrooms. "These factors—a mix of race, poverty and family structures—are associated with a plethora of other problems: lower math and reading achievement, behavioral problems, grade retention, obesity, risky sexual behavior, greater risk of illness, greater risk of interpersonal or self-directed violence. The list is endless and the issues continue through adulthood, creating a cycle that proves difficult to escape for many" (Cook). Poverty plays a large role in measuring academic and personal success. In some opinions this variance can be explained by the fact that America is far more diverse in its population than societies such as Finland and Norway. But diversity should not equal disparities when it comes to public education.

Dropout Factories

One measure of school success is retention rates, that is the number of students enrolled as freshmen who continue to be enrolled the next year. Schools with retention rates of sixty percent or less are often called dropout factories. These schools are typically found in large cities and high-poverty rural areas that serve mostly minority populations. "Minority students represent 57 percent of the population in dropout factories—schools where the senior class has 60 percent or fewer students who entered as freshmen—but only 30 percent of the population in all schools" (Cook). According to a report published in The Associated Press, Johns Hopkins researchers analyzed data from the Education Department and concluded that about 1,700 schools nationwide fail to

retain 40 percent of their students, thus qualifying for the dropout factory label. The data looks at a span of three years to account for student transfers and local events like plant closures that would skew the data (AP).

Students from underfunded and underperforming schools have less access to the resources they need to participate in advanced courses. “Fewer black students have access to a full range of high school math and science courses—algebra I, geometry, algebra II, calculus, biology, chemistry and physics. They are under-represented in gifted and talented programs. Black students take fewer advanced placement classes than white students and score lower on advanced placement tests” (Cook).

Students from low-income areas are more likely to have less qualified and less engaged teachers who lack the resources to deliver advanced subjects. According to a report released by The Education Trust, “low-income students and students of color are about twice as likely as other students to be enrolled in core academic classes taught by out-of-field teachers” (Edtrust). Out-of-field teaching occurs when an instructor leads a course that they have no background in, a history major teaching a math course for example. “On average, schools serving minority populations have less-experienced and lower-paid teachers who are less likely to be certified” (Cook).

The American public education system cannot make progress without acknowledging its shortcomings. Increased spending will not fix the systemic problems described above. Sweeping educational reform is needed in order to improve underperforming schools. The leading economies of the world should also have the most highly qualified workforce, but American public schools are failing to provide their nation with the education it needs to remain competitive in the global economy.

III. CURRENT KNOWLEDGE AND STRATEGIES

Integrating the arts into core subjects is a proven method of improving classroom results. Federally funded programs have done just that. A charter school in Berkeley has had positive results in both affluent and low-income areas. Subjects such as science, technology, engineering, and math (STEM) provide students with theoretical and technological skills, but art education along with those abilities creates critical thinkers and innovative problem solvers. This has led some educators to suggest that a better grouping of these subjects would be: science, technology, engineering, art, and math (STEAM). The resources required to teach these subjects are out of reach for some schools because of lack of qualified faculty and/or necessary equipment and supplies. Projects like the STE(A)M Truck in Atlanta have found a more efficient means of delivering these resources to those schools. The following knowledge and strategies are proven to increase student achievement and engagement levels.

Learning Through the Arts

Fine arts and performing arts are commonly seen as electives to a well-rounded education. “Many parents feel that the study of the fine and performing arts is a nice thing for their children to do, a kind of finishing touch to a good liberal arts education. However, they feel that what prepares their children for the “real world” of college and the work place is the study of traditional liberal arts disciplines such as math or science” (Perrin).

The Center for Arts in the Basic Curriculum has proven that integrating art into core curriculum is a cost effective means of improving educational performances. “Teaching arts every day in the core curriculum of elementary schools is the single most

powerful tool presently available to educators to motivate students, enhance learning, and develop higher order thinking skills" (Oddleifson).

Teaching arts education in conjunction with core subjects creates well-rounded students who are able to communicate and ask question as opposed to dispense predetermined answers. "Music education at the elementary school level appears to be a necessary ingredient for children to realize their potentials in mathematics and reading. Visual arts appear to be necessary for children to realize their potentials in science. Similarly, other arts, such as creative writing, dance or drama, appear to be necessary for development of one's abilities to fully express oneself, whether in writing or in interpersonal communications, both of which are requisite for being an effective member of a highly technological society" (Oddleifson).

Critical thinking skills and the ability to adapt to various situations are essential in the modern workforce. "Schools can no longer train people to do specific tasks; we must educate students in terms of broad skills so that they can function in any number of capacities" (Perrin). Both the subject matter of the visual and performing arts, and the process used to teach those subjects are essential for teaching critical thinking.

Turnaround Arts

The Turnaround Arts initiative is a federally funded program led by the President's Committee on the Arts and Humanities (PCAH). It has improved low-performing schools by strategically integrating the arts into core classroom subjects. The Turnaround Arts initiative "marks the first federal effort to support the use of arts education in the targeted improvement of some of America's lowest performing schools" (PCAH). They have significantly improved reading and math scores by integrating the

arts. “In terms of average improvement, from 2011 to 2014, Turnaround Arts schools demonstrated a 22.55 percent improvement in math proficiency and a 12.62 percent improvement in reading proficiency” (PCAH).

The Turnaround Arts pilot project has also demonstrated dramatic increases in attendance and reductions in school suspensions. Half of the Turnaround Arts schools improved their attendance rates significantly between 2011 and 2014, with an average attendance rate of 91.77 percent. More than half of Turnaround Arts schools drastically reduced in-school and out-of-school suspensions. For example: New Orleans Louisiana experienced a 51.32 percent overall suspension reduction, 81.13 percent in-school suspension reduction between 2011 and 2014. Boston Massachusetts reported zero expulsions in 2014 and an 85.90 percent overall suspension reduction between 2011 and 2014. Des Moines Iowa saw a reduction of 57.14 percent in out-of-school suspensions between 2011 and 2014 and 35.10 percent overall reduction in disciplinary referrals. Portland Oregon had a 70 percent reduction in both in and out-of-school suspensions between 2011 and 2014 (PCAH). The Turnaround Arts initiative proves that the arts can have a measurable and significant impact on campus culture and student results and spark school-wide reform in America’s lowest performing schools.

Studio H

Studio H is a non-profit that focuses on creating an educational experience that promotes design thinking and project-based building. It is a year-round design/build course that operates out of REALM Charter School in Berkeley California. Studio H began as an educational experiment called Project H, which was initially launched in a low-income rural county in North Carolina. “Project H has a core focus on using design

and full-scale building projects to activate public education systems in the U.S. to provide a more engaged learning framework for K-12 students, particularly in rural communities" (CMU).

Through active designing and building, Studio H integrates the arts into core subjects such as English and Math. Studio H has a special initiative to educate teachers on how to integrate the arts into their subjects. "At REALM, Emily is not only in the classroom with students but engaged in training the teachers in using design and project based thinking in any subject" (Colston). According to their website, they have constructed 24 community design and architecture projects, 16 of which were designed and built entirely by youth participants. "These projects include a 2000-foot farmers market, a school library, an outdoor classroom, farmstands, and a tiny home" (Pilloton).

STEM to STEAM Education

The most recent development in STEM education is the introduction of the arts. Artistic creativity is an essential skill for innovation. STEM subjects alone are not sufficient to drive the type of creative innovation necessary to remain competitive in a global economy. By creating the President's Committee on Arts and Humanities, President Obama has become an advocate for arts education, saying "To remain competitive in the global economy, America needs to reinvigorate the kind of creativity and innovation that has made this country great. To do so, we must nourish our children's creative skills. In addition to giving our children the science and math skills they need to compete in the new global context, we should also encourage the ability to think creatively that comes from a meaningful arts education" (Eger). "President Obama's Committee on The Arts and Humanities released a report at the Art Education

Partnership Conference, called *Reinvesting in Arts Education: Winning America's Future Through Creative Schools*. The report, like the work of the National Science Foundation, provides evidence of the important connection between art, culture, creativity, innovation, and the urgent need for a new agenda for reinventing education in America" (Eger). John Maeda, former President of the Rhode Island School of Design (RISD), has written and spoken about the topic of STEAM for many years. Maeda argues that the next generation cannot meet the challenges of the future relying solely on a STEM education. He states, "Innovation happens when convergent thinkers, those who march straight ahead towards their goal, combine forces with divergent thinkers—those who professionally wander, who are comfortable being uncomfortable, and who look for what is real" (Maeda).

Adding the arts to STEM education combines creative thinking and making skills to theoretical knowledge and technical abilities. "Steve Jobs' work is the best example out there of a STEAM approach—the fact that technology and business and art and design intertwined to create something more human…I believe that art can help the economy the same way that Apple has helped the economy, by showing that making things more human makes them more desirable" (Petrilla).

Lastly, the STEAM approach better represents the cross-disciplinary nature of the real world. As Maeda stated when talking about his approach at RISD "I always wondered why art and science were somehow [considered] different, and more recently here as president of RISD, I began to think about art and the relationship from art to all kinds of spaces: government, economics, industry. I noticed that people think innovation comes from the STEM space—at MIT, that's how we used to feel, or at least how I felt

there—but I also wondered about art and how that fits in. I'd be walking around RISD and I'd see so many examples of how a STEAM approach leads innovation. It seemed like turning STEM to STEAM made a lot of sense to talk about" (Britton).

In an Op/Ed in the San Diego Union-Tribune, Harvey White, co-founder of Qualcomm said, "A STEAM-based education system gives a country an advantage, or at least a level playing field, in the innovation race. We need to equip our technologists and leaders with the best training possible and add arts to STEM and put STEAM to work. It's not that we wouldn't still have some innovation without an arts education mandate, it is that we will be competing at a major disadvantage against STEAM-trained opponents in innovating—a critical area relative to our future economy and way of life. We need to get business, government and media to connect the dots between arts education and economic success" (Eger).

The STE(A)M Truck

The STE(A)M Truck is a creative solution that fills a void in STEAM education in the Atlanta area by hosting workshops in low-income schools that lack STEAM resources. The trucks travel from school to school leading full year or twenty-day workshops on STEAM subjects. Each truck carries about twenty thousand dollars worth of equipment in a trailer behind it. The trucks feature both low-tech tools such as hammers and saws, and high-tech equipment like their 3D printer and laser cutter.

The STE(A)M Truck is an efficient means of delivering costly resources to low-income areas. One of the downsides of this model is that there are no leave behind resources. Once the truck leaves, so too does the STEAM education. Like Studio H, they are currently developing a teacher training to go along with the services they offer.

All these programs and others like them have proven to increase student performances in low-income areas by changing their approach to teaching. Both the subject matter of the visual and performing arts, as well as the instruction methods used to teach those subjects are crucial aspects of a well-formed liberal arts education. These measures are cost efficient because they focus on instructional approach rather than additional materials and resources. These examples serve as proof that arts education increases student achievement and engagement levels.

IV. CREATIVE RESEARCH METHODOLOGY

English social psychologist and London School of Economics co-founder Graham Wallas, in his 1926 book *The Art of Thought*, penned the first description of the creative process. He described it as: Preparation, Incubation, Illumination, and Verification. Since then countless others have re-describe the creative process as a similarly tidy line from beginning to end. Hugh Dubberly describes the process as a series of interconnected loops. These loops form a repeating cycle of design prototypes and testing (see Figure 1). This thesis follows Dubberly's model.

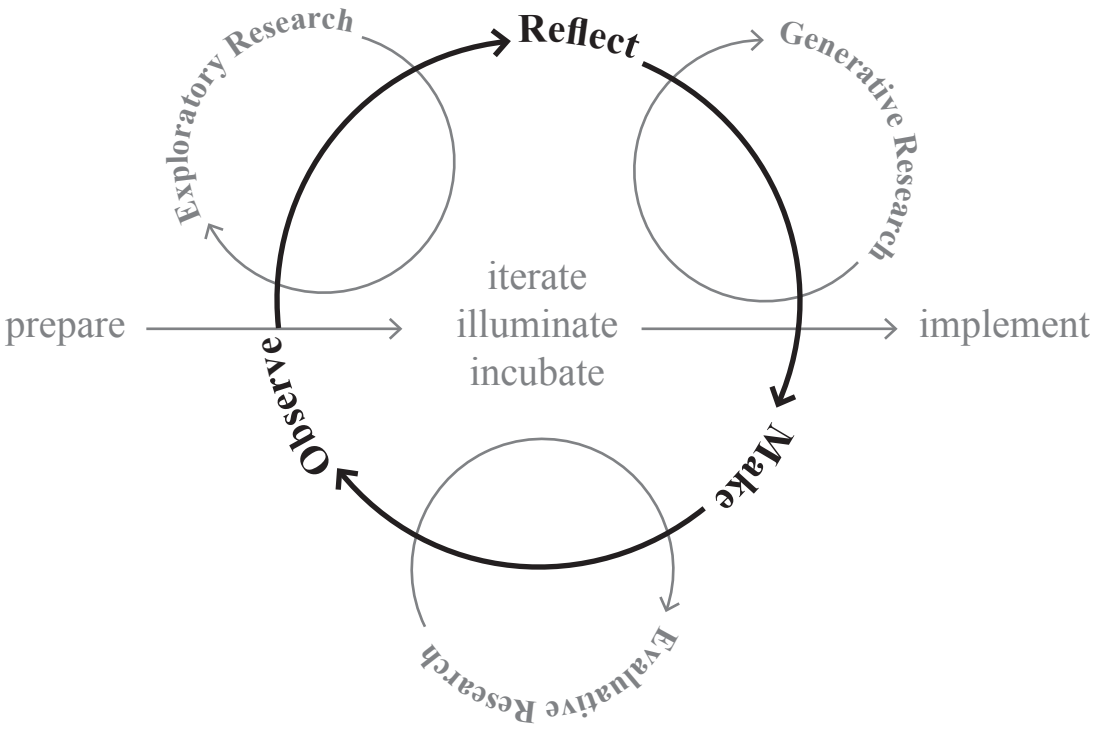


Figure 1. Hugh Dubberly's Model for the Creative Process.

There are three basic steps in Dubberly's creative process; they are Observe, Reflect, and Make. These steps are similar to other creative and business models such as Research, Development, and Execution. The key difference is that the Dubberly process

is a loop and not a line, implying that the process is continuously developing. The creative process can start at any step and at times may jump back-and-forth between steps. There are also three research phases between each step; they are Exploratory, Generative, and Evaluative research. This thesis began with observations of educational trends and conversations with community partners. A supplemental education model was conceived of that was capable of delivering sustainable STEAM education to low-income areas.

Step 1: Observe

This project began with observations and conversations with educators in the public education system from both affluent and low-income areas. Events such as the Designs on eLearning Conference provided opportunities to attend lectures on social design topics by Jon Kolko, founder of the Austin Center for Design (AC4D). The AC4D is an educational institution that transforms society through design and design education. Larger events such as South by Southwest Interactive brought Emily Pilloton from Studio H to lecture about her work transforming communities through design education in low-income areas.

Several affluent and low-income institutions were contacted to start a dialog with various educators, students, and parents who were interested in this research project. An understanding of community cultures was established through site visits and interviews with teachers and students. A meeting was arranged with Julie Ahn to discuss potential partnership opportunities. Ahn teaches at a public middle school in Austin called KIPP in a low-income, majority Latino area. The discussion at the meeting centered around the shortcomings of her branch of KIPP, compared to other branches and public schools;

specifically the lack of computer science and technology in her school, student's and parent's busy schedules, issues of poverty, English as a second language, and other factors that have an impact on public education. These early conversations focused on a potential solution to fill a void in computer science at that school.

Meanwhile, a parent of a gifted eleven-year-old student from an affluent public school contacted her daughter's technology teacher, at Highland Park Elementary school and several other contacts at an affluent branch of KIPP Austin. The parent and her daughter were interviewed together, and her daughter's technology teacher, Roger Steel, was interviewed at his technology lab at the Elementary school (see Figure 2). In the course of conversation it was shown that Steel utilized online resources to teach his courses. Most of which were free or paid for entirely by the school district. He also initiated several creative student-led projects that involved various disciplines. Students wrote, recorded, and edited their own music as well as writing, shooting, and editing their own comedy shows to host on webpages that they built themselves. Steel stated that he had started doing these types of projects at his old elementary school, an underperforming school in a low-income area of Austin, before moving to Highland Park Elementary.

Figure 2. Technology classroom in an Affluent Elementary School.

Public schools that have successful technology programs use various platforms to teach computer science to their students. Many of these are free. One of the most popular is Code.org, a non-profit that works to increase access to computer science education and pushes participation by women and underrepresented students of color. Many others also utilize initiatives designed to address the same problem, such as the recently popular hashtag campaign #kodewithkarlie started by the supermodel Karlie Kloss. Her purpose is to provide coding scholarships to high school girls.

Some insights gleaned from this research included: Student school days are long and exhausting. There is very little time left at the end of the day to introduce new subjects. Students are interested in and capable of coding in early childhood education. Students form opinions about what they are good at and what they are bad at in early childhood education. Less affluent schools could utilize the same resources that others

schools use to teach their programs. Kids are naturally creative makers. Students are more engaged when they are getting to be creative and learning through making.

Exploratory Research

An extensive literature review and research into the current state of the public education system revealed huge disparities between socioeconomic classes, particularly when compared with other countries. Problems such as the achievement gap and dropout factories were undeniably evident on international student assessments. The core cause of these issues where examined with the community.

Step 2: Reflect

Several questions were addressed in this phase. The project began by focusing on the lack of computer science education in American schools but the problem turned out to be a symptom of a broken system. There were several organizations already tackling the lack of computer science in education. A substantial contribution to the conversation would need to look beyond the symptoms in order to address the problem on a larger scale. The main question became, why do disparities between socioeconomic classes exist in the public education system?

Generative Research

This is the main ideation phase. Various solutions were proposed and discussed with community partners in an attempt to build a shared understanding of the desired situation. What does the ideal solution look like? Several attempts to create a solution were initiated that addressed various problems as the focus of the research shifted from lack of computer sciences to larger disparities within the system. Early solutions centered on creating an afterschool program to teach coding in low-income schools. The next idea

proposed was a summer camp where the material could be delivered more effectively over the course of a three-week workshop. The focus eventually shifted from computer science to STEAM learning and ways to construct a lab for low-income schools.

Step 3: Make

The make phase involved creating the STEAM curriculum that could be implemented in low-income schools for little extra cost. All the materials were designed in conjunction with educators and students that could utilize existing resources already available in most schools. Various STEAM activities were created as well as a system for delivering those resources via a working prototype. The final design solution was the creation of a learning lab capable of delivering sustainable STEAM education to low-income schools.

Evaluative Research

Evaluative research was used for testing the participation rates of the activities created. It highlighted where plans failed to obtain the desired results and areas that needed to be reworked in order to obtain the highest participation levels possible.

As the Dubberly Model suggest, this process is not complete at the end of the evaluative research phase. It begins again with further observations and analysis, followed by more refined iterations of the prototype. This endless and messy cycle is a positive step toward educational reformation in American.

V. DESIGN OUTCOME

The objective of this project is to bring educational resources to low-income schools. The following solution is a supplemental education model that is capable of sustaining STEAM education in areas that lack the personnel and resources necessary. It is based on other successful initiatives that have a similar approach. This model is a cost effective means of delivering STEAM education.

The following prototype can be used as a template for building similar supplemental education models in order to improve students' learning experiences, particularly in low-income areas.

The solution is called the Level Up Learning Lab (see Appendix A). It consists of various activities that take place at individual stations. Each station focuses on one of the STEAM subjects, but all of the stations integrate art and as many other subjects as possible. The stations are labeled with the name of the STEAM subject and information about the topic. They also include worksheets with instructions on how to participate (see Appendix B). These worksheets were used to test the participation results of the activities.

This setup was constructed from donated objects for less than fifty dollars in total expenses. The activities are designed to be easily understandable and self-paced so participants need minimal guidance. Keeping the stations self-paced ensures that participants are actively engaged and remain in control. Various disciplines have been worked into each station with additional emphasis on the arts (see Table 1). It is less important to mimic this setup exactly than to adopt the idea of integrating the arts into engaging, self-paced, hands-on STEAM activities.

Table 1: Cross-disiplinary Station Matrix.

	Science	Technology	Engineering	Art	Math
Science Station: *Microscopic Art*	x	x		x	
Technology Station: *Code a Game*		x	x		x
Engineering Station: *Earthquake Shakedown*			x	x	x
Art Station: *The Art of Handwriting*			x	x	
Math Station: *More to Math*			x	x	x
Music Station: *Make Some Noise*		x		x	

The following is a description of the Level Up Learning Lab's objectives, concepts, materials used, production methods, and expectations. This prototype was setup as a participatory exhibit in the Texas State University gallery, which is located in the Art and Design Building on the Texas State campus. The participation results were analyzed in the evaluative research phase for improvements.

Level Up Learning Lab Overview

1.) Objective: The Level Up Learning Lab's objective is to create a do-it-yourself learning lab capable of providing STEAM subjects for low-income schools at minimal expense.

2.) Concept: The idea behind the lab is to improve achievement and engagement levels by exposing participants to STEAM subjects who might not otherwise have the opportunity.

3.) Materials: The lab is constructed from found or donated resources and built within available space. This prototype was constructed for less than fifty dollars.

4.) Production: A Level Up Learning Lab was hosted in the Texas State University Art Gallery. Six stations were created, each focusing on one of the five STEAM subjects, plus a bonus (music) station that was intended to attract visitors from within the community by giving away an electric guitar. An email announcing the arrival of the Level Up Learning Lab, and the guitar giveaway, was sent to friends and colleagues in the area, and circulated on online social networks.

5.) Expectations: Participants were expected to engage in the self-paced and unintimidating, yet engaging hands-on STEAM activities.

Science Station: Microscopic Art

1.) Objective: Participants were given a microscope to study details of common everyday objects that cannot be seen with the human eye.

2.) Concept: The underlying structure of objects can be studied with simple microscopes, revealing a world that was once too tiny to observe. The intention of this station was for participants to see common objects in a new way by scientifically observing the details through a microscope.

3.) Materials: A microscope was borrowed from a fellow graduate student. The scope worked well at low magnification but poorly at high magnification. A set of prepared slides was purchased for less than ten dollars from a local teacher's shop. It contained slides of dyed fibers, cork, human hair (curly and straight), tobacco, and the letter "e." There was also a desk lamp placed nearby to illuminate the slides. A worksheet was

provided along with instructions to pick a zoom level, focus the scope and draw what the participant sees. Colored markers, pencils, and crayons were placed beside the worksheets for participants to use. A submission box was placed on the right-hand side of the setup to collect the worksheets.

4.) Production: The microscope was setup on a desk with the lamp close by to light the scope's mirror. One slide was left in focus and the others were placed for use in a box nearby. One worksheet was already filled out and submitted as an example for others to follow.

5.) Expectations: In spite of the difficulty of operating a microscope, expectations for this station were high. The desk lamp used to illuminate the mirror drew a lot of visual attention, like a spotlight, and the colorful crayons and markers made it inviting and approachable. Participants who have rarely or never used a microscope may have trouble locating the objects on the slide and getting them into focus or lighting them correctly with the lamp and mirror.

Technology Station: Code a Game

1.) Objective: The objective of this station was to introduce participants to block level programming by having them walk through a tutorial that teaches them how to build and navigate a Minecraft videogame world. Minecraft is a popular video game about placing blocks to build anything you can imagine.

2.) Concept: The idea behind this station was to introduce participants to programming in small lessons that build upon each other. The tutorial interface played like a game with users choosing a character, and programing him/her to respond to their environment. At

the end of the lesson users were able to create their own Minecraft world and navigate around it.

3.) Materials: A desktop computer with Internet access and a browser opened to the online interactive platform, Codecademy, a service which offers free coding classes in nine different programing languages. No accounts were necessary to complete this exercise. Worksheets were stacked next to the computer with a submission box.

4.) Production: Codecademy has a series of hour-long lessons designed to introduce coding in short projects. A desktop computer was opened to Codecademy's Hour of Code Minecraft lesson. The lesson began with the creator of the Minecraft game, Markus "Notch" Persson, explaining the importance of programming and how to play the tutorial. Participants were instructed to walk through the tutorial, which would take about 45 minutes to an hour, and take a screenshot at the end of their session marking the time on their worksheet for keeping accurate participant records.

5.) Expectations: The computer used had a large screen that drew a lot of attention. Recognition of the Codecademy interface and the popular Minecraft characters were also expected to attract participants familiar with the game. Participants may struggle to record their results correctly due to the multiple steps needed to take a screenshot. Also the screen needs to be manually reset to the start of the activity between participants, which could cause confusion.

Engineering Station: Earthquake Shakedown

1.) Objective: The purpose of this station was to introduce participants to Civil Engineering principles through a playful activity.

2.) Concept: Participants learn through building structures out of simple materials and then testing the integrity of those structures by shaking them vigorously.

3.) Materials: Structures were built using toothpicks, various soft candies, and small marshmallows. Markers and worksheets were also provided with a submission box.

4.) Production: Soft candies and marshmallows were placed in bowls alongside boxes of toothpicks. The worksheets instructed participants to draw the structure they planned on building and then build it on top of their worksheet. They were then asked to trade structures with a friend and shake them forcefully to see which structure survived the longest, marking the damaged area(s) on their worksheets.

5.) Expectations: Low task difficulty made for high expectations for this station. The colorful candy was expected to draw participants who wanted to snack.

Art Station: The Art of Handwriting

1.) Objective: The objective of this station was to build basic artistic skills such as hand-eye coordination.

2.) Concept: The art of handwriting is becoming more obsolete in the digital age, as are hand skills. The idea behind this station was to practice hand skills by practicing elaborate penmanship and calligraphic techniques that were popular in England in the 1700s.

3.) Materials: A calligraphic pen and ink set was provided along with standard felt tip markers and worksheets that featured an alphabet set in an ornate script based on the handwriting of English Penmaster George Bickham. The Adobe Company created

Bickham Script Pro based on the handwriting of George Bickham. It is a well-designed typeface that is similar to handwriting taught in some elementary schools.

4.) Production: Worksheets used the alphabet set in upper and lowercase letters in Bickham script. The entire alphabet was set three times on the back of the worksheet at diminishing levels of opacity. Participants were to practice tracing their initials over the letters provided until they were able to do it from memory. They were then to flip the worksheet over and draw their initials at large scale in the English Roundhand style of writing as practiced on the back of the page.

5.) Expectations: Expectations for this station were initially low due to the sophistication of the English Round Hand script that participants were asked to use. It was thought that the activity would prove intimidatingly challenging.

Math Station: More to Math

1.) Objective: The objective of the More to Math station was to help develop a concrete basis for fundamental math skills by making the concepts taught therein more visible.

2.) Concept: The ability to picture mathematical concepts such as fractions and square numbers in simple physical block form can help visual learners who may otherwise have difficulty grasping abstract mathematic concepts.

3.) Materials: A box a various Lego® building blocks was borrowed from a local special education teacher. Worksheets were created using instructions from the curriculum that Lego® created called *MoreToMath,* which uses the blocks to teach math skills in an intuitive, hands-on, mentally stimulating way that sparks creativity and helps students visualize arithmetic problems. Lastly, an inbox was provided to submit worksheets.

4.) Production: A tub of blocks was placed on a table beside a stack of worksheets from lesson one of the Lego® *MoreToMath* curriculum. Participants were instructed to build a snake out of blocks noting the number of blocks used as well as the total number of studs. They were then asked to construct the longest snake possible. A demonstration of how fractions and square numbers work was also presented using the blocks.

5.) Expectations: Nostalgia and familiarity with the colorful Lego® blocks was expected to draw participants who wanted to build.

Music Station: Make Some Noise

1.) Objective: The goal of this station was to make practicing and learning to play guitar easier. Learning to play can be frustrating for beginners because of the time it takes to build finger strength and memorize notes, chords, and scales.

2.) Concept: Participants learned to play guitar with little or no experience in a fun gaming environment using a video game called Rocksmith®. This video game claims to be the fastest way to learn guitar or bass guitar in just 60 days. Their website claims over 3 million people have learned to play using this method. It works on multiple platforms such as PC or MAC computers and various Playstation® and Xbox® gaming consoles.

3.) Materials: A junior guitar was donated to the Level Up Lab and the Playstation® 3 and Rocksmith® video game were provided from home. They were connected to a television monitor, and a clipboard with a high scores contact sheet that was affixed to the TV stand.

4.) Production: The Playstation® 3 was hidden behind the TV stand and the controller and guitar were placed beside the TV along with a set of headphones to make the station

more audibly private. Participants were to select a song from the Rocksmith® song bank and perform it, then write down high scores and contact information for a chance to win the competition guitar.

5.) Expectations: The competition guitar giveaway was used as a promotional item to entice visitors from within the community. The guitar and monitor were strategically positioned to be clearly visible from the entrance. The large screen graphic interface and presence of players was expected to draw lots of attention.

Evaluative Research Analysis

The objective of the evaluative research phase is to show places where plans failed to obtain the desired results. Analyzing the data showed areas that needed modification(s) in order to obtain higher participation results. The following observations are from the Level Up Learning Lab that was exhibited in the Texas State Art Gallery over the course of five days in Spring 2016 (see Appendix C). The following observations were deemed noteworthy.

Level Up Learning Lab

1.) Observations: The Level Up STEAM Learning Lab participatory exhibit gained a large amount of traffic on opening night. Every station was being used. Many observers were meandering throughout the space reading the signage and waiting for their turn to participate in an open station (see Figure 3).

Figure 3. Level Up Learning Lab Prototype in the Texas State Art Gallery.

2.) Evaluation: There were a total of 63 filled out worksheets collected at the end of the five day exhibit (see Appendix D). The popularity of the six stations were noted on the bottom of the station worksheets and are as follows from most to least popular: Art, Engineering, Math, Science, Technology, and Music (see Table 2).

Table 2: Worksheet Participation Results.

	Science	Technology	Engineering	Art	Math	Music
Marked	7	4	11	32	10	3
Unmarked	11	12	7	4	8	-
Positive Feedback	4	1	6	9	6	-
Negative Feedback	2	0	0	0	0	-
Popularity Ranking	4	5	2	1	3	6

3.) Analysis: Participation level on opening night was very high. One third of the worksheets were submitted on opening night. The rest of the time the gallery was mostly empty which made for a much quieter and private environment for participants visiting during these hours. Some stations yielded surprising results in popularity (Art, Engineering and Math) while others needed modifications in order to achieve their desired goals (Technology and Music).

Science Station: Microscopic Art

1.) Observations: The science station was the first station most participants encountered upon entering the Level Up Learning Lab (see Figure 4). Lots of participants appeared interested in using the microscope, but some had difficulties operating the instrument and locating objects on the slide. Some participants reported not being able to see anything at all. One slide was broken during the exhibition, it was accidentally crushed while trying to find and focus the slide.

Figure 4. Science Station Setup.

2.) Evaluation: Seven filled out worksheets were collected from this station with four having positive feedback, and two having negative feedback.

3.) Analysis: Three participants drew artistic renditions of the objects they observed. Two participants noted on their worksheets that they couldn't see any of the objects. An easier to use microscope for finding and focusing objects would yield better results.

Technology Station: Code a Game

1.) Observations: The technology station was often empty during the exhibit or visited for only a short while. Much of the time the computer screen was deserted in the middle of the tutorial causing confusion for the next participant upon approaching (see Figure 5).

Figure 5. Technology Station Setup.

2.) Evaluation: There were only four worksheets collected, one of which had a positive review. There were no negative reviews.

3.) Analysis: The digital nature of the station made it difficult to track results on the worksheets. The 45-minute tutorial proved too long for an art gallery exhibition. Participants seemed to move on after about ten minutes. Visitors in other settings might expect to be there for a longer duration than a visitor to an Art Gallery.

Engineering Station: Earthquake Shakedown

1.) Observations: This station was one of the most popular and visibly appealing of all. It was located in the middle of the lab and participants left their sculptures fully built on top of their worksheets on the table that shared space with the art station (see Figure 6). By

the end of the exhibition there was so many structures left that the engineering station had almost completely overtaking the art station.

Figure 6. Engineering Station Setup.

2.) Evaluation: A total of eleven worksheets were collected with six having positive reviews and none having negative reviews.

3.) Analysis: The activity was engaging with all structures surviving at least somewhat intact. The large number of structure overtaking the table clearly showed that participants enjoyed the activity (see Figure 7).

Figure 7. Engineering Station Overtaking the Art Station.

Art Station: The Art of Handwriting

1.) Observations: The art station was very popular from the beginning of the exhibition with most participants choosing to use the pen and ink set over the felt tip markers. Some worksheets were highly marked while others had hardly been used (see Figure 8). Many participants practiced more than just their initials. Some also wrote their full names and sentences as well as numbers, shapes, and random words.

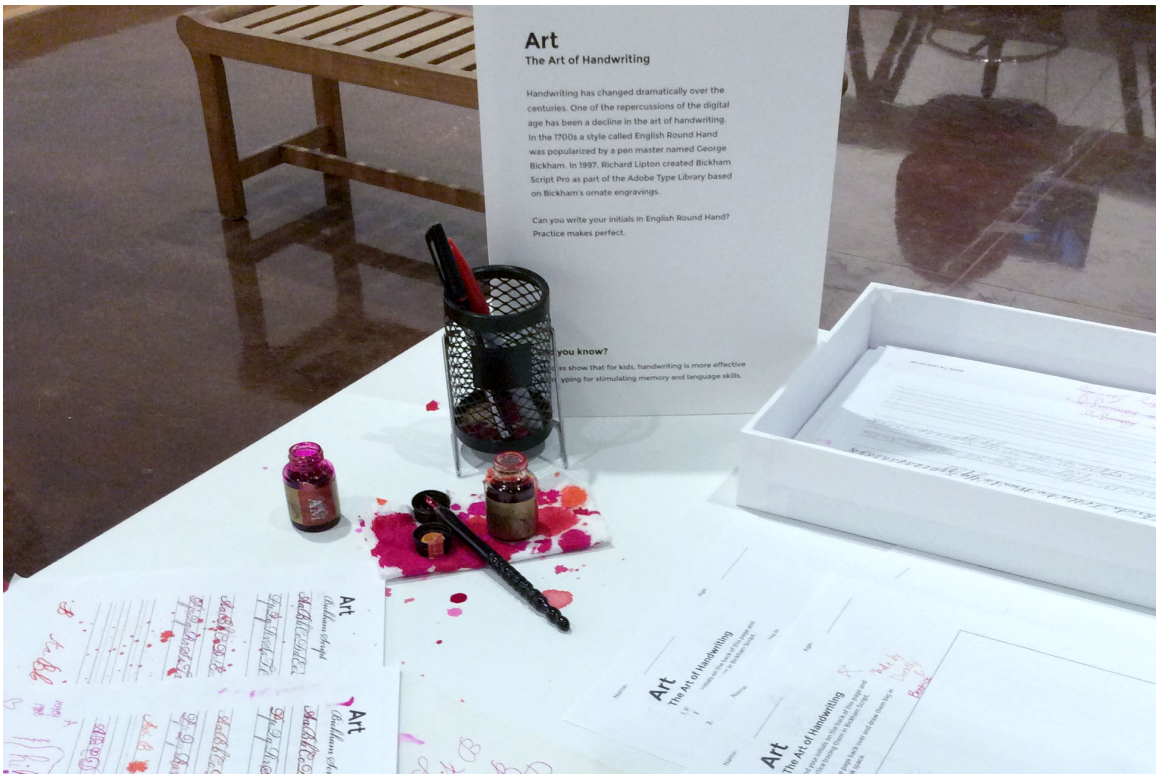


Figure 8. Art Station Setup.

2.) Evaluation: A total of 32 worksheets were collected at this station with nine having positive feedback and none having negative feedback.

3.) Analysis: The location of this exhibit in an art gallery may have influenced the popularity of this station over what would be found at a low-income school environment because artist have more experience with drawing graceful lines in pen and ink. Many of the sheets appeared to have been filled out by participants who were practicing on multiple worksheets. The tabletop was covered in paper to protect the surface from ink. This surface was also highly decorated with English Roundhand by the end of the week.

Math Station: More to Math

1.) Observations: Participants seemed attracted to this station with the motivation of playing (see Figure 9). Participants went beyond the worksheet instructions and built elaborate structures with the unused blocks that grew bigger and more detailed over the week.

Figure 9. Math Station Setup.

2.) Evaluation: A total of ten worksheets were collected at this station with six having positive feedback and none having negative feedback.

3.) Analysis: Some participants were confused by the instruction while others found creative ways to work around the limitations of their materials. A few participants built elaborately long snakes the longest being 256 studs. One creative participant took a literal

interpretation of the instructions “Use the worksheet…” and drew a snake on the back of their worksheet, then strategically ripped the paper to form a snake.

Music Station: Make Some Noise

1.) Observations: This station had some visitors and lots of observers but very low participation overall (see Figure 10). The idea of playing guitar in a public space seemed intimidating to those not familiar with the game, particularly on opening night while the gallery was busy. The cords for the headphones and the guitar regularly tangled with the strap of the guitar causing visible frustration.

Figure 10. Music Station Setup.

2.) Evaluation: There were only three total submissions for this station. A few other participants had played at least part of the game but most failed to record their scores or finish the level (i.e. song).

3.) Analysis: This station had the lowest performance of all. The game interface itself was hard for inexperienced players to navigate. Midway through the week the Playstation® 3 was found frozen preventing any participation. It was unclear how long the system had been down but was estimated to be around 24 hours. The winner of the contest outscored second place by a huge margin of 59,319 points with a high score of 71,330. Interestingly, the highest score submitted was not the highest score played. The highest score recorded by the video game was over 90,000, but that score was never submitted for the contest. This suggests someone was playing the game but not interested in participating in the contest or content to comeback and replay if another contestant challenged their score.

Modifications to Proposed Setups

The following stations had poor participation results based on the collected worksheets. The following modifications to the lowest preforming stations will improve participation levels.

Science Station: Microscopic Art

Participants who were unfamiliar with microscopes had a hard time finding the objects. Some voiced their frustrations on their worksheets. Using a simpler microscope or limiting users to a single slide to prevent them from needing to refocus would be a solution to the problem.

Technology Station: Code a Game

Users of this station would benefit from knowing the duration of the tutorial before they begin, wall signage should be updated to indicate the average time it takes to complete the tutorial so participants know what to expect. Furthermore, the computer could be programed to refresh to the introduction video when the computer is idle, to prevent users from starting in the middle of the lesson or users could create accounts to keep track of their progress online.

Math Station: More to Math

Additional lessons from the *MoreToMath* curriculum should be added to extend this activity. The Lego® *MoreToMath Core Set 1-2* curriculum should also be included with the Learning Lab.

The Level Up Learning Lab solution is a step in the right direction for providing cost-efficient and sustainable STEAM education. Level Up labs implemented in low-income areas can reduce the achievement gap by increasing student engagement in public education. The Level Up Learning Lab model can be expanded to better meet its educational reformation goals. These ideas are described in the next section.

VI. CONCLUSION

The Level Up Learning Lab is an effective and efficient tool to drive school-wide reformation in underperforming schools. But, this supplemental education model needs to be widely implemented in the lowest performing schools in order to accomplish its goal of reducing the achievement gap on a national level.

This project's design process is continuously repeating, as explained in the methodology section of this paper. The next step is to remake the materials that were previously tested for further improvement and expansion. The activities at each station can be expanded to include numerous educational options. For example, in addition to the microscope, the science station should have a variety of experiments with various levels of complexity for participants to choose from. Similarly the technology station can utilize other platforms to teach participants more programing languages besides HTML and CSS such as Python, JavaScript, Ruby, PHP, and others. Other engineering topics could be explored like electrical and mechanical engineering projects that utilize robotics for participants to build and program. The art station can easily be expanded to include different type of art projects and materials to work with, for example, paints or sculpting materials. The math station should be expanded to include more advanced lessons that utilize the visual mathematics approach. The sixth bonus station should be reserved to rotate subjects that are not related to STEAM such as drama, philosophy or foreign languages.

After remaking these materials they should be retested, starting the design process over again. The results should be observed and evaluated on demographics across a much wider sample pool. The two initial demographics that should be tested are primary

education (ages 5-11) and secondary education (ages 12-18). Once these evaluations are completed further refinements should be made to customize the activities and materials for specific demographics.

These newly reworked activities can then be assembled into a Level Up Starter Kit with instructions on how to assemble a Level Up Learning Lab. The digital kit would include all the instructions and methodology, as well as worksheets and materials needed for each station. A physical kit could also be assembled containing all the equipment needed to construct the prototype described in the previous section, including a microscope and slides, $29.50; Lego® *MoreToMath Core Set 1-2*, $59.95; toothpicks and candy for the engineering station, $10.00; colored pencils, $3.25; and a pen and ink set for the art station, $17.03. This basic setup would cost $120.00 (see Appendix E). Other expansion packs would include more expensive resources like expanded *MoreToMath* programs or programmable robotics and electronics kits. Expanded packs would be sold at additional costs.

All of these resources need to be made readily available to the public. A Level Up website would be the next step in implementing this system (see Appendix F). The website would provide free access to download the digital starter kit. The website would also allow visitors to purchase the physical starter kits that include all the equipment needed or expansion packs for their existing Level Up Lab. Social media channels would help promote the brand and allow fans to share resources and ideas from one lab to another. Hashtag campaigns can be utilized in order to build brand awareness through brand advocates and promote special competitions. Level Up Labs can compete against one another to create projects that create positive social change in their community.

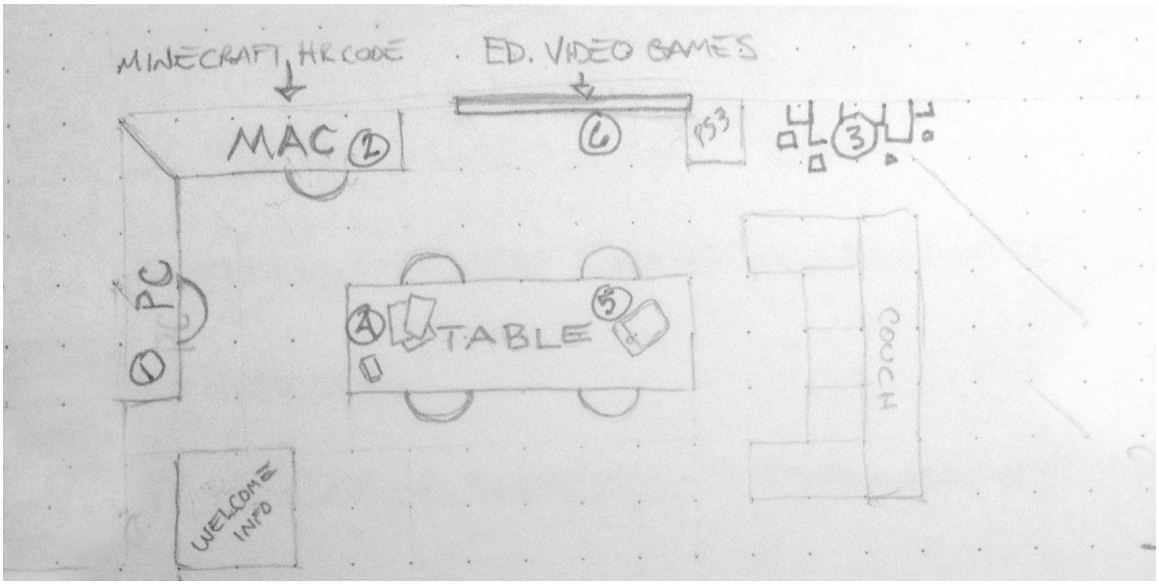
Participants could win additional STEAM equipment for their own Level Up Lab, or a chance to have a high-tech mobile STEAM Truck (similar to one described in the established knowledge section of this paper) bring additional resources and hold a workshop at the winning location to help participants build their project(s).

It has been shown that art education increases student engagement in both affluent and low-income schools and improves academic achievement. Art education integrated with core subjects has proven to increase math, science, and reading scores and have a positive impact on graduation and retention rates. The Level Up Learning Lab is a tool designed to initiate school-wide reform in America's lowest performing schools by following this model. The public education system stands to gain the most ground by focusing on bringing the lowest performing schools up to acceptable achievement levels. If this program, and others like it, can be integrated into underperforming schools and low-income communities across the nation, the cumulative effect will have a significant impact on reducing, and eventually closing, the achievement gap between affluent and low-income schools. The Level Up Learning Lab will bring attention to the educational crisis in America and begin the initial steps of a steep climb to fix a broken system.

APPENDIX SECTION

APPENDIX A: LEVEL UP LEARNING LAB SETUP


LevelUp
Mobile Learning Lab
STEAM Education for Low-Income Schools


MINECRAFT, HR CODE
ED. VIDEO GAMES
MAC
6
PC
TABLE
COUCH
WELCOME INFO

Caleb Horn

Welcome to Level Up!

The Level Up Mobile Learning Lab is a learning environment focused on teaching kids about Science, Technology, Engineering, Art, and Math (STEAM). It is a flexible design solution that can be adapted to various environments and student needs. Level Up operates on the Gestalt principle that the whole is greater than the sum of its parts.

Each lab set up will vary with available materials, supplies, and expertise. It is important that activities in the STEAM lab are engaging, predominantly self-paced, and cross various disciplines.

The six stations setup for this Thesis Exhibition serve as an example of one possible configuration of the Learning Lab. Stations change based on available resources. The following six stations each focus on one letter of the STEAM acronym while attempting to encompass as many of the other fields as possible.

Pick a station and a worksheet and try it. Don't forget to submit your work. Thanks for playing!

Science

Microscopic Art

The microscope was invented in 1590 by Zaccharias Janssen. Since then it has become an invaluable tool for scientists of all disciplines who depend on it to see beyond the limits of the human eye. Just as microscopes allow us to look at objects closer, drawing trains our brains to study the details.

Checkout some different slides under the microscope and draw what you see using the activity sheets provided.

Did you know?

The honeycomb structure seen in slide 1H-26 are what Robert Hooke viewed when he described the first cell in 1665.

Name: _____ Age: _____

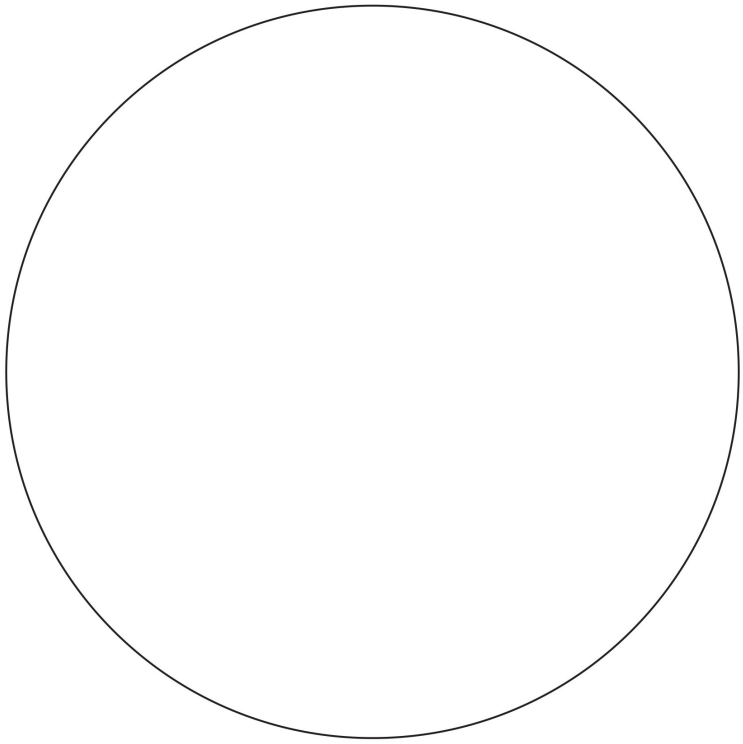
Science

Microscopic Art

1. Place a slide under the microscope.
   What number is it? _____

2. Focus the scope and draw what you see.
   What zoom level are you using? 5x 12x 40x 60x

* Tip: Place the lens as close as possible to the slide and zoom away from the object to avoid bumping it.



Subjects: 🔬 🎨

I enjoyed this project: ☺ ☹

Technology

Code a Game

Our world is driven by technology. Everything from banking systems to video games are coded in various languages. Yet all languages share the same fundamentals of programming. This station uses Codecademy™ to provide an introduction to programming using Minecraft™ characters.

Drag and drop blocks of code into the sequence, then press “Run” to see what you’ve programmed. Make your way through the lesson to build your own Minecraft™ world at the end.

Did you know?

At the current rate, there will be 1 million more computer jobs than there will be qualified students to fill them by the year 2020.

Name: _____ Age: _____

Technology

Code a Game

1. Choose a character from the start page.
2. Follow the on-screen instructions to drag and drop block commands into the sequence.
3. Press “Run” to see what you’ve done. Continue the lesson.
4. When you are done hold down command+shift+3 to take a screen-shot of your work.
5. Then write down the date and time.

Date: _____

Time: _____

Subjects: 

I enjoyed this project: ☺ ☹

Engineering

Earthquake Shakedown

There are many different types of engineering, such as Mechanical Engineering or Biological Engineering. This station focuses on an age old Civil Engineering problem. How to build a multi-level structure that can resist earthquakes?

Build a multi-level (2 or more) structure of any shape on top of a piece of paper. Then trade structures with a friend and shake the paper to simulate an earthquake. Whose structure survived the quake?

Did you know?

The most powerful earthquake ever recorded on Earth was in Valdivia, Chile. Occurring in 1960, it had a magnitude of 9.5.

Name: _____ Age: _____

Engineering

Earthquake Shakedown

1. Use the bottom of this page to draw the multi-level structure you plan on building.

2. Build your structure on top of this paper using the materials provided.

3. Trade buildings with a friend and try to shake the other building down, count the seconds it takes.

4. Did your building survive the quake? Yes No

5. How many seconds did the quake last? _____

* Bonus: Mark the areas that suffered the most damage on your original drawing.

Subjects: 📐 🎨 📊

I enjoyed this project: ☺ ☹

Art

The Art of Handwriting

Handwriting has changed dramatically over the centuries. One of the repercussions of the digital age has been a decline in the art of handwriting. In the 1700s a style called English Round Hand was popularized by a pen master named George Bickham. In 1997, Richard Lipton created Bickham Script Pro as part of the Adobe Type Library based on Bickham's ornate engravings.

Can you write your initials in English Round Hand? Practice makes perfect.

Did you know?

Studies show that for kids, handwriting is more effective than typing for stimulating memory and language skills.

Name: _____ Age: _____

Art

The Art of Handwriting

1. Find your initials on the back of this page and practice tracing them in Bickham Script.

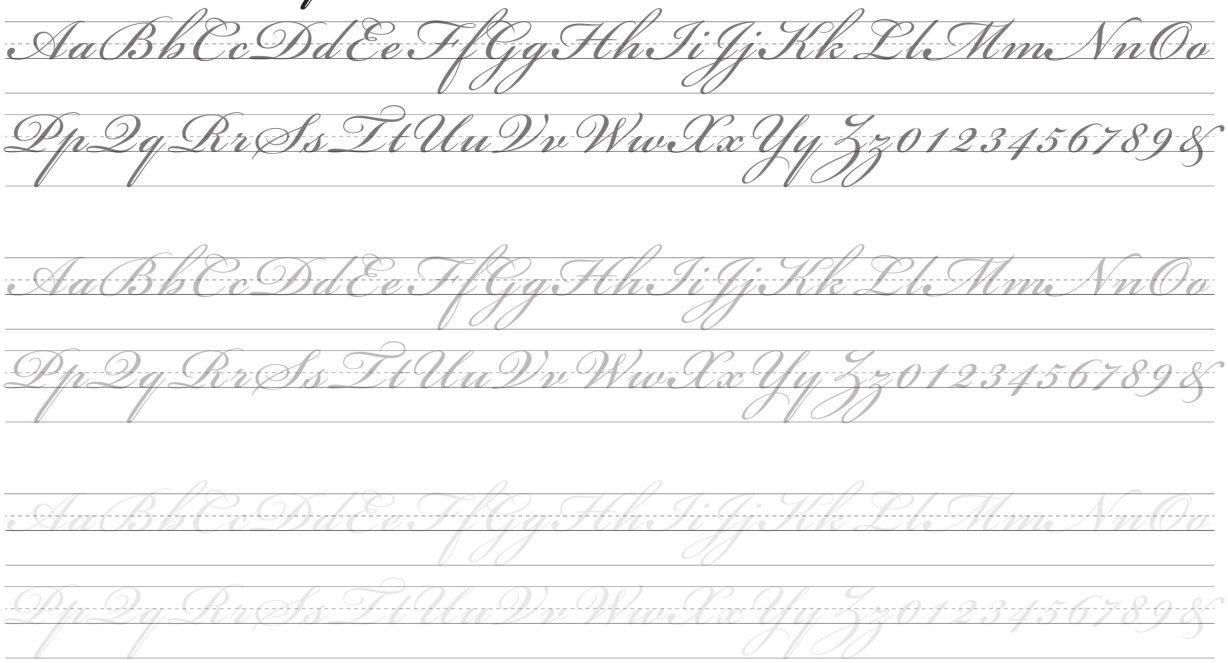
2. Flip the page back over and draw them big in the blank space.

Subjects: 🎨 📐

I enjoyed this project: ☺ ☹

Art

Bickham Script



Math

More to Math

Math is the foundation of learning, but many students who struggle with it decide that they are “bad at math.” Lego® bricks help by making arithmetic more visual. The colorful and familiar blocks create a playful environment to engage with mathematical concepts such as fractions, square numbers, mean, median and mode. They can be used to better understand algebraic thinking, place and value, and how to measure and represent data.

Use the worksheet to build the longest snake possible.

Did you know?

Students in Shanghai outperform students in Massachusetts by the equivalent of two years of formal schooling.

Name: _____ Age: _____

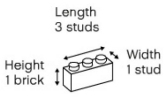
Math

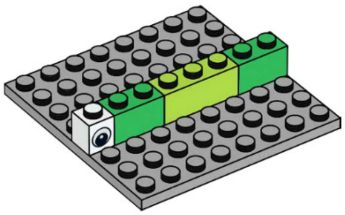
More to Math

1. Build a snake that is 10 studs long.
   How many bricks did you use? _____

2. Make another snake that is 14 studs long.
   Can you do it using only 6 bricks? Yes No

3. Now build the longest snake possible.
   How many studs was it? _____
   How many bricks was it? _____





Subjects:

I enjoyed this project: ☺ ☹

Music

Make Some Noise

This station utilizes a PlayStation®3 and Rocksmith™ to learn how to play the guitar or bass. Learning a new instrument can be frustrating for beginners because of the time it takes to build finger strength and memorize chords and scales. Rocksmith™ makes learning to play the guitar fun with an engaging interface and modern song base as well as various arcade style games that use a guitar as the controller.

Strap on the guitar and pick a song. The game will walk you through everything from tuning up through the final note. Don't forget to log your score in the logbook for a chance to win the competition guitar.

Did you know?

The English word "guitar" comes from the Spanish word "guitarra" which comes from the Arabic word "qitara."

Music

Make Some Noise

Enter your score and contact information in the logbook of high-scores for a chance to compete in the Level Up Rocksmith™ Challenge. The winner will receive the competition guitar. The competition will be open all week. Top two scores will compete in the finals on the last day.

Contact:	_____	Score:	_____
Contact:	_____	Score:	_____
Contact:	_____	Score:	_____
Contact:	_____	Score:	_____
Contact:	_____	Score:	_____
Contact:	_____	Score:	_____
Contact:	_____	Score:	_____
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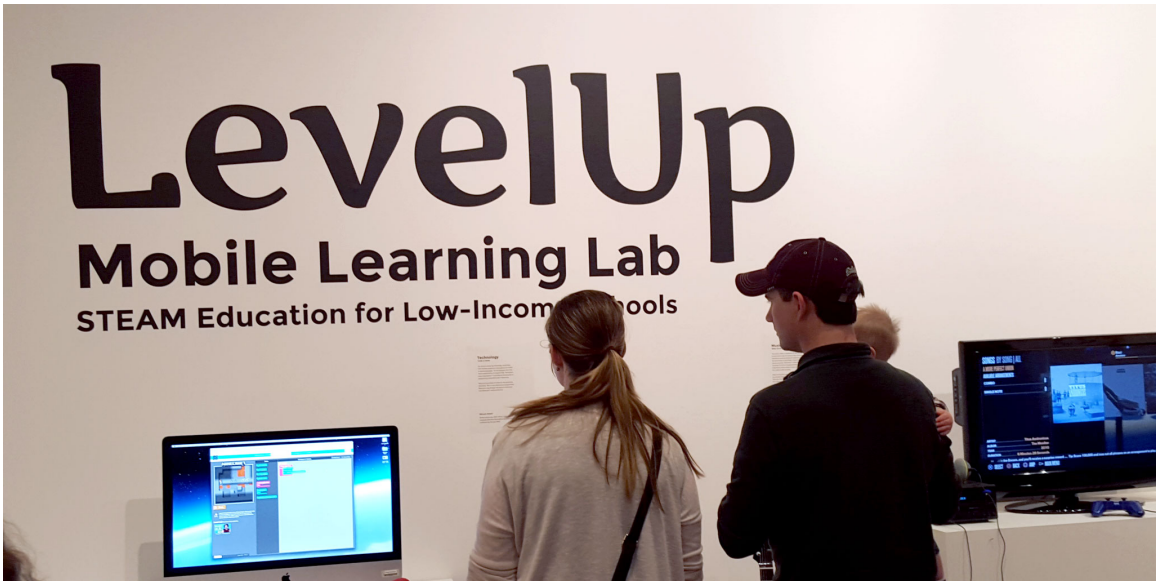
Contact:	_____	Score:	_____
Contact:	_____	Score:	_____
Contact:	_____	Score:	_____
Contact:	_____	Score:	_____
Contact:	_____	Score:	_____
Contact:	_____	Score:	_____

Subjects: 🎸 🖥️

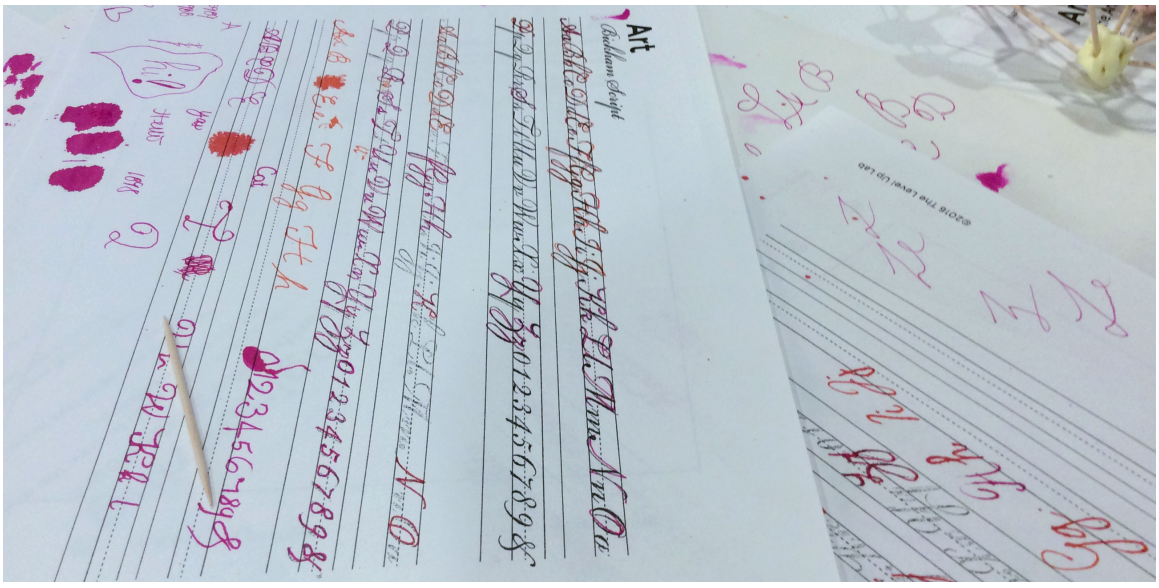
APPENDIX C: EXHIBITION PHOTOGRAPHS

Level Up Learning Lab

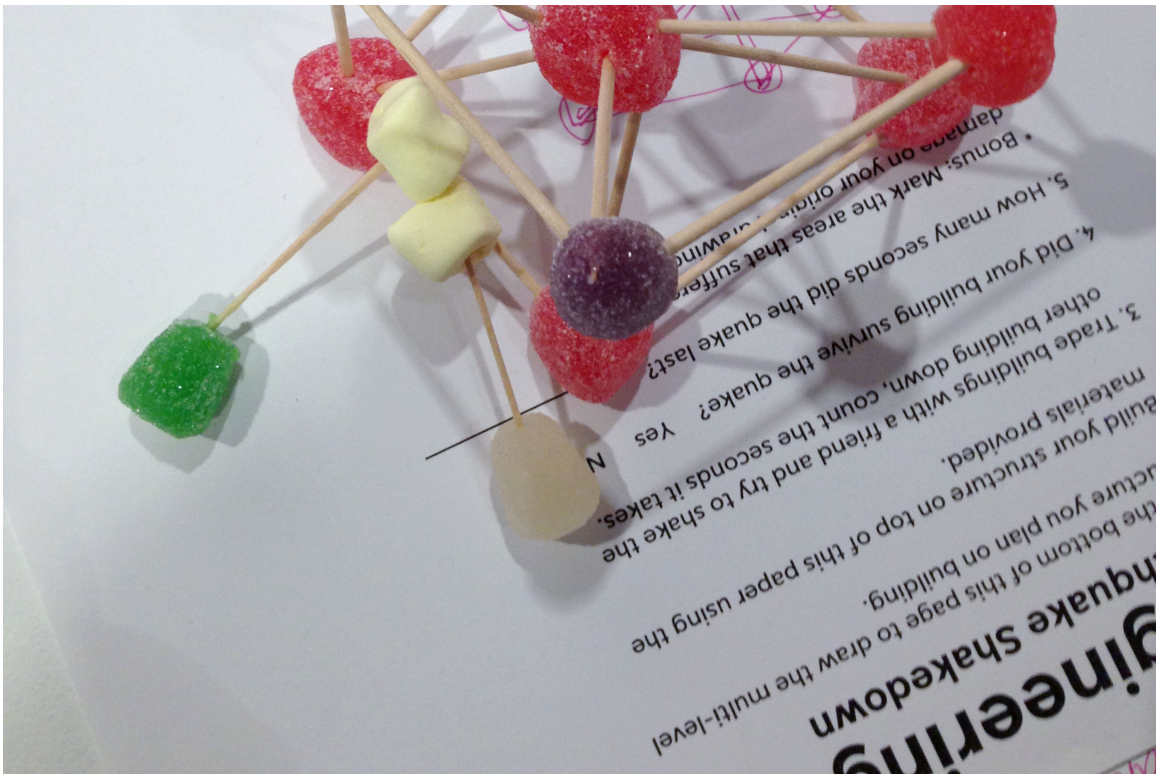

LevelUp
Mobile Learning Lab
STEAM Education for Low-Income Schools


LevelUp
Mobile Learning Lab
STEAM Education for Low-Incom ools

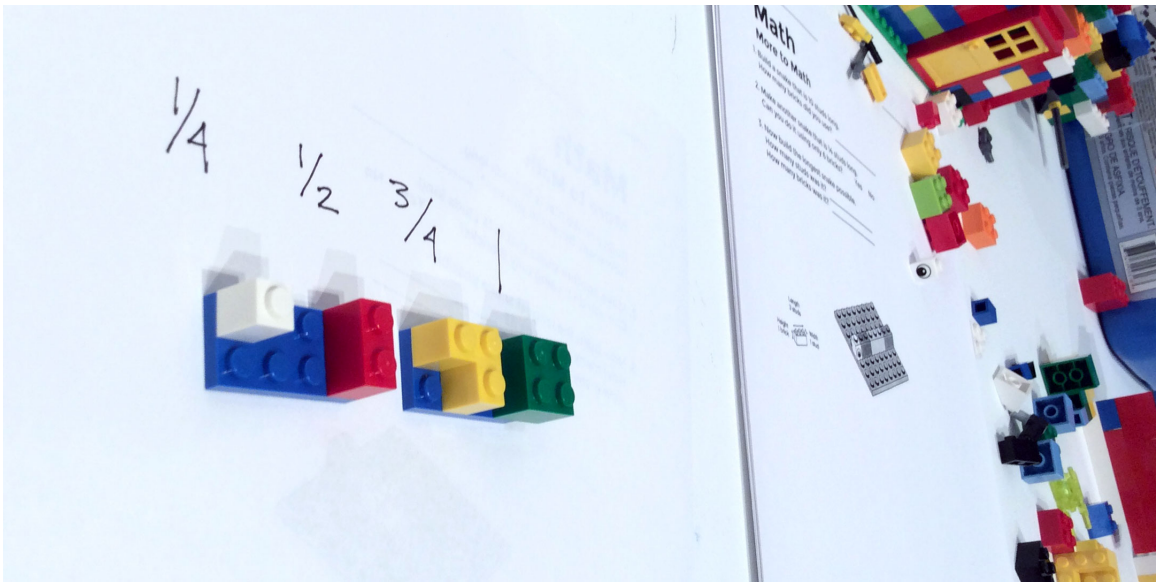
Art Station: The Art of Handwriting



Engineering Station: Earthquake Shakedown



Math Station: More to Math



Science Station: Microscopic Art

Name: Ursula S. Age: 23

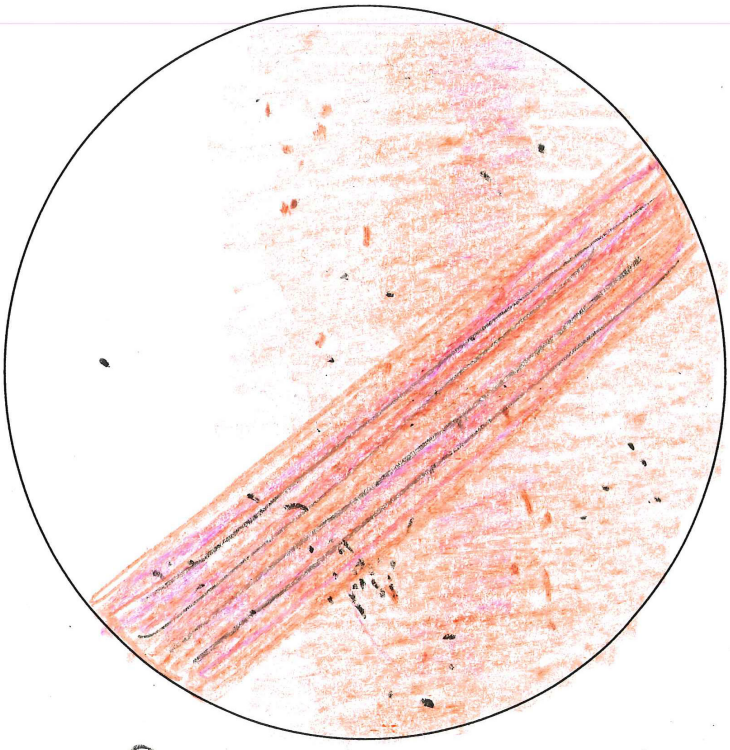
Science

Microscopic Art

1. Place a slide under the microscope.
   What number is it? IH-5

2. Focus the scope and draw what you see.
   What zoom level are you using? (5x) 12x 40x 60x

* Tip: Place the lens as close as possible to the slide and zoom away from the object to avoid bumping it.



Subjects: 

I enjoyed this project:  ☹

Name: CAEB Age: 34

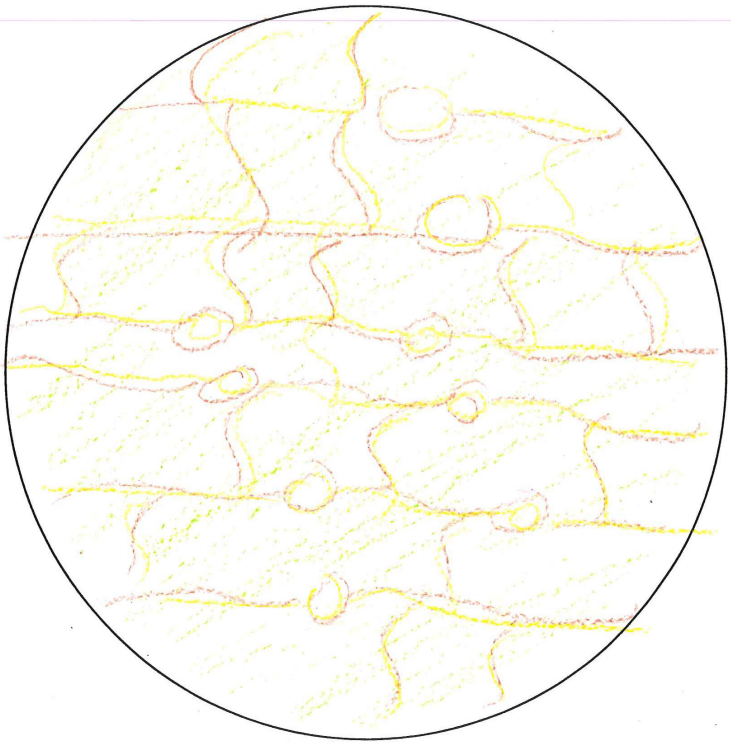
Science

Microscopic Art

1. Place a slide under the microscope.
   What number is it? 1H-26

2. Focus the scope and draw what you see.
   What zoom level are you using? (5x) 12x 40x 60x

* Tip: Place the lens as close as possible to the slide and zoom away from the object to avoid bumping it.



Subjects:

I enjoyed this project:

Name: Kendall Age: 17

Science

Microscopic Art

1. Place a slide under the microscope.
   What number is it? "e"

2. Focus the scope and draw what you see.
   What zoom level are you using? 5x 12x 40x 60x

* Tip: Place the lens as close as possible to the slide and zoom away from the object to avoid bumping it.

Subjects:

I enjoyed this project: ☺ ☹

Name: Sam Age: 22

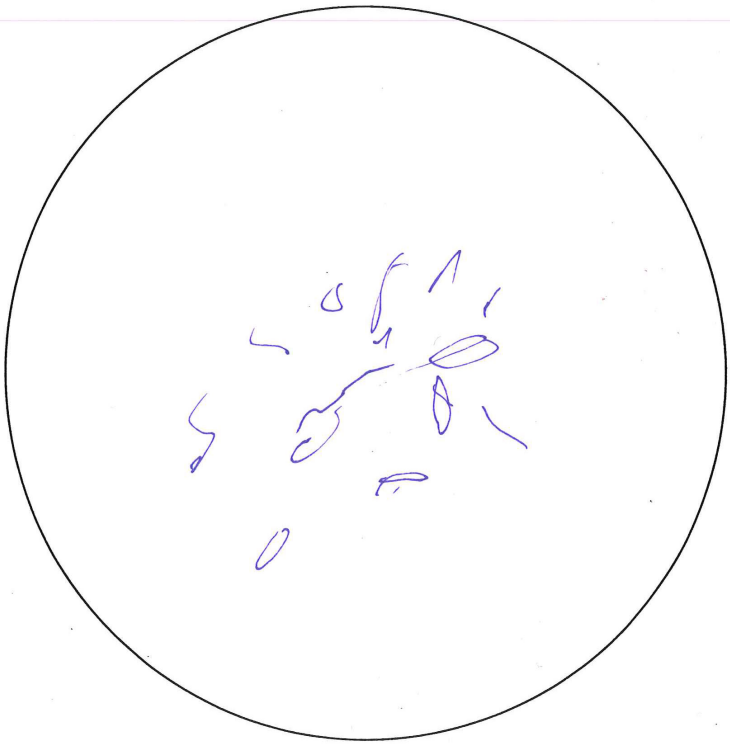
Science

Microscopic Art

1. Place a slide under the microscope.
   What number is it? 1H-5

2. Focus the scope and draw what you see.
   What zoom level are you using? 5x 12x 40x (60x)

* Tip: Place the lens as close as possible to the slide and zoom away from the object to avoid bumping it.



Subjects:

I enjoyed this project: ☺ ☹

Name: Gar Age: 17

Science

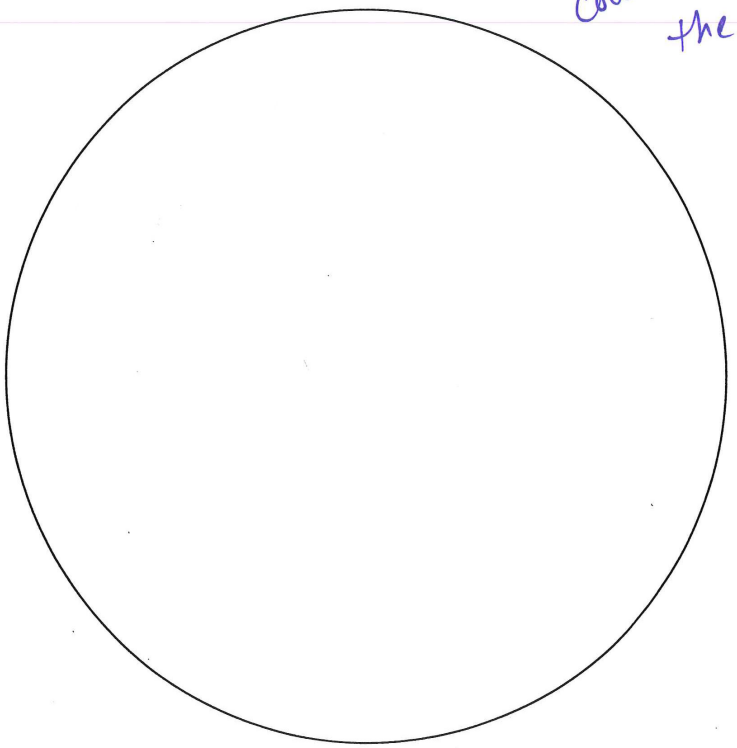
Microscopic Art

1. Place a slide under the microscope.
   What number is it? 1H-5

2. Focus the scope and draw what you see.
   What zoom level are you using? 5x 12x 40x 60x

* Tip: Place the lens as close as possible to the slide and zoom away from the object to avoid bumping it.

could not see the slide very well



Subjects:

I enjoyed this project: ☺ ☹

Name: Stephanie Long Age: 31

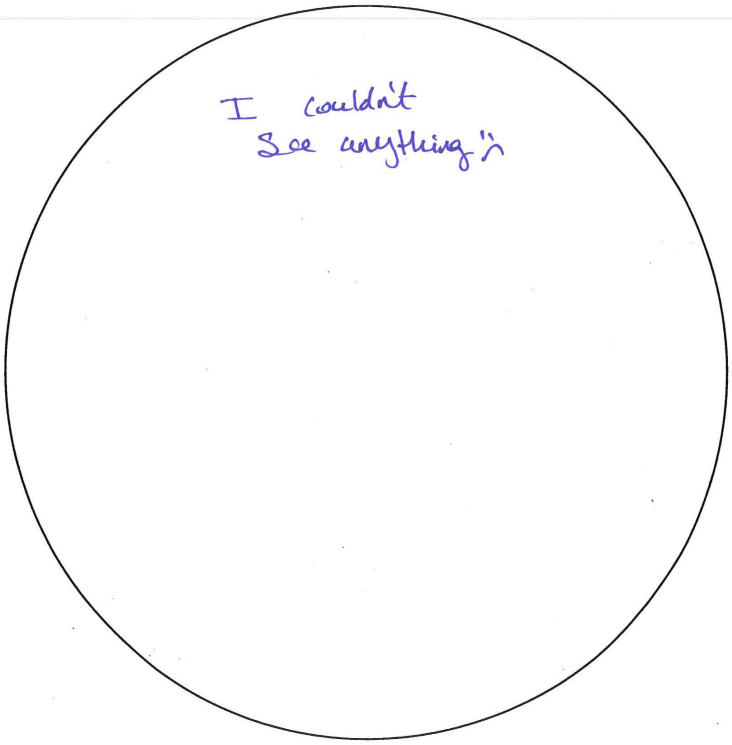
Science

Microscopic Art

1. Place a slide under the microscope.
   What number is it? 14-35

2. Focus the scope and draw what you see.
   What zoom level are you using? 5x 12x 40x 60x

* Tip: Place the lens as close as possible to the slide and zoom away from the object to avoid bumping it.



Subjects:

I enjoyed this project: ☺ ☹

Name: Jean Age: 53

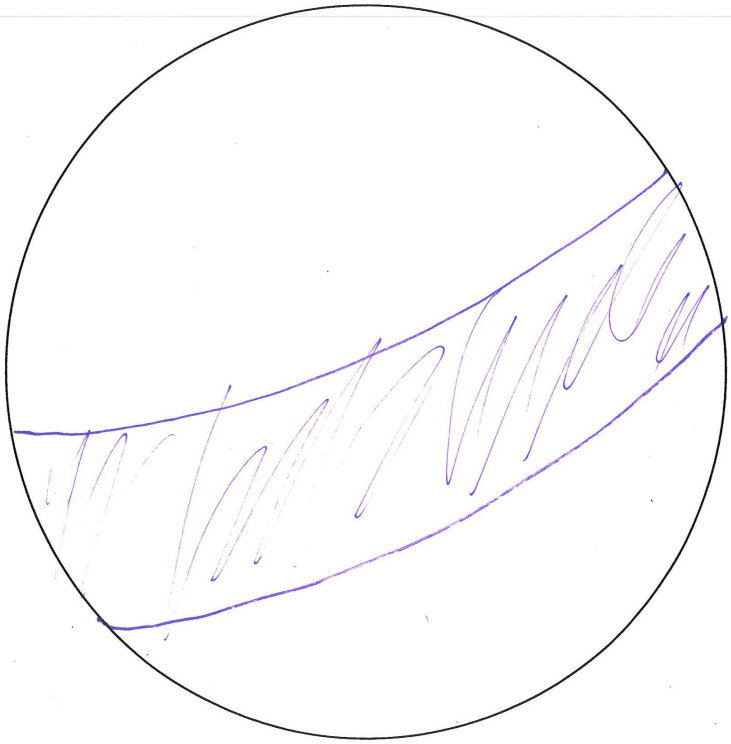
Science

Microscopic Art

1. Place a slide under the microscope.
   What number is it? 1 - 1+1

2. Focus the scope and draw what you see.
   What zoom level are you using? (5x) 12x 40x 60x

* Tip: Place the lens as close as possible to the slide and zoom away from the object to avoid bumping it.



Subjects:

I enjoyed this project: ☺ ☹

Name: Gav Age: 19

Technology

Code a Game

1. Choose a character from the start page.
2. Follow the on-screen instructions to drag and drop block commands into the sequence.
3. Press "Run" to see what you've done. Continue the lesson.
4. When you are done hold down command+shift+3 to take a screen-shot of your work.
5. Then write down the date and time.

Date: 1/20/16

Time: 2:31

Subjects:

I enjoyed this project: ☺ ☹

Name: Chris Age: 34

Technology

Code a Game

1. Choose a character from the start page.
2. Follow the on-screen instructions to drag and drop block commands into the sequence.
3. Press "Run" to see what you've done. Continue the lesson.
4. When you are done hold down command+shift+3 to take a screen-shot of your work.
5. Then write down the date and time.

Date: 1/19/16

Time: 4:00

Subjects:

I enjoyed this project: ☺ ☹

Name: Stephanie Lou, Age: 31

Technology

Code a Game

1. Choose a character from the start page.
2. Follow the on-screen instructions to drag and drop block commands into the sequence.
3. Press "Run" to see what you've done. Continue the lesson.
4. When you are done hold down command+shift+3 to take a screen-shot of your work.
5. Then write down the date and time.

Date: 1/29/16

Time: 6:25 pm

Subjects:

I enjoyed this project: ☺ ☹

Name: Brianna Soto Age: _____

Technology

Code a Game

1. Choose a character from the start page.
2. Follow the on-screen instructions to drag and drop block commands into the sequence.
3. Press "Run" to see what you've done. Continue the lesson.
4. When you are done hold down command+shift+3 to take a screen-shot of your work.
5. Then write down the date and time.

Date: 1/19/16

Time: 7:44pm

Subjects:

I enjoyed this project: ☺ ☹

Name: _____ Age: _____

Engineering

Earthquake Shakedown

1. Use the bottom of this page to draw the multi-level structure you plan on building.

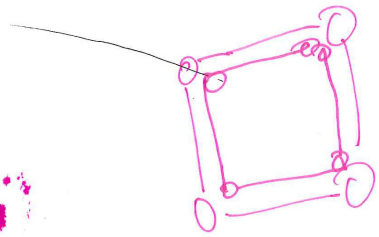
2. Build your structure on top of this paper using the materials provided.

3. Trade buildings with a friend and try to shake the other building down, count the seconds it takes.

4. Did your building survive the quake? (Yes) No

5. How many seconds did the quake last? 30

* Bonus: Mark the areas that suffered the most damage on your original drawing.



Subjects:

I enjoyed this project: ☺ ☹

Name: Kathy Merley Age: 59

Engineering

Earthquake Shakedown

1. Use the bottom of this page to draw the multi-level structure you plan on building.

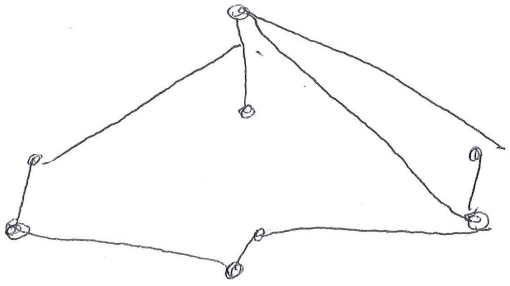
2. Build your structure on top of this paper using the materials provided.

3. Trade buildings with a friend and try to shake the other building down, count the seconds it takes.

4. Did your building survive the quake? (Yes) No

5. How many seconds did the quake last? long time.

* Bonus: Mark the areas that suffered the most damage on your original drawing.



Subjects:

I enjoyed this project: ☺ ☹

Name: Foo Fanis Age: 22

Engineering

Earthquake Shakedown

1. Use the bottom of this page to draw the multi-level structure you plan on building.

2. Build your structure on top of this paper using the materials provided.

3. Trade buildings with a friend and try to shake the other building down, count the seconds it takes.

4. Did your building survive the quake? Yes No

5. How many seconds did the quake last? _____

* Bonus: Mark the areas that suffered the most damage on your original drawing.

Subjects:

I enjoyed this project: ☺ ☹

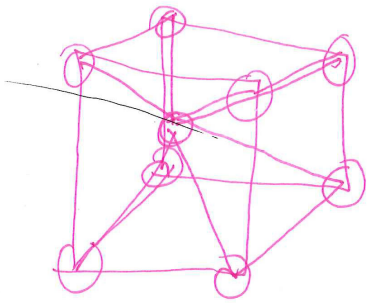
Name: Andrew Fox Age: 28

Engineering

Earthquake Shakedown

1. Use the bottom of this page to draw the multi-level structure you plan on building.
2. Build your structure on top of this paper using the materials provided.
3. Trade buildings with a friend and try to shake the other building down, count the seconds it takes.
4. Did your building survive the quake? Yes No
5. How many seconds did the quake last? _____

* Bonus: Mark the areas that suffered the most damage on your original drawing.



Subjects:

I enjoyed this project: ☺ ☹

Name: Kendall Age: 7

Engineering

Earthquake Shakedown

1. Use the bottom of this page to draw the multi-level structure you plan on building.

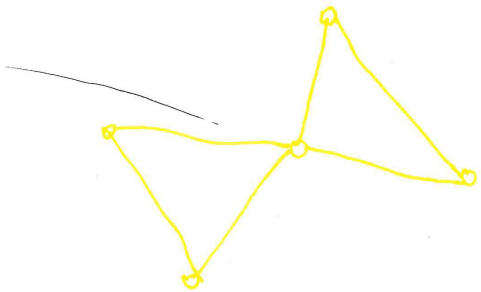
2. Build your structure on top of this paper using the materials provided.

3. Trade buildings with a friend and try to shake the other building down, count the seconds it takes.

4. Did your building survive the quake? (Yes) No

5. How many seconds did the quake last? _____

* Bonus: Mark the areas that suffered the most damage on your original drawing.



Subjects:

I enjoyed this project: ☺ ☹

Name: Alex Age: 34

Engineering

Earthquake Shakedown

1. Use the bottom of this page to draw the multi-level structure you plan on building.

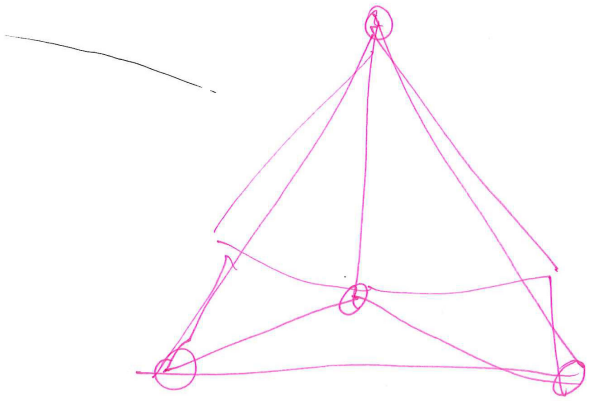
2. Build your structure on top of this paper using the materials provided.

3. Trade buildings with a friend and try to shake the other building down, count the seconds it takes.

4. Did your building survive the quake? (Yes) No

5. How many seconds did the quake last? 15

* Bonus: Mark the areas that suffered the most damage on your original drawing.



Subjects:

I enjoyed this project: ☺ ☹

Name: Spencer King Age: 23

Engineering

Earthquake Shakedown

1. Use the bottom of this page to draw the multi-level structure you plan on building.
2. Build your structure on top of this paper using the materials provided.
3. Trade buildings with a friend and try to shake the other building down, count the seconds it takes.
4. Did your building survive the quake? Yes No
5. How many seconds did the quake last? all

* Bonus: Mark the areas that suffered the most damage on your original drawing.

Subjects:

I enjoyed this project: ☺ ☹

Name: Vashist Age: 17

Engineering

Earthquake Shakedown

1. Use the bottom of this page to draw the multi-level structure you plan on building.

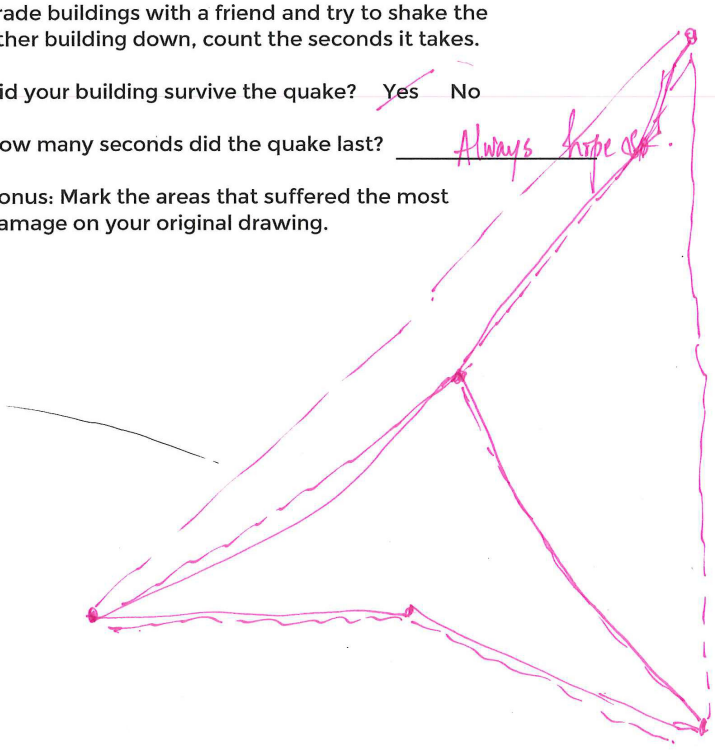
2. Build your structure on top of this paper using the materials provided.

3. Trade buildings with a friend and try to shake the other building down, count the seconds it takes.

4. Did your building survive the quake? Yes No

5. How many seconds did the quake last? Always stops off.

* Bonus: Mark the areas that suffered the most damage on your original drawing.



Subjects:

I enjoyed this project: ☺ ☹

Name: Yajayra Barragan Age: 19

Engineering

Earthquake Shakedown

1. Use the bottom of this page to draw the multi-level structure you plan on building.

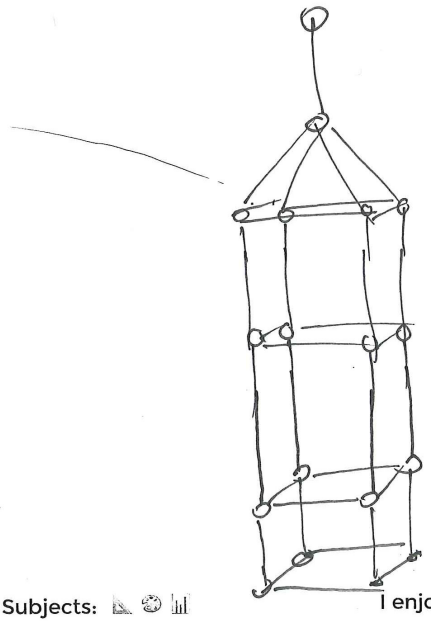
2. Build your structure on top of this paper using the materials provided.

3. Trade buildings with a friend and try to shake the other building down, count the seconds it takes.

4. Did your building survive the quake? (Yes) No

5. How many seconds did the quake last? long time

* Bonus: Mark the areas that suffered the most damage on your original drawing.



Subjects:

I enjoyed this project (☺) ☹

Name: Nick Carlis Age: 21

Engineering

Earthquake Shakedown

1. Use the bottom of this page to draw the multi-level structure you plan on building.

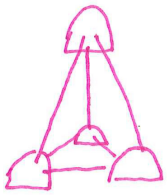
2. Build your structure on top of this paper using the materials provided.

3. Trade buildings with a friend and try to shake the other building down, count the seconds it takes.

4. Did your building survive the quake? (Yes) No

5. How many seconds did the quake last? _____

* Bonus: Mark the areas that suffered the most damage on your original drawing.



Subjects:

I enjoyed this project: ☺ ☹

Name: Gav Age: 19

Engineering

Earthquake Shakedown

1. Use the bottom of this page to draw the multi-level structure you plan on building.

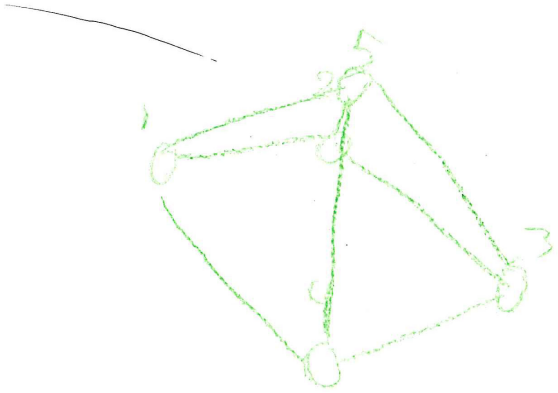
2. Build your structure on top of this paper using the materials provided.

3. Trade buildings with a friend and try to shake the other building down, count the seconds it takes.

4. Did your building survive the quake? (Yes) No

5. How many seconds did the quake last? 4

* Bonus: Mark the areas that suffered the most damage on your original drawing.



Subjects: 📐 🌍 📊

I enjoyed this project: ☺ ☹

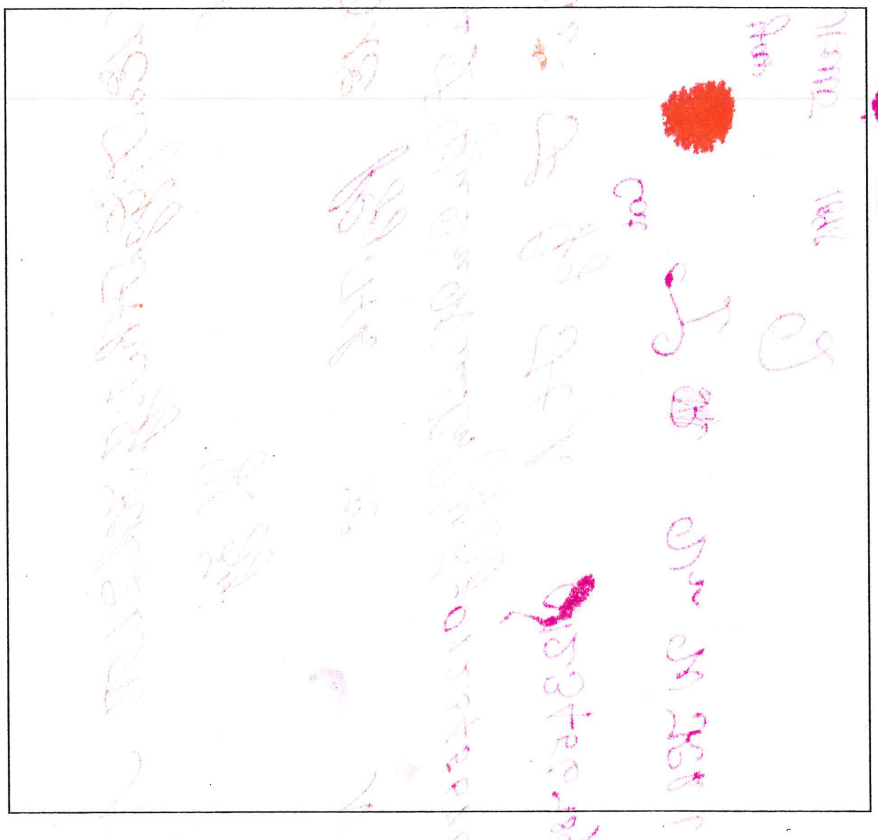
Name: _____ Age: _____

Art

The Art of Handwriting

1. Find your initials on the back of this page and practice tracing them in Bickham Script.

2. Flip the page back over and draw them big in the blank space.



Subjects:

I enjoyed this project: ☺ ☹

Art

Bickham Script

Aa Bb Cc Dd Ee Ff Gg Hh Ii Jj Kk Ll Mm Nn Oo

Pp Qq Rr Ss Tt Uu Vv Ww Xx Yy Zz 0 1 2 3 4 5 6 7 8 9 &

Aa Bb Cc Dd Ee Ff Gg Hh Ii Jj Kk Ll Mm Nn Oo

Pp Qq Rr Ss Tt Uu Vv Ww Xx Yy Zz 0 1 2 3 4 5 6 7 8 9 &

Aa Bb Ee Ff Gg Hh 0 1 2 3 4 5 6 7 8 9 &

Cat

A B C D E I W K h l

A

15989
1988

hi!

yas

Hello

1898

2

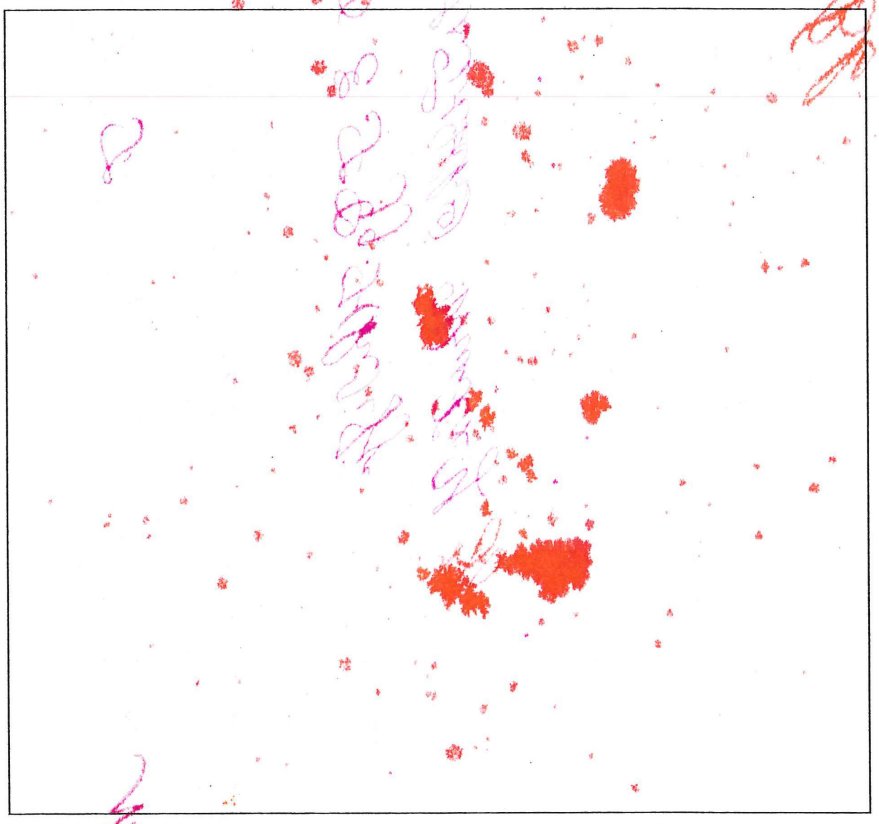
Name: _____ Age: _____

Art

The Art of Handwriting

1. Find your initials on the back of this page and practice tracing them in Bickham Script.

2. Flip the page back over and draw them big in the blank space.

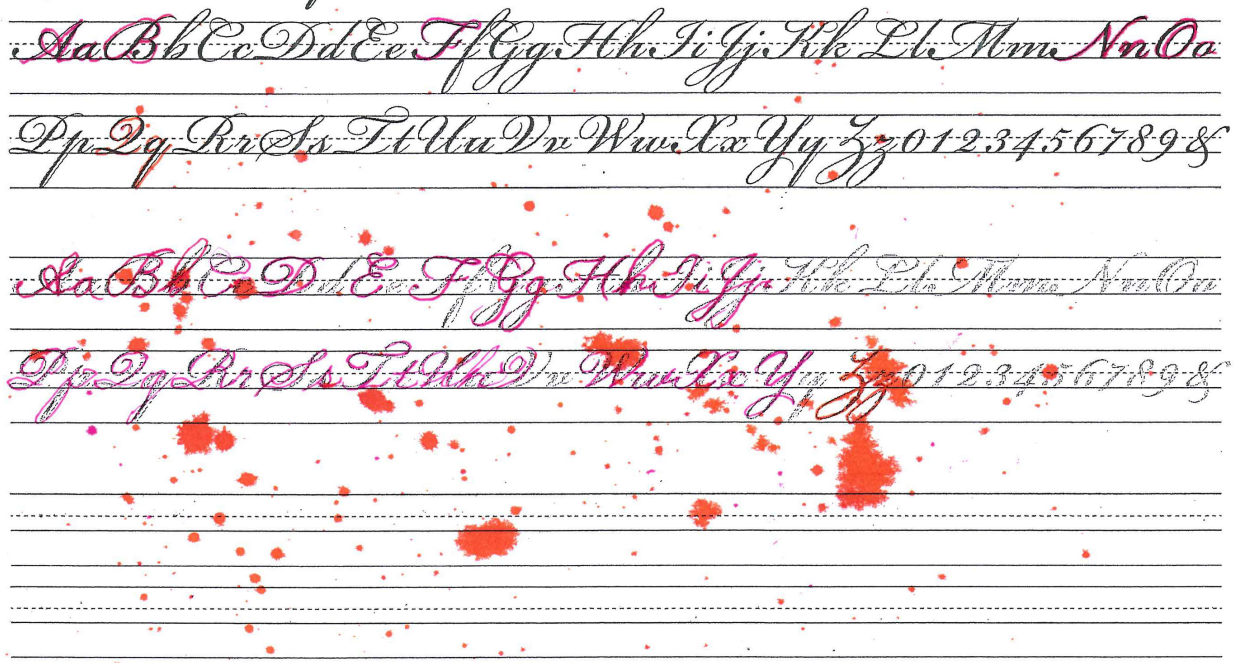


Subjects:

I enjoyed this project: ☺ ☹

Art

Bickham Script



B Aa Bb

Name: _____ Age: _____

Art

The Art of Handwriting

1. Find your initials on the back of this page and practice tracing them in Bickham Script.

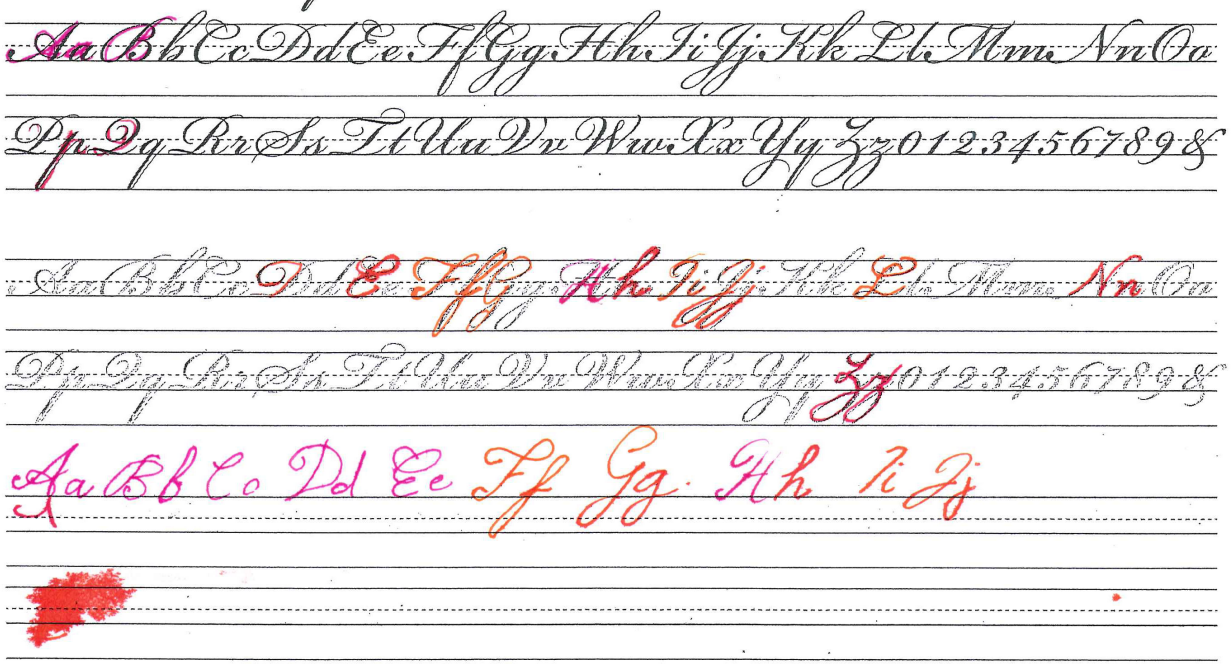
2. Flip the page back over and draw them big in the blank space.

Subjects:

I enjoyed this project: ☺ ☹

Art

Bickham Script



Name: _____ Age: _____

Art

The Art of Handwriting

1. Find your initials on the back of this page and practice tracing them in Bickham Script.

2. Flip the page back over and draw them big in the blank space.

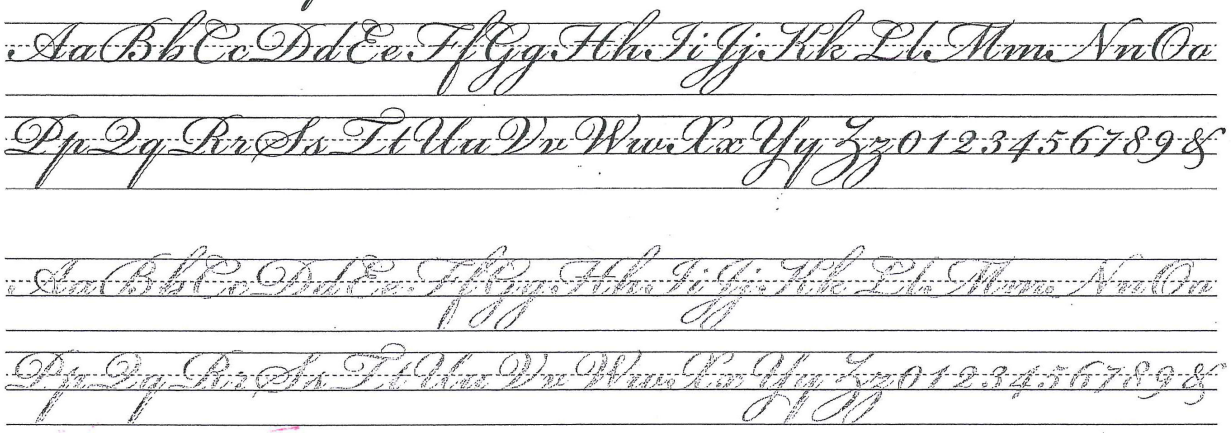
Made by Dorothy & Beatrice

Subjects:

I enjoyed this project: ☺ ☹

Art

Bickham Script



Name: _____ Age: _____

Art

The Art of Handwriting

1. Find your initials on the back of this page and practice tracing them in Bickham Script.

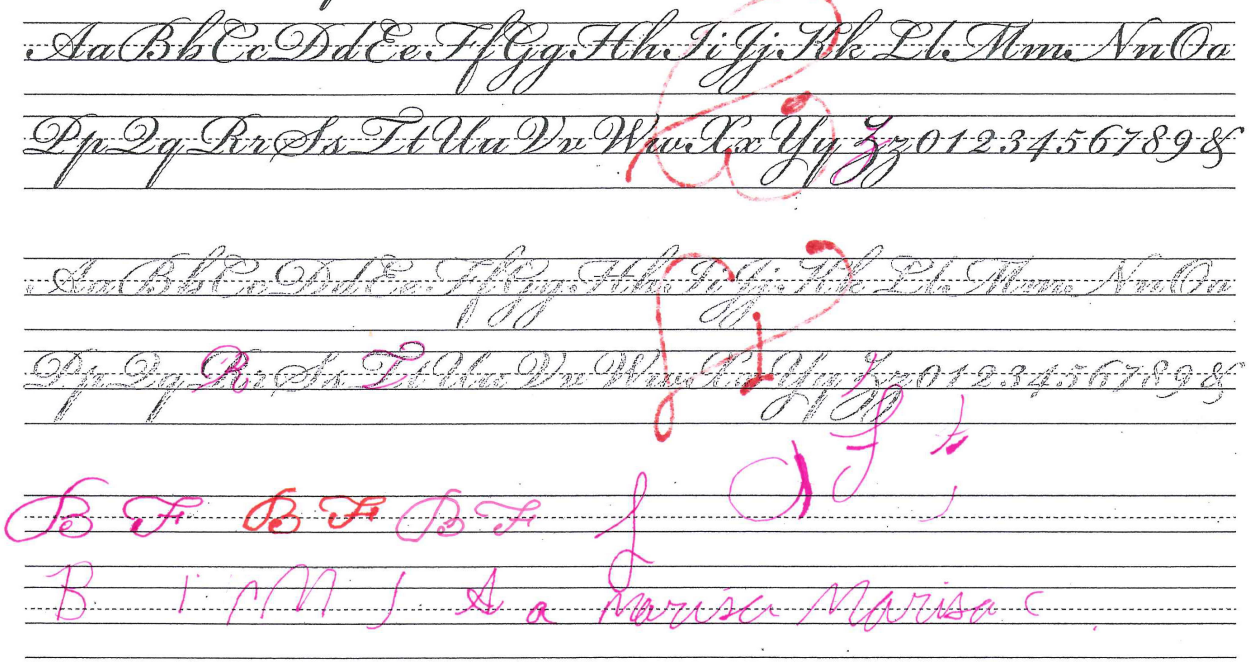
2. Flip the page back over and draw them big in the blank space.

Subjects:

I enjoyed this project: ☺ ☹

Art

Bickham Script



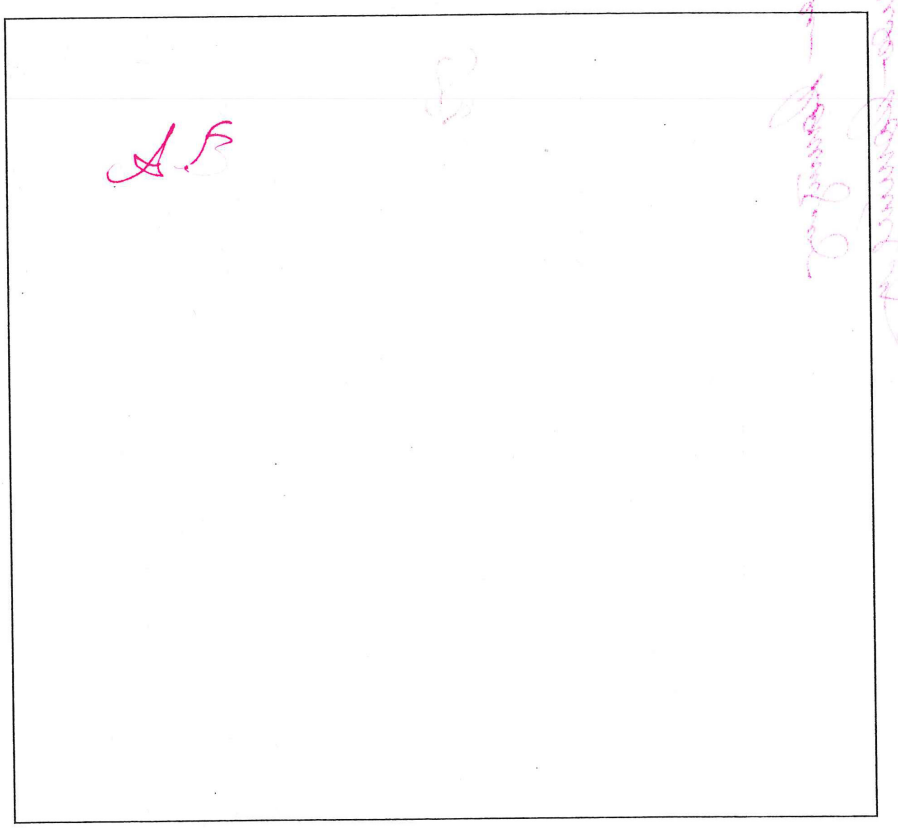
Name: Andi Age: _____

Art

The Art of Handwriting

1. Find your initials on the back of this page and practice tracing them in Bickham Script.

2. Flip the page back over and draw them big in the blank space.



Subjects:

I enjoyed this project:

Art

Bickham Script

Aa Bb Cc Dd Ee Ff Gg Hh Ii Jj Kk Ll Mm Nn Oo

Pp Qq Rr Ss Tt Uu Vv Ww Xx Yy Zz 0 1 2 3 4 5 6 7 8 9 &

A B

P Q T

A B T

Yasiel Figueroa Dominguez

Yasiel Figueroa Dominguez

Amy M. Martinez Fernandez

Name: _____ Age: _____

Art

The Art of Handwriting

1. Find your initials on the back of this page and practice tracing them in Bickham Script.

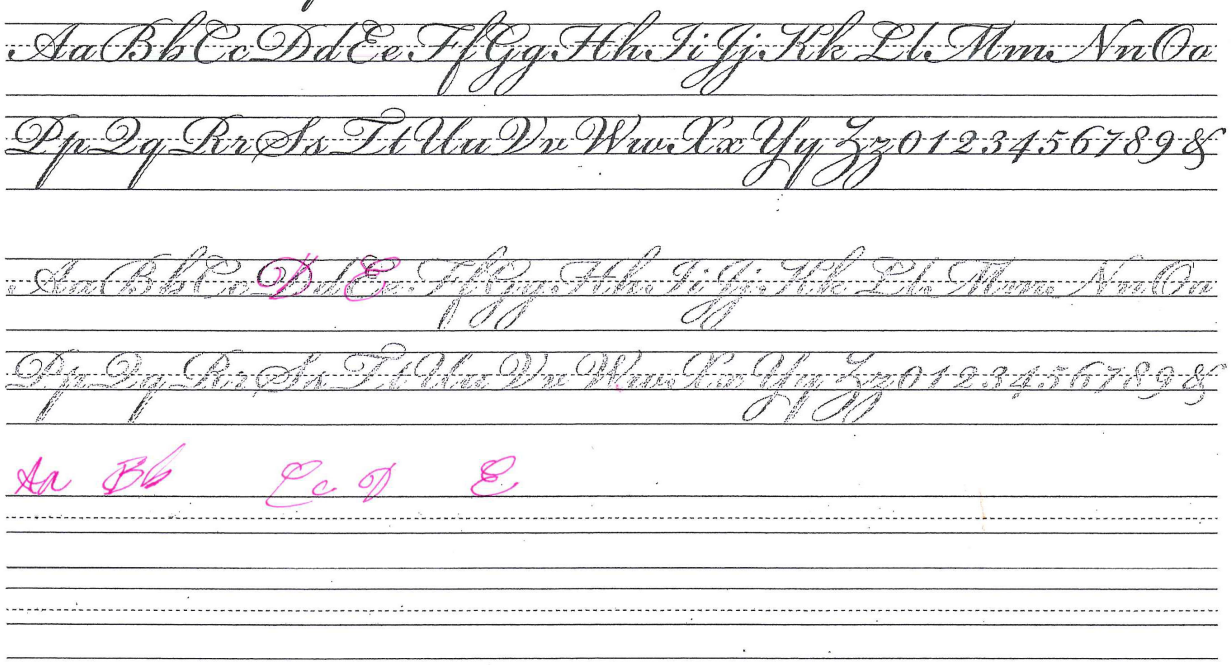
2. Flip the page back over and draw them big in the blank space.

Subjects:

I enjoyed this project: ☺ ☹

Art

Bickham Script



Name: Kinsey Major Age: 20

Art

The Art of Handwriting

1. Find your initials on the back of this page and practice tracing them in Bickham Script.

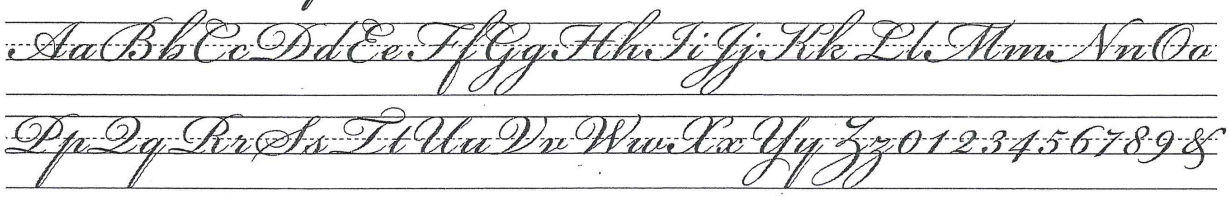
2. Flip the page back over and draw them big in the blank space.

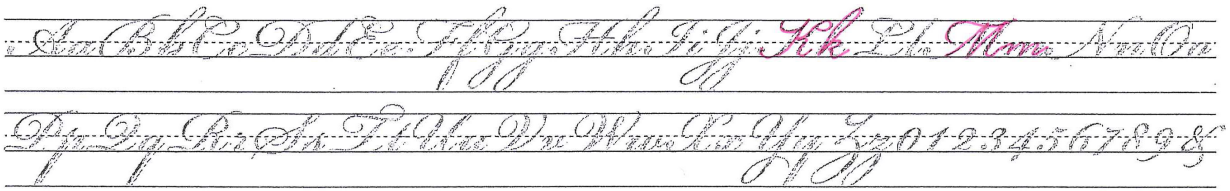
Subjects:

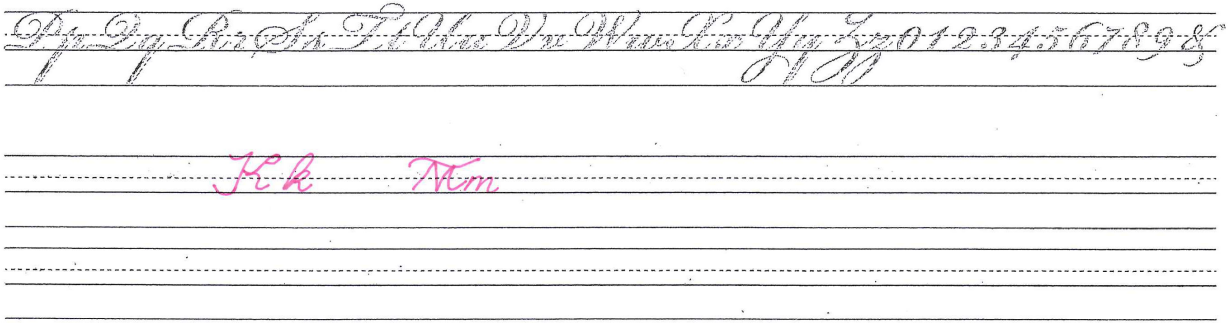
I enjoyed this project: ☺ ☹

Art

Bickham Script







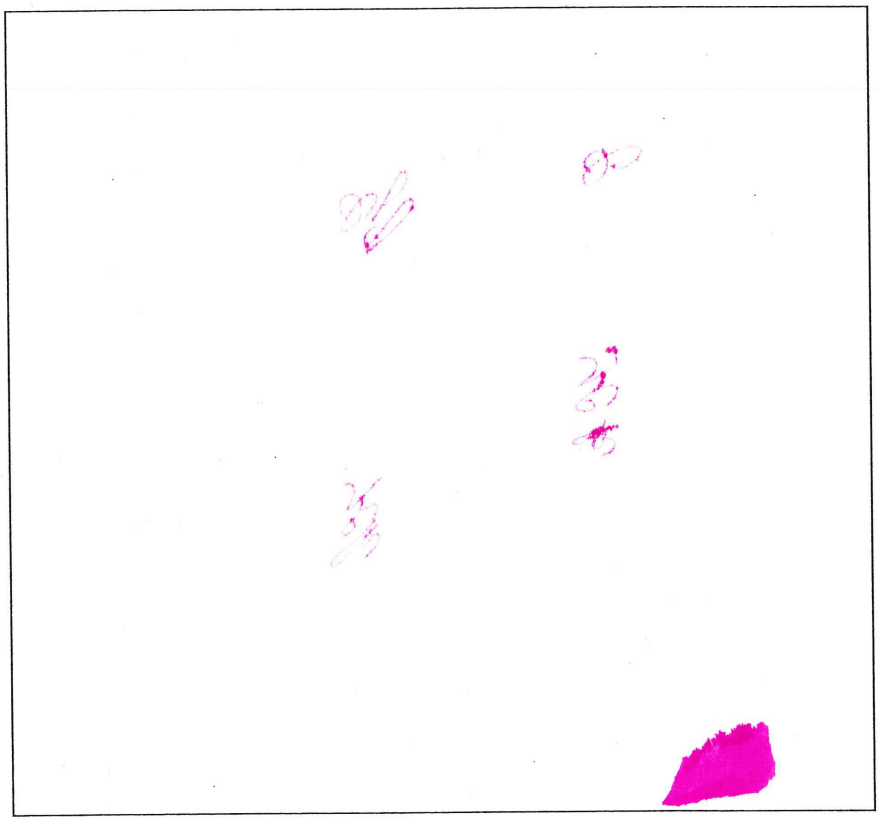
Name: _____ Age: _____

Art

The Art of Handwriting

1. Find your initials on the back of this page and practice tracing them in Bickham Script.

2. Flip the page back over and draw them big in the blank space.

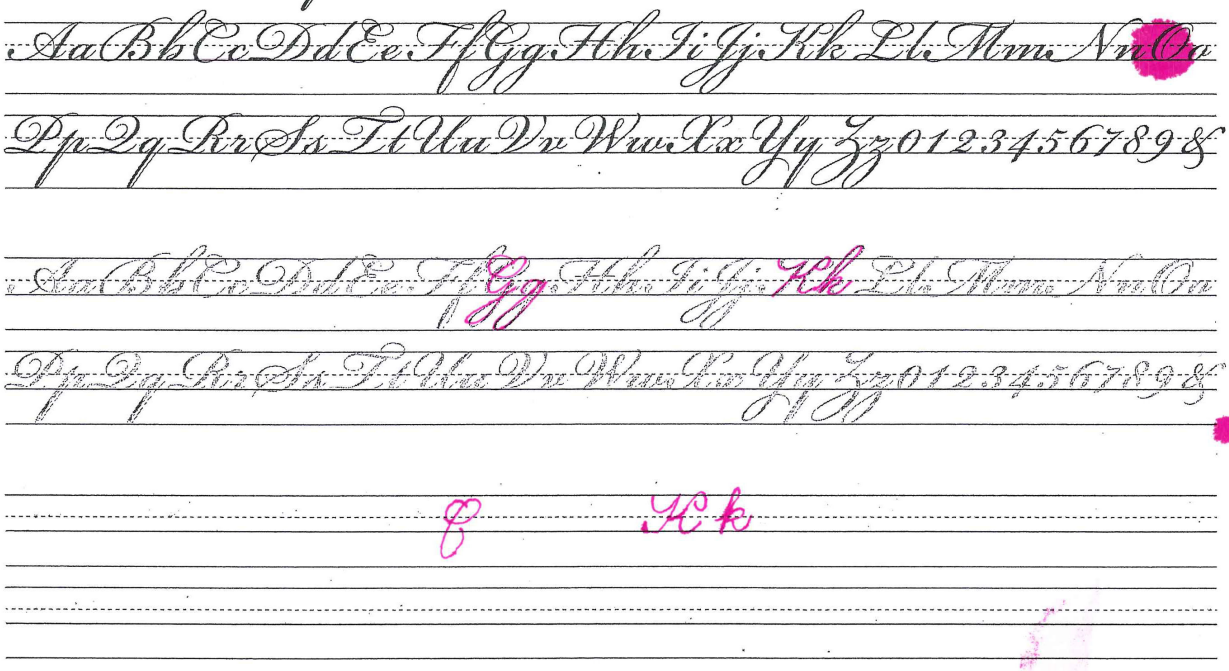


Subjects:

I enjoyed this project: ☺ ☹

Art

Bickham Script



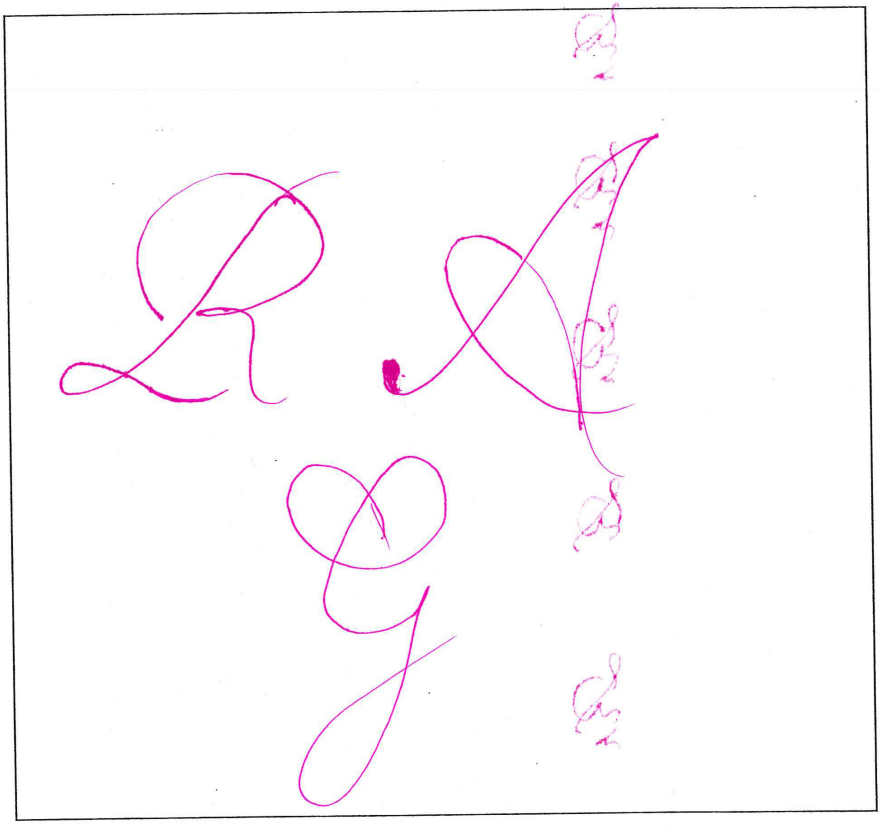
Name: Reyna Guevara Age: _____

Art

The Art of Handwriting

1. Find your initials on the back of this page and practice tracing them in Bickham Script.

2. Flip the page back over and draw them big in the blank space.



Subjects:

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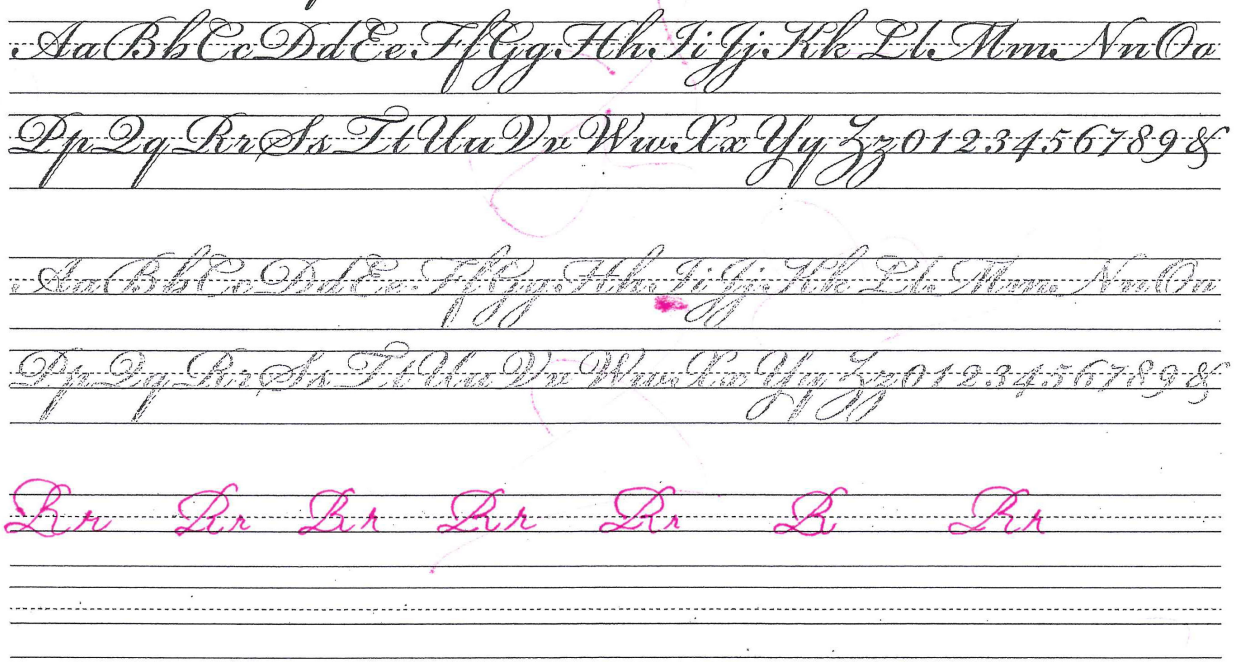

Name: Brandon OBryant Age: 28

Art

The Art of Handwriting

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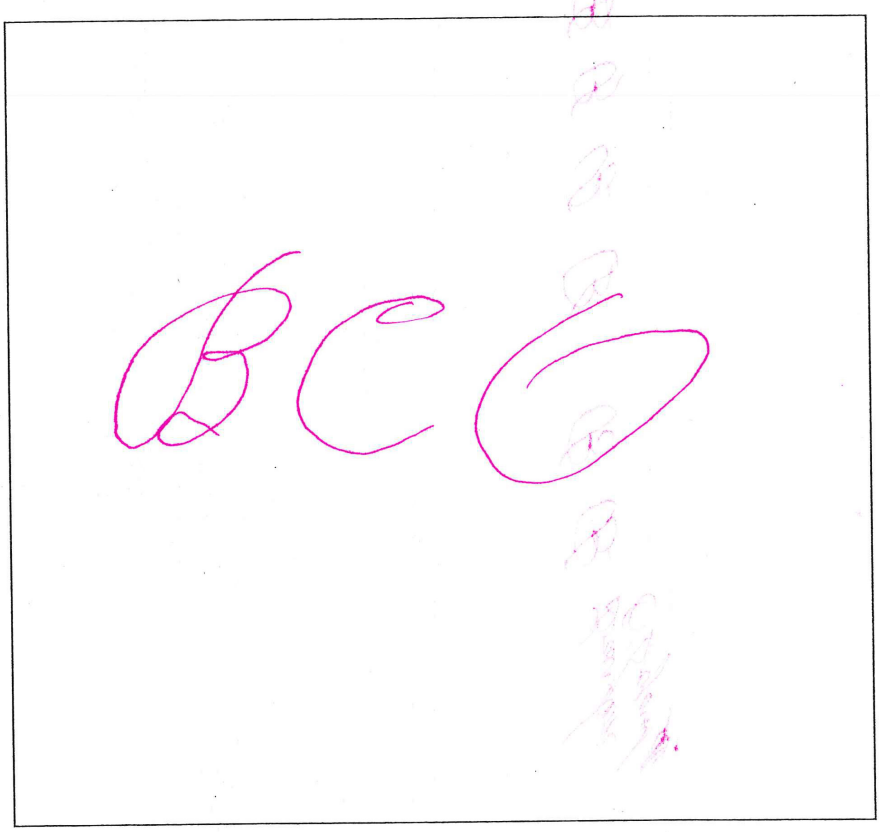

Subjects:

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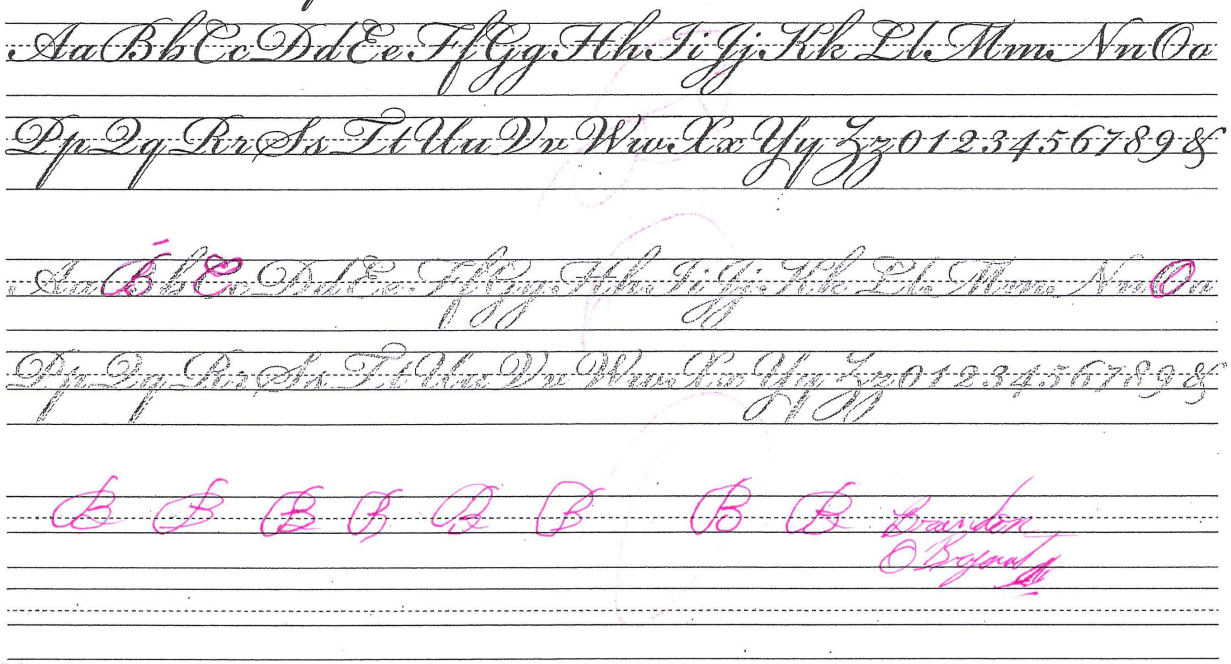
Art

Bickham Script



Name: _____ Age: _____

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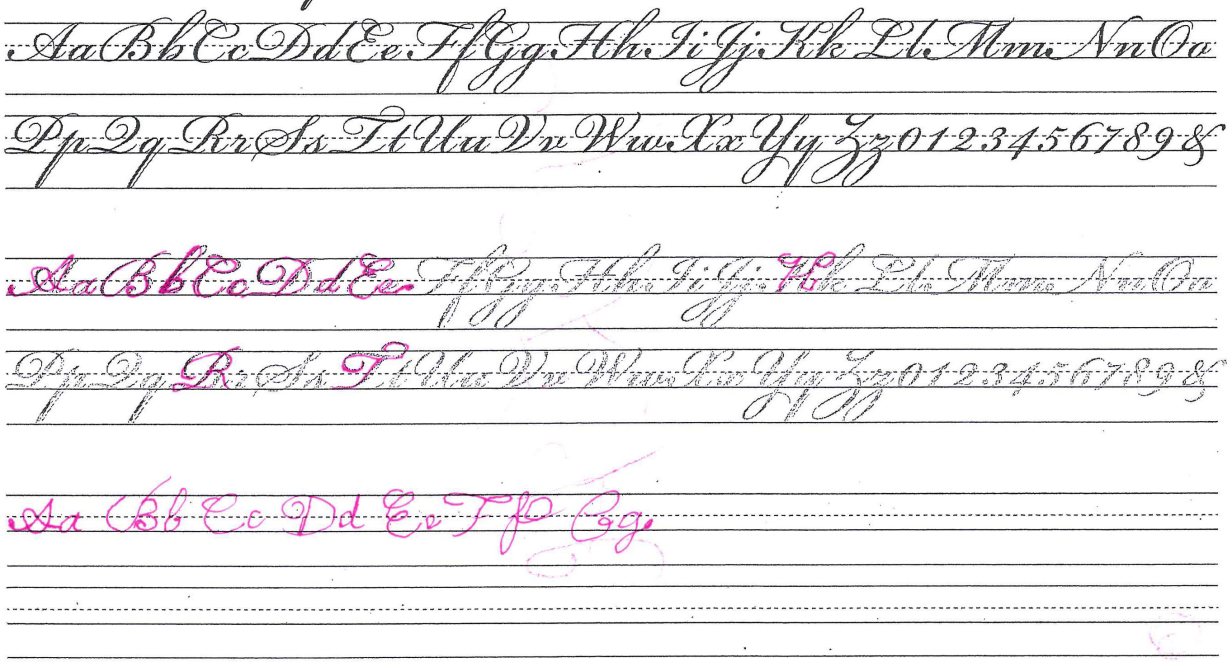

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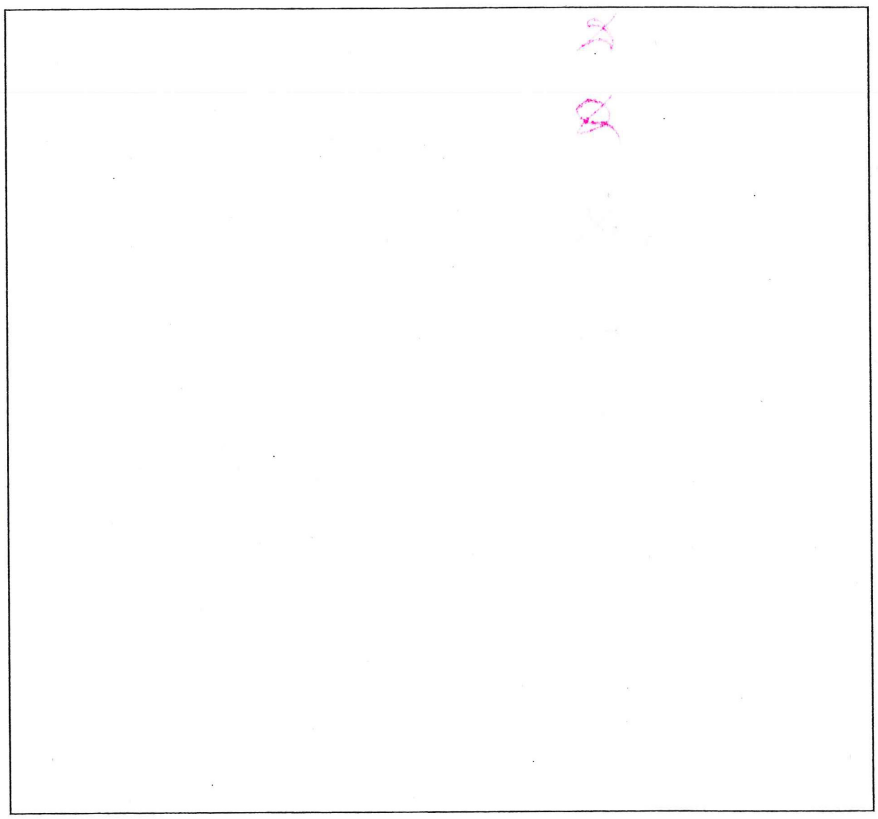

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Art

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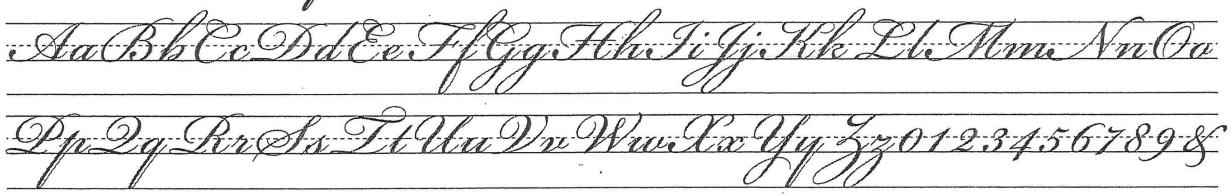

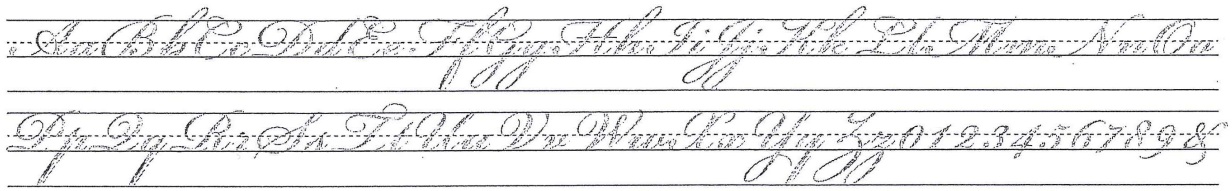

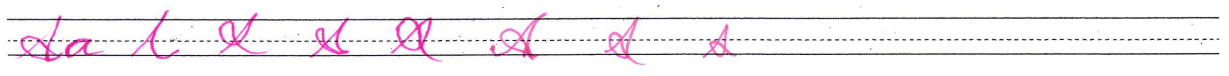

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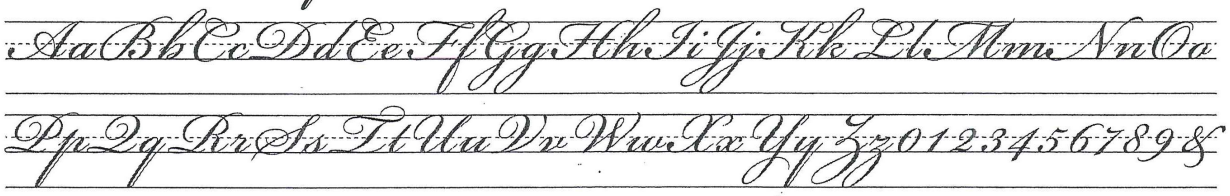

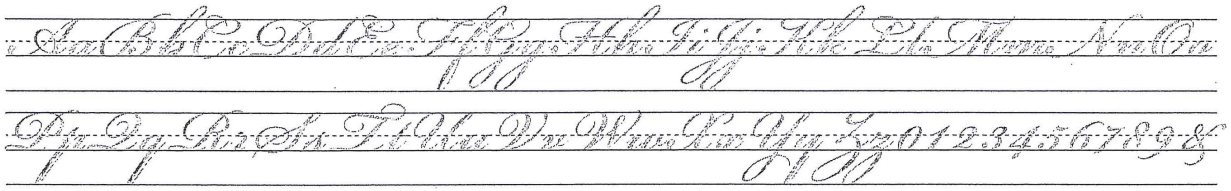

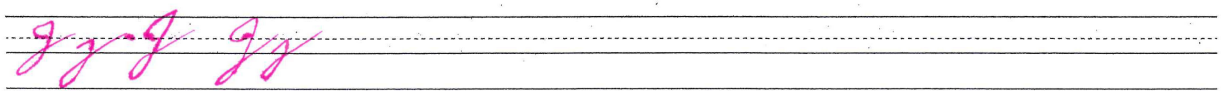

Name: _____ Age: _____

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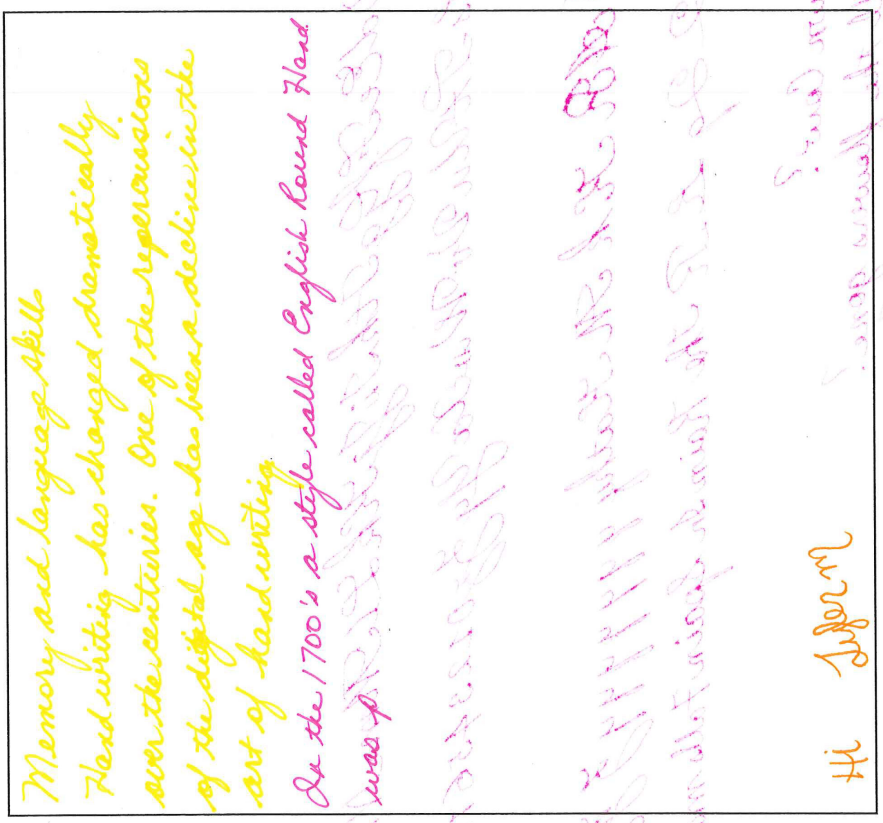

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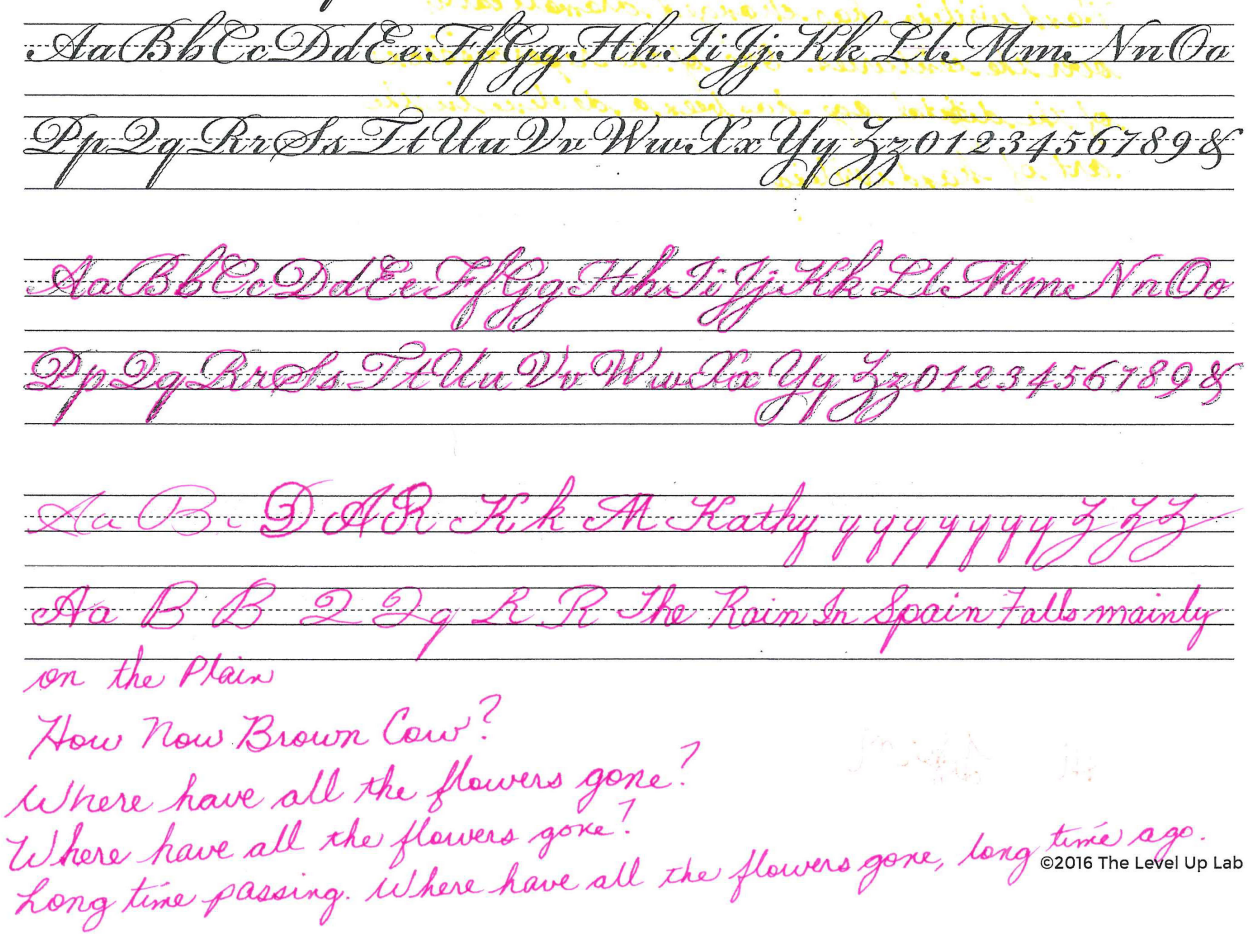

Name: Gav Age: 19

Art

The Art of Handwriting

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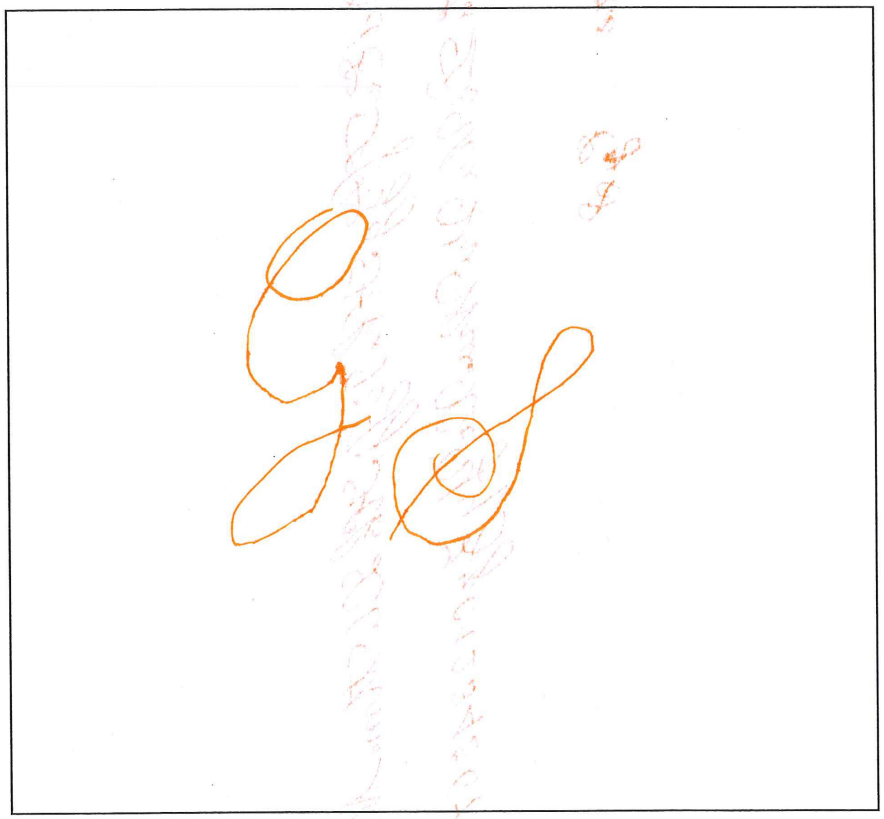

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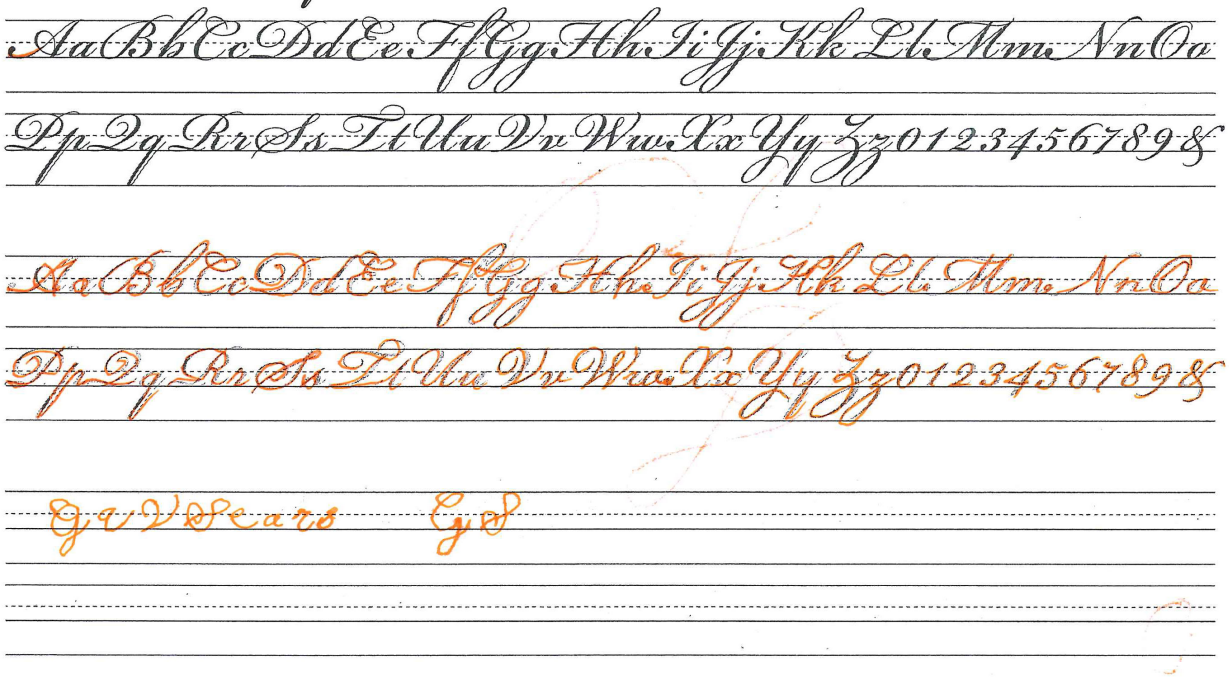

Name: Hector D Leon M. Age: 23

Art

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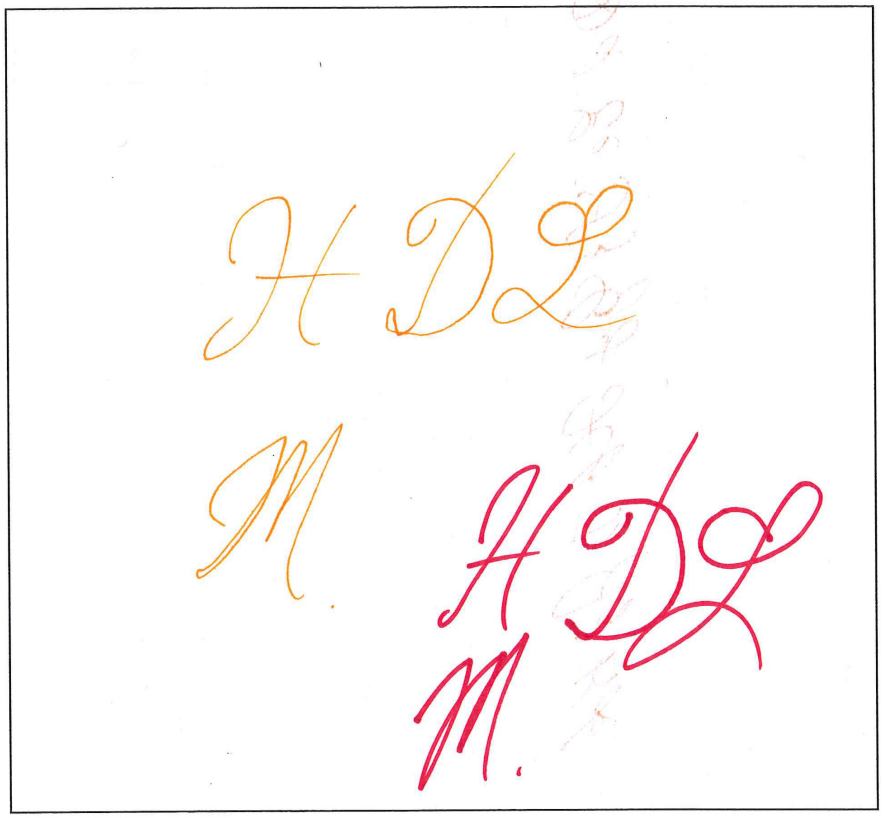

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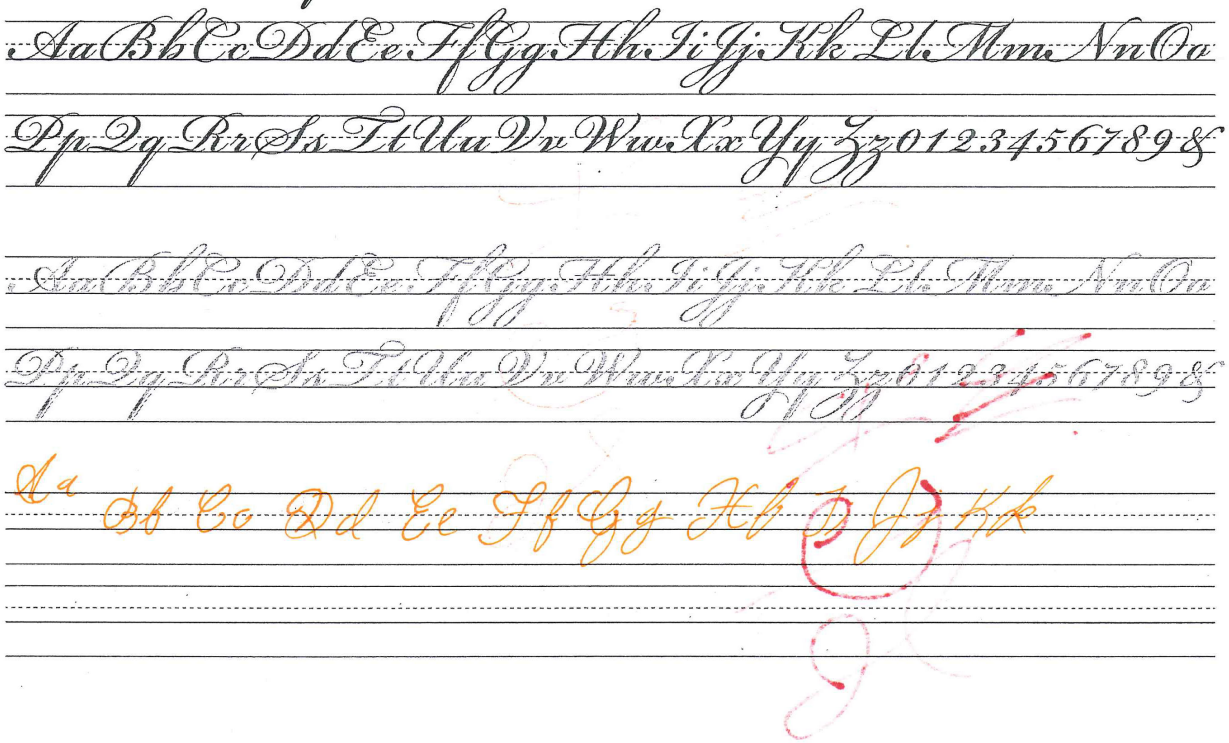

Name: Anna Age: 34

Art

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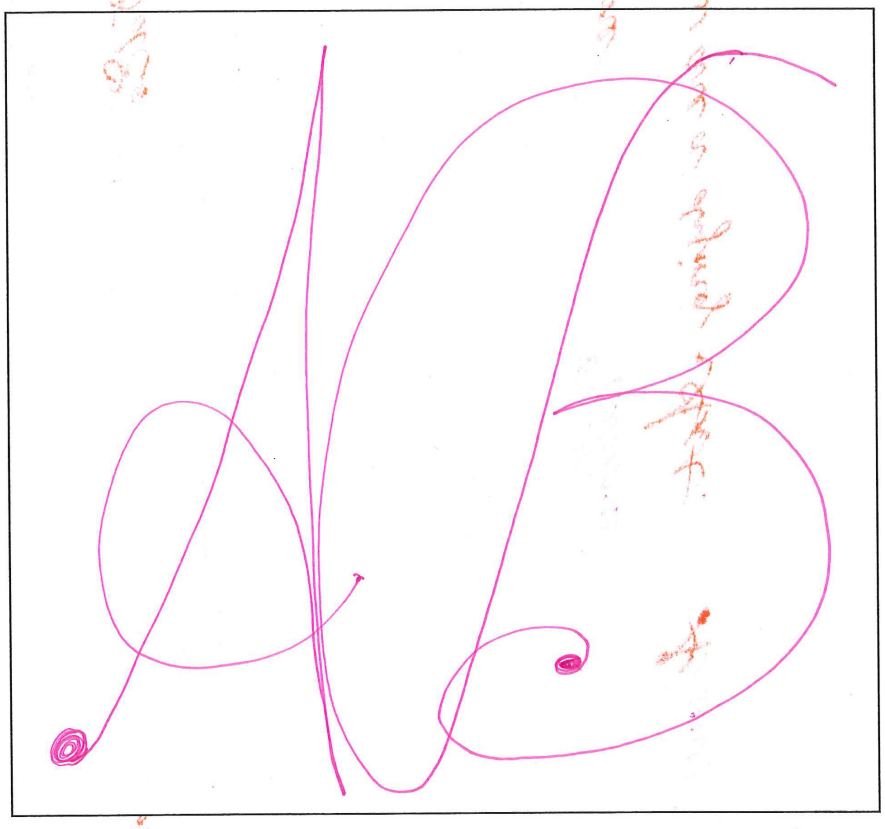

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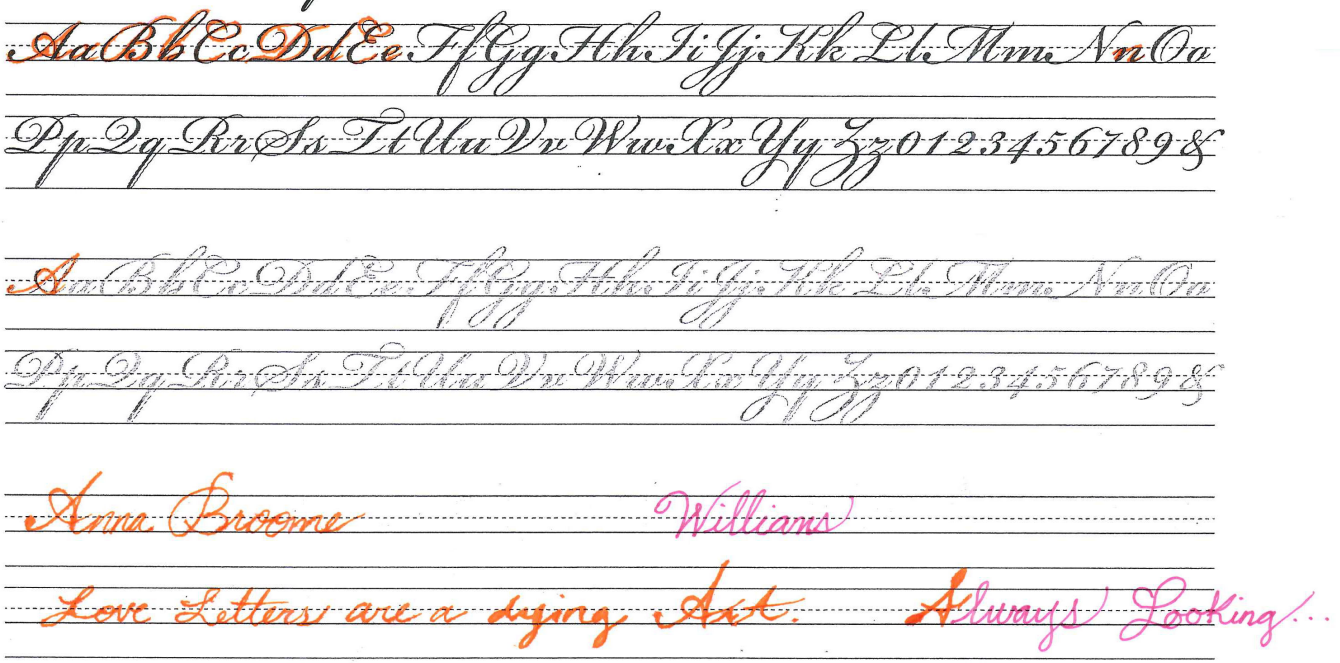

Name: Nick Age: 21

Art

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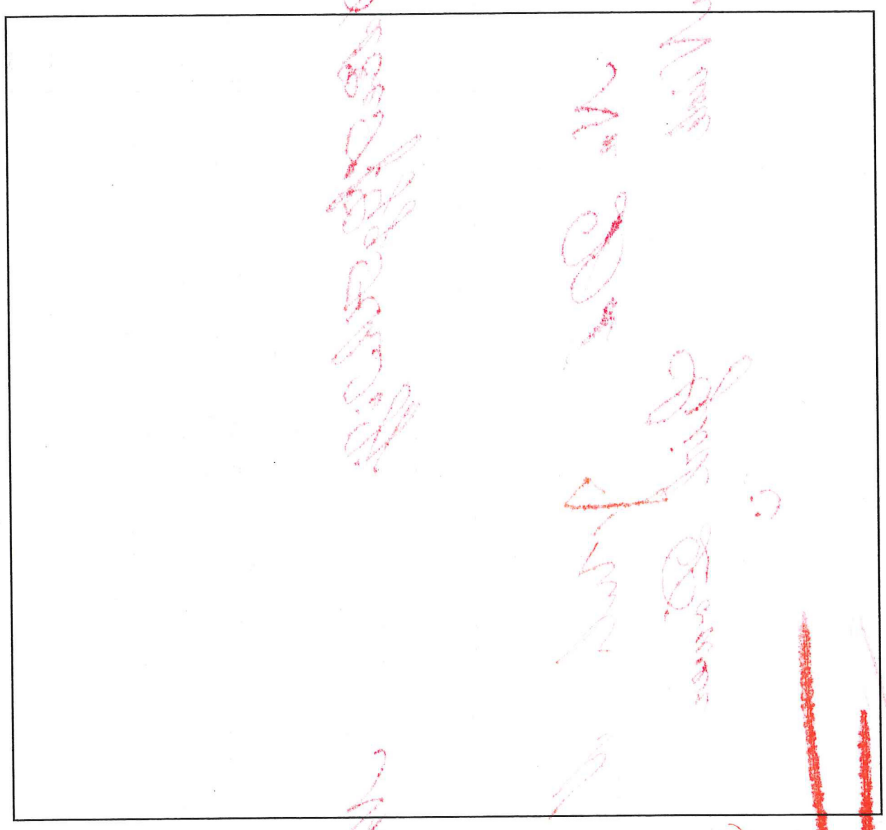

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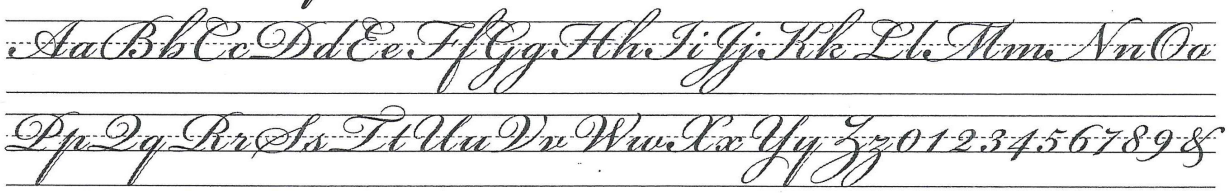

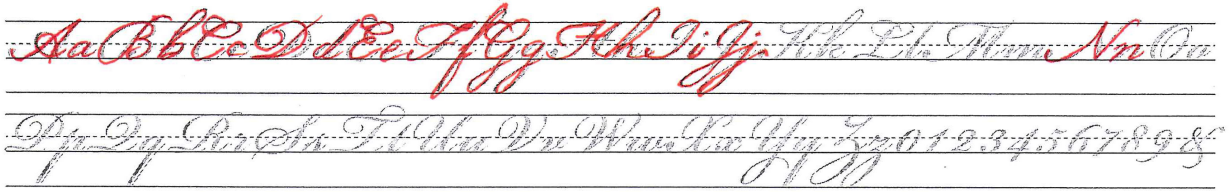

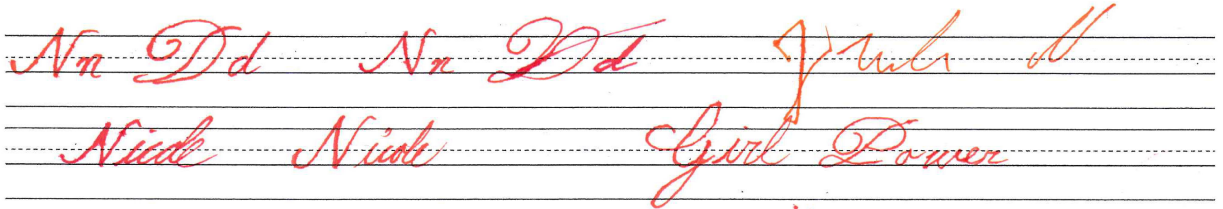

Name: Jess Age: 22

Art

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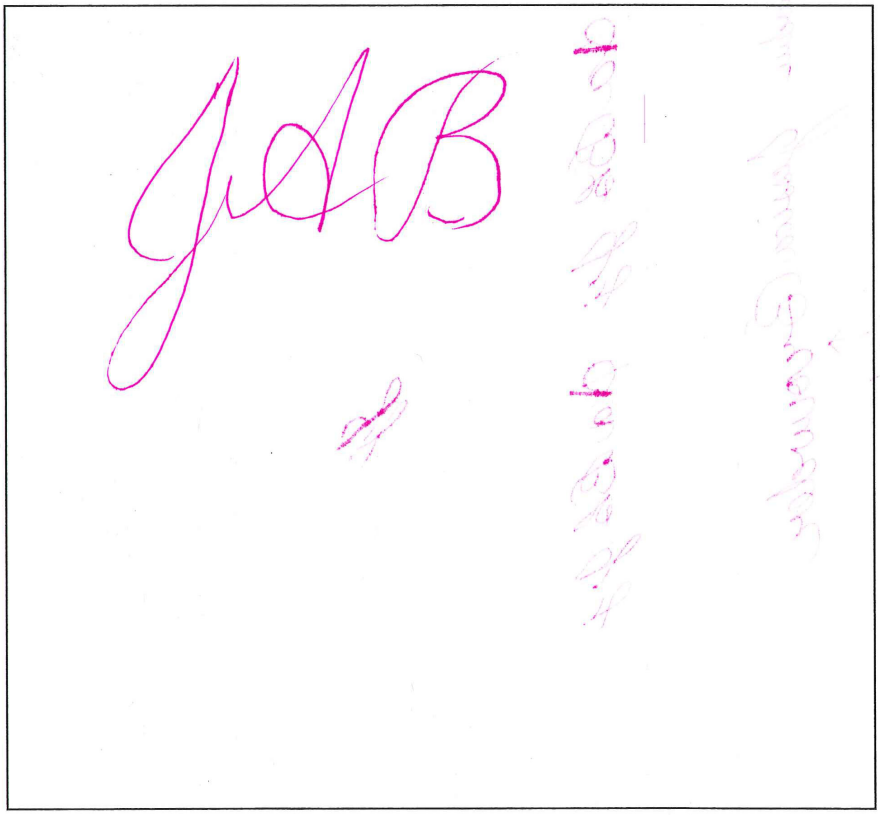

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Art

Bickham Script

Aa Bb Cc Dd Ee Ff Gg Hh Ii Jj Kk Ll Mm Nn Oo

Pp Qq Rr Ss Tt Uu Vv Ww Xx Yy Zz 0 1 2 3 4 5 6 7 8 9 &

Aa Bb Cc Dd Ee Ff Gg Hh Ii Jj Kk Ll Mm Nn Oo

Pp Qq Rr Ss Tt Uu Vv Ww Xx Yy Zz 0 1 2 3 4 5 6 7 8 9 &

Aa Bb Jj Aa Bb Jj Aa Bb Jj

Jessica Browder Jessica Browder

YIKES!

Name: _____ Age: _____

Art

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Art

Bickham Script

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Pp Qq Rr Ss Tt Uu Vv Ww Xx Yy Zz 0 1 2 3 4 5 6 7 8 9 &

Aa Bb Cc Dd Ee Ff Gg Hh Ii Jj Kk Ll Mm Nn Oo

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D

Name: _____ Age: _____

Art

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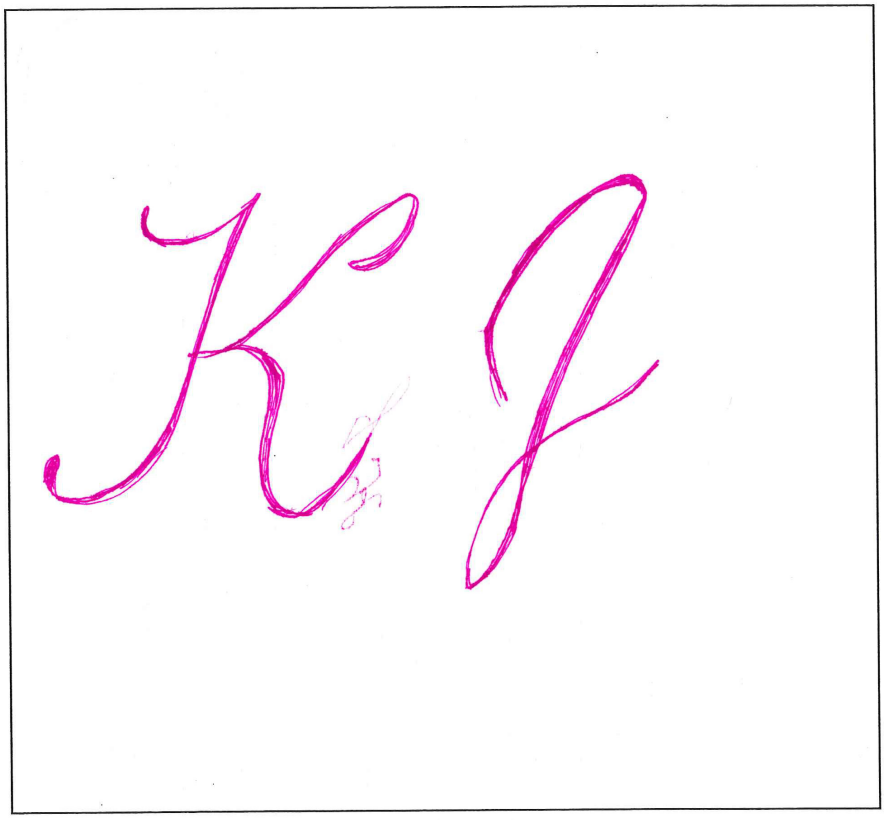

Subjects:

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Art

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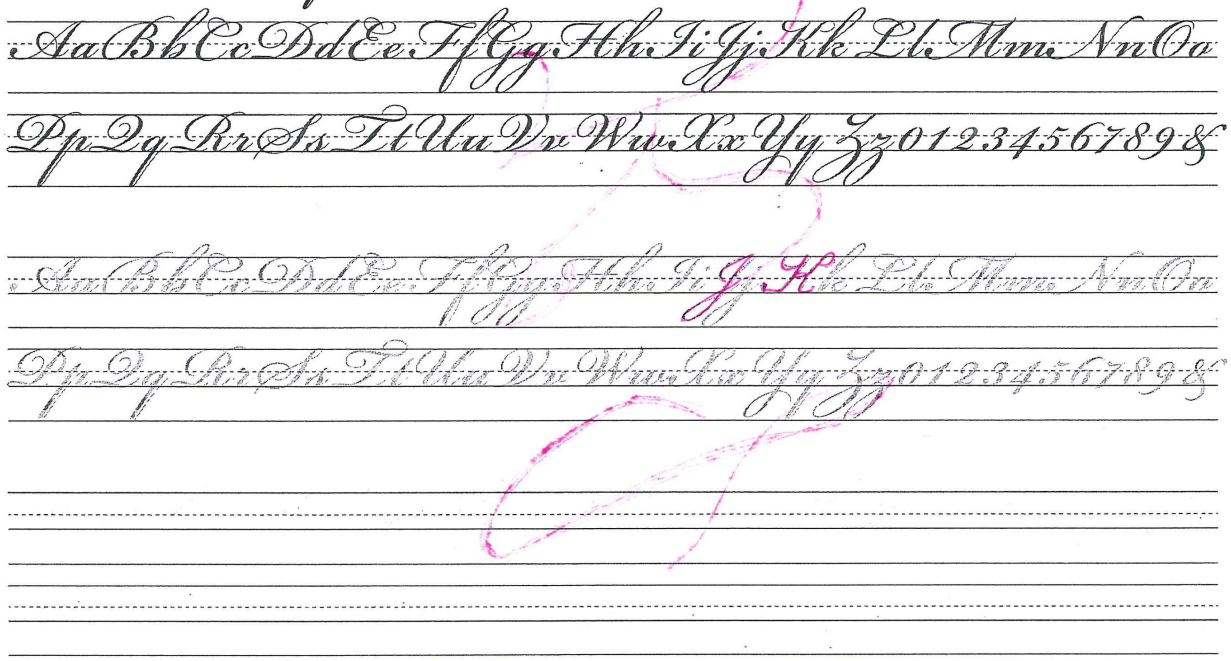

Name: _____ Age: _____

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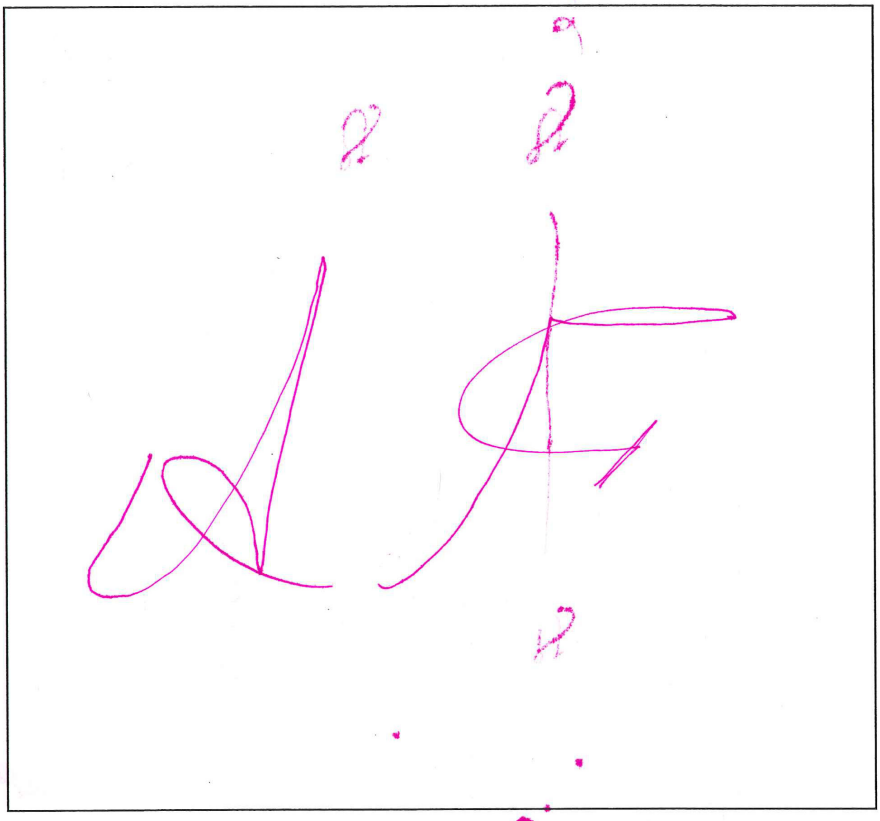

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Pp Qq Rr Ss Tt Uu Vv Ww Xx Yy Zz 0 1 2 3 4 5 6 7 8 9 &

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Aa Bb Cc Dd Ee Ff Gg Hh Ii Jj Kk Ll Mm Nn Oo

Pp Qq Rr Ss Tt Uu Vv Ww Xx Yy Zz 0 1 2 3 4 5 6 7 8 9 &

Rumta Ali

Name: Carla Age: 34

Art

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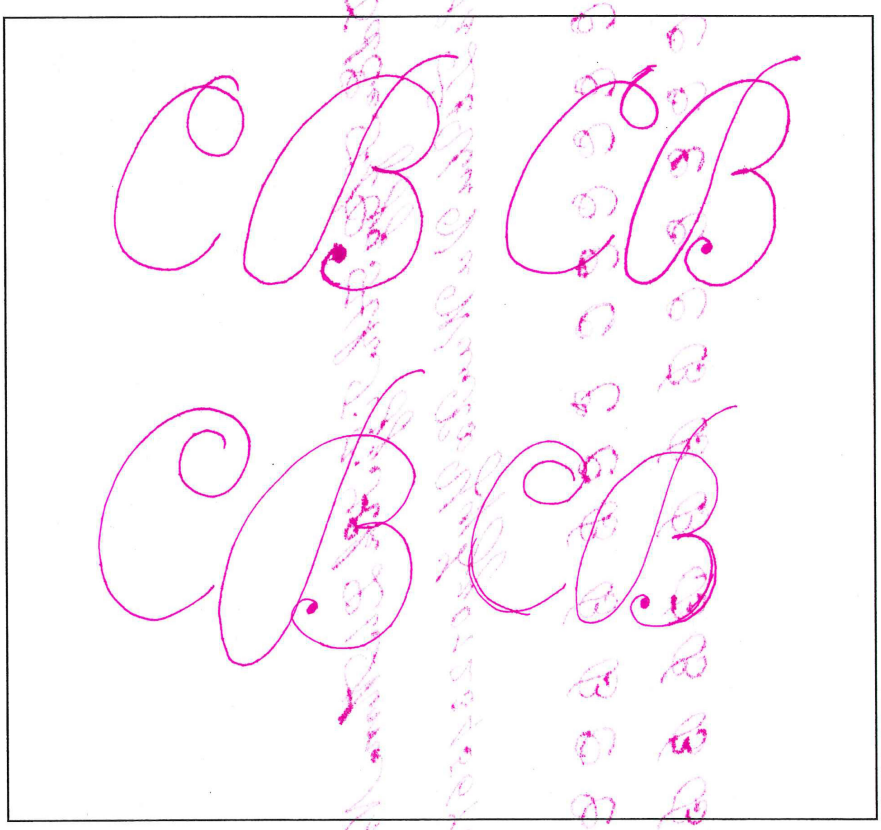

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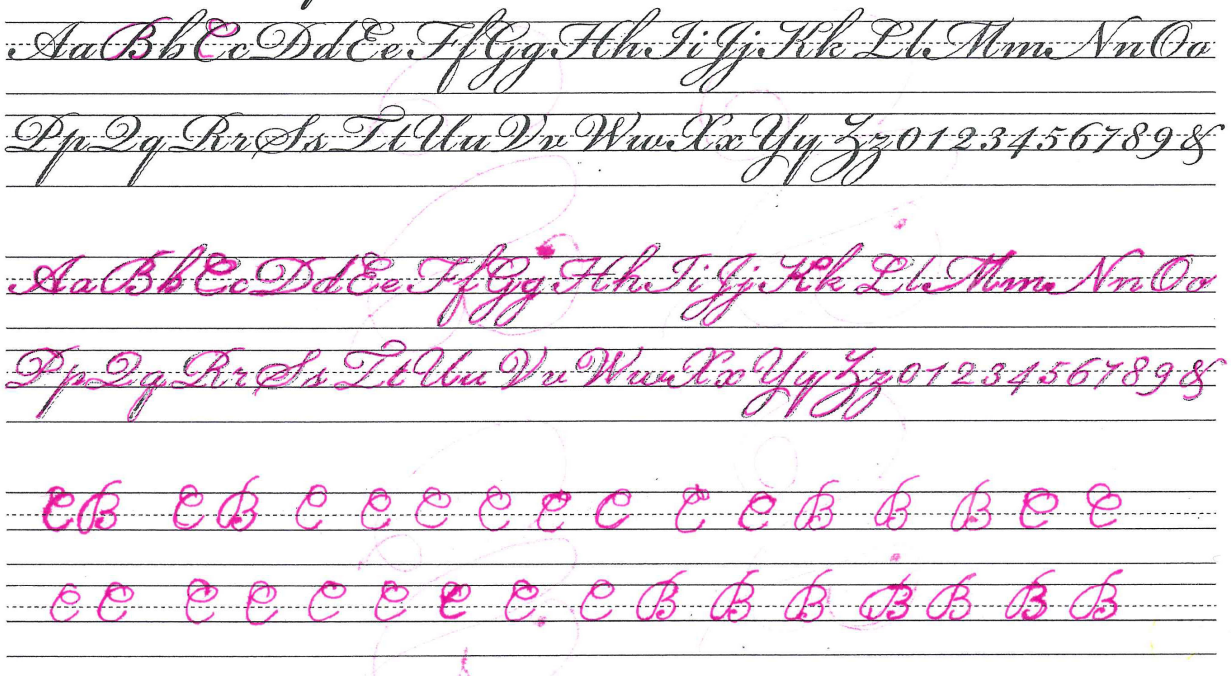

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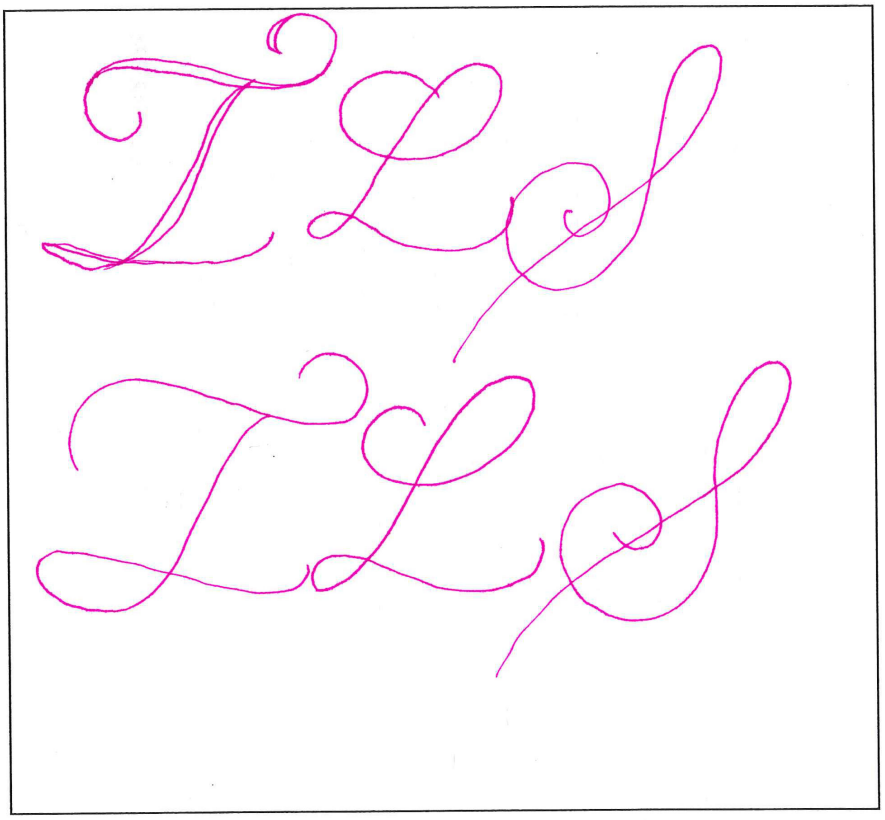

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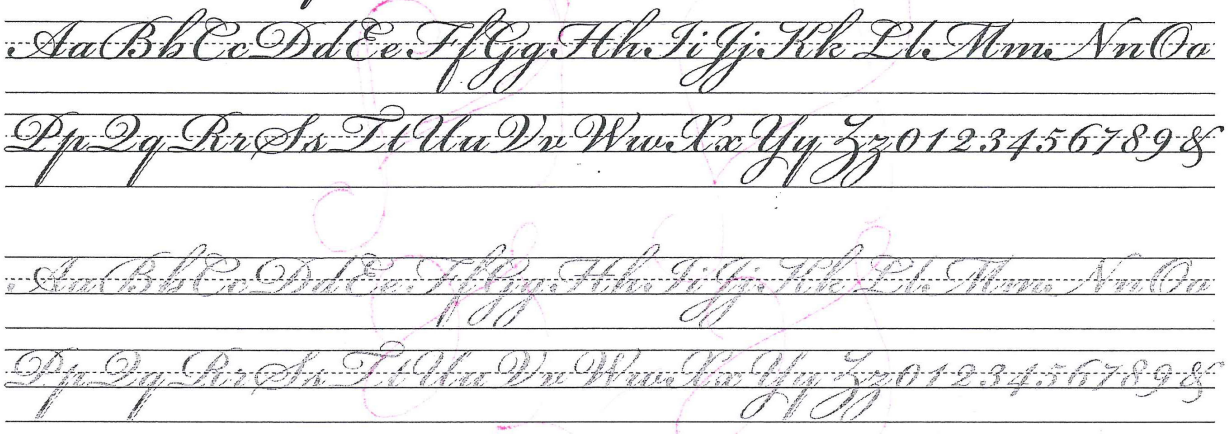

Name: _____ Age: _____

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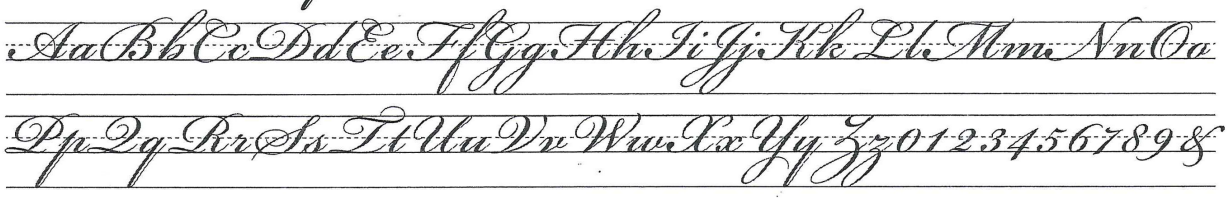

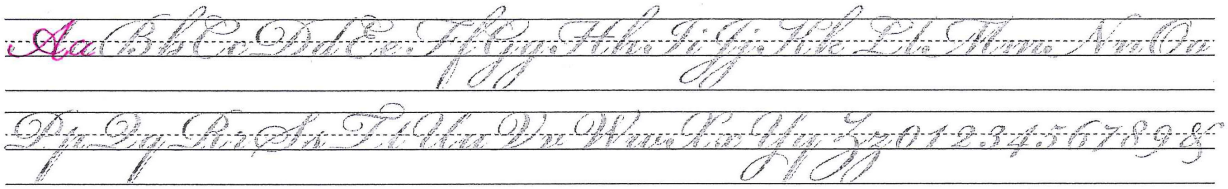

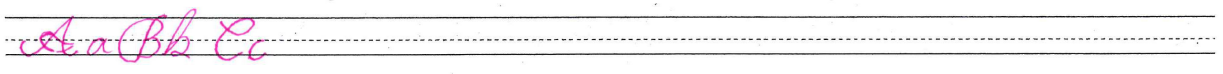

Name: _____ Age: _____

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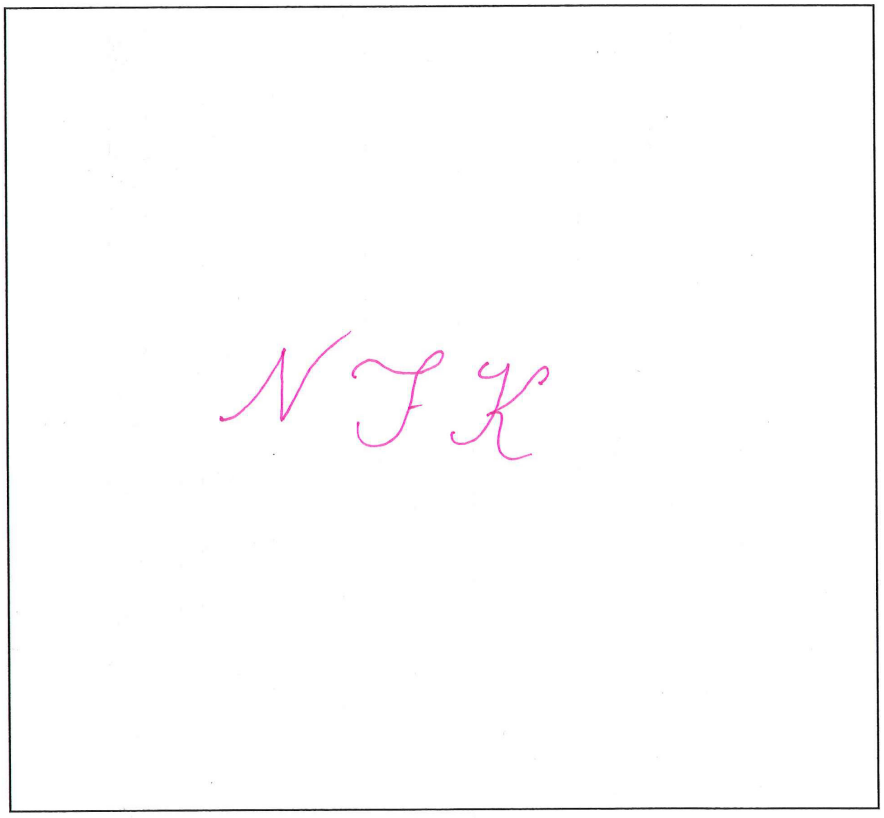

Subjects:

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Art

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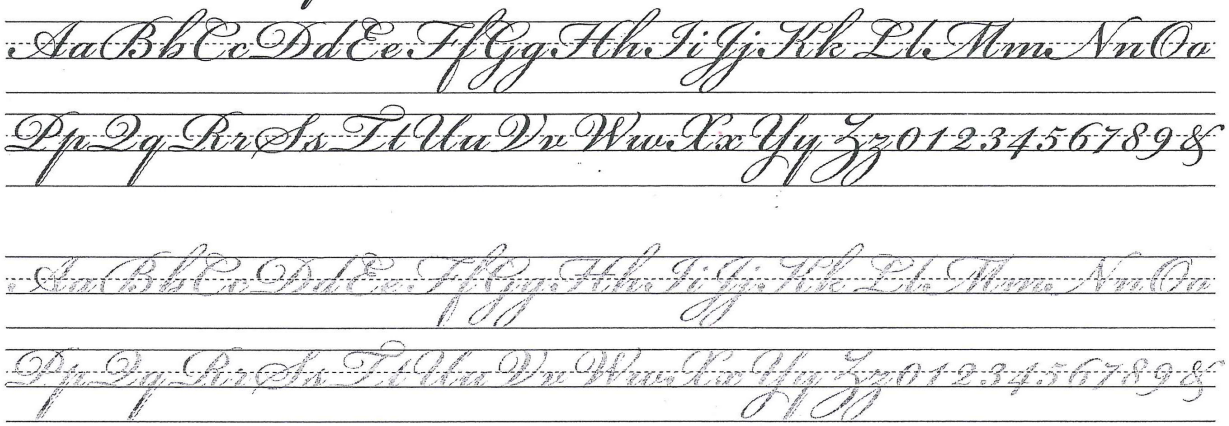

Name: Kathy Morley Age: 59

Art

The Art of Handwriting

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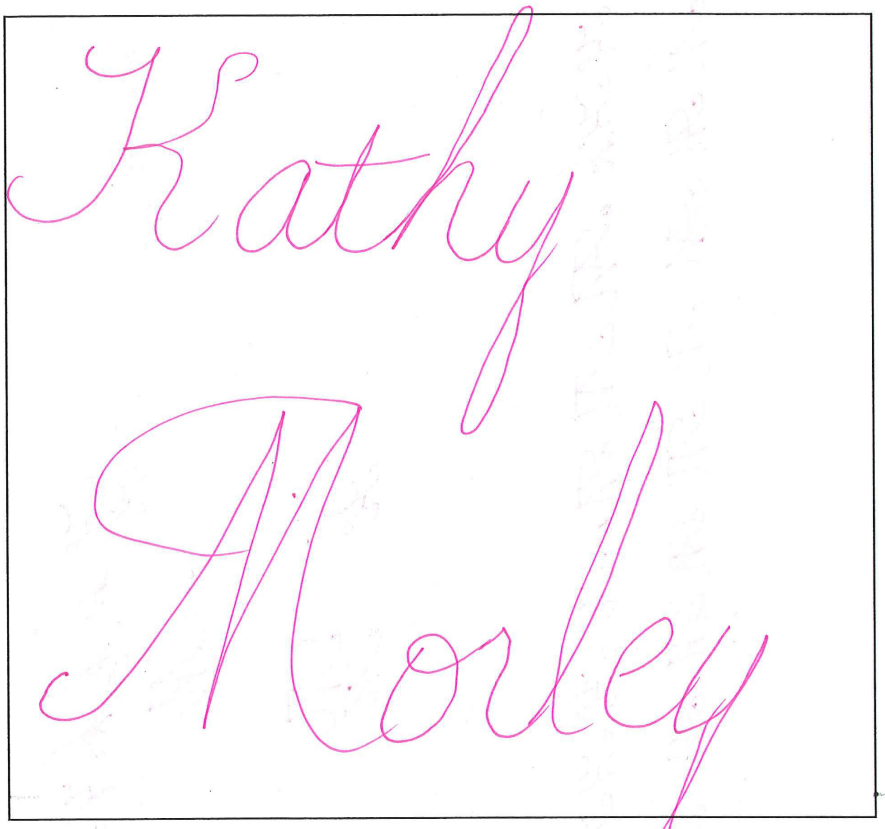

Subjects:

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Art

Bickham Script

Name: Cantava Age: 20

Art

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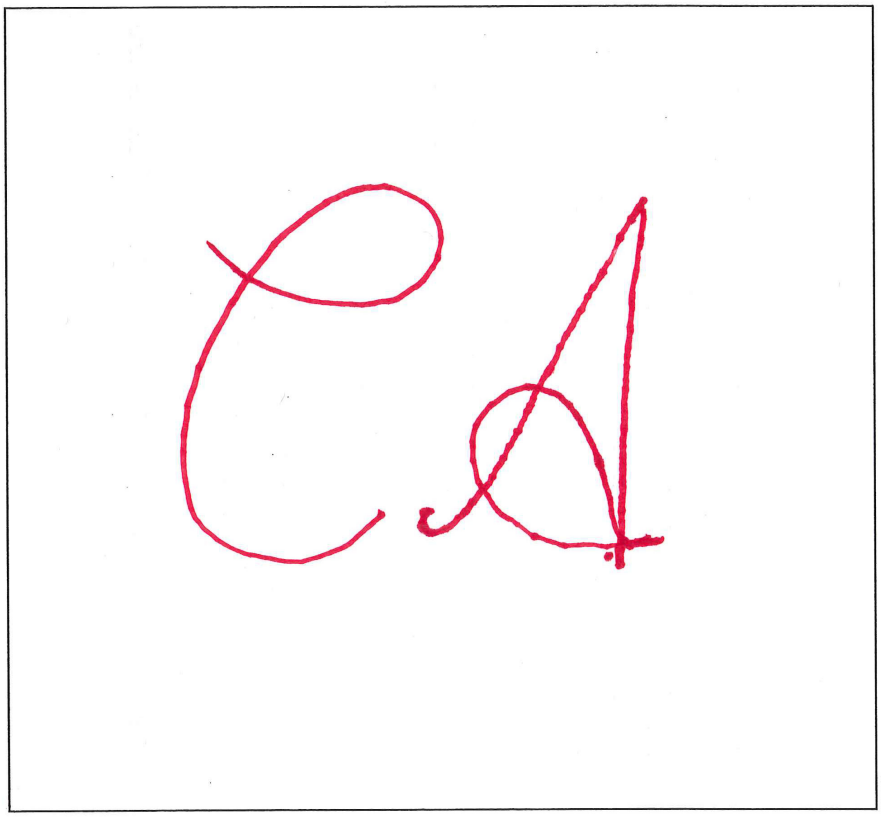
2. Flip the page back over and draw them big in the blank space.



Subjects:

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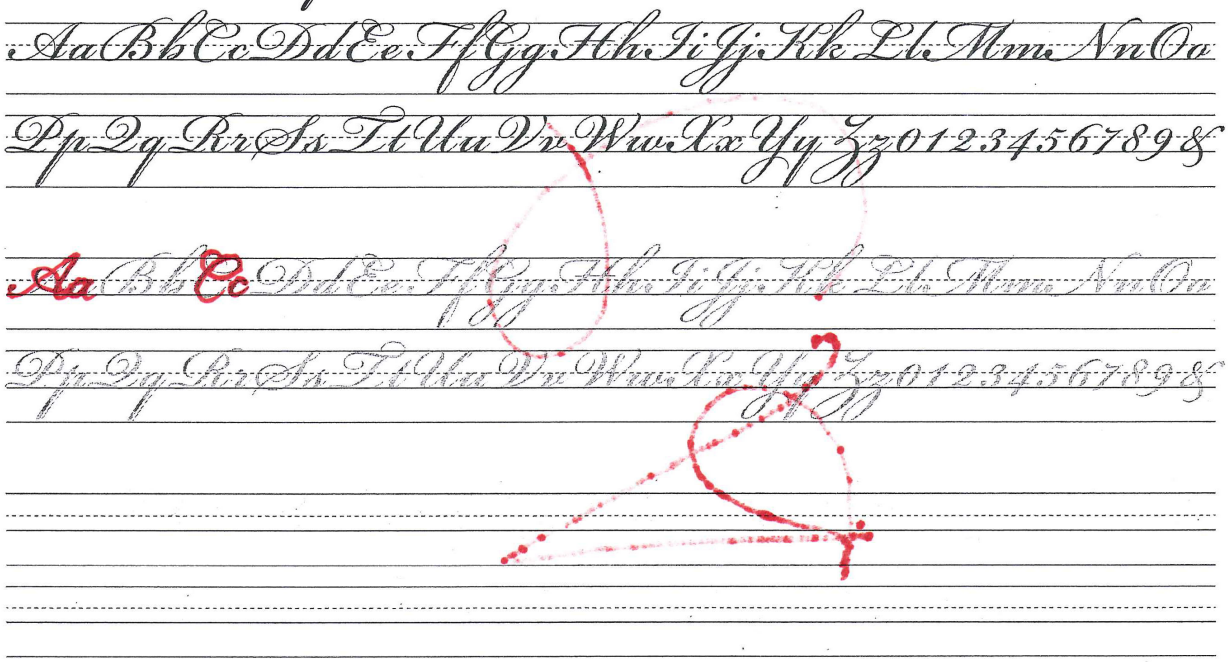
Art

Bickham Script



Name: [illegible] Age: 34

Art

The Art of Handwriting

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Subjects:

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Art

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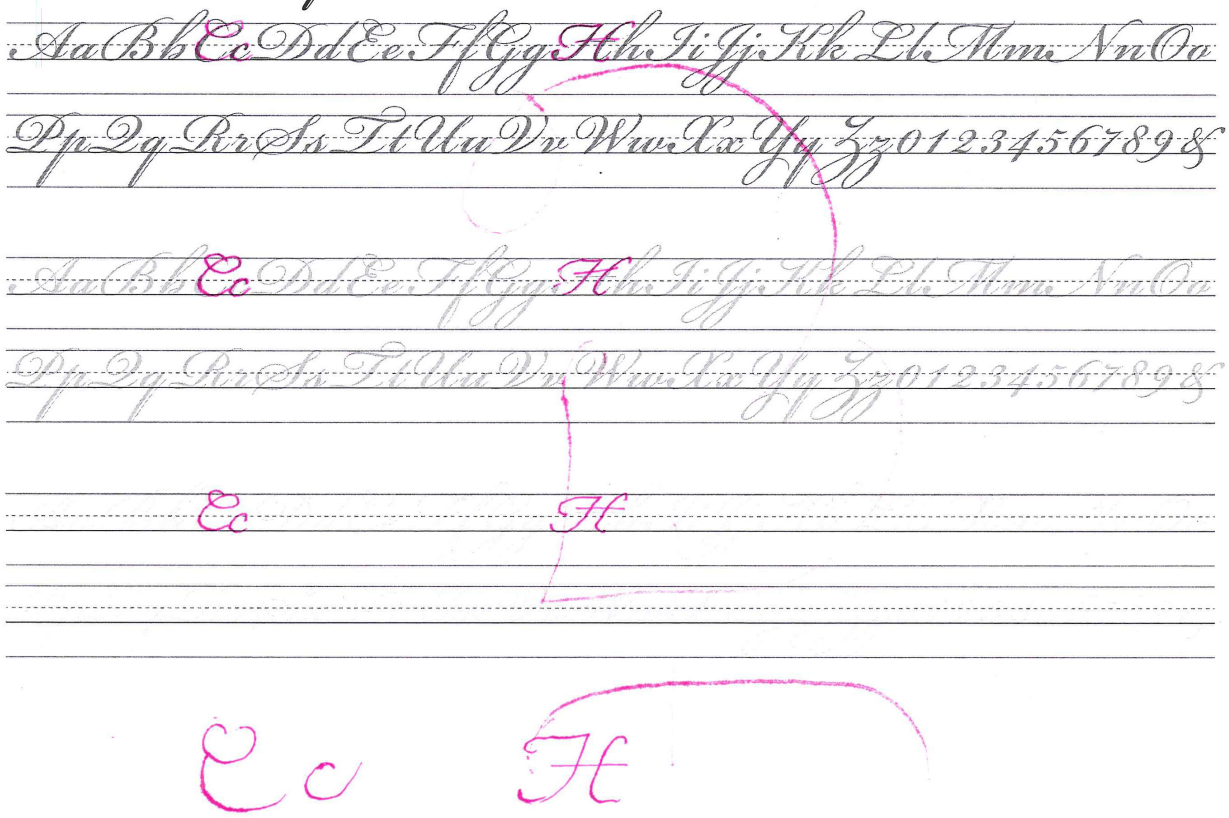


Name: JEAN Age: 53

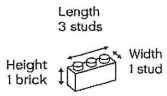
Math

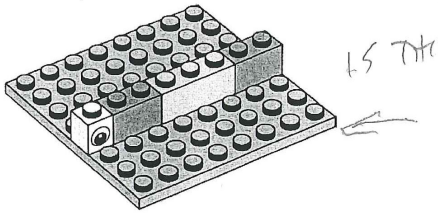
More to Math

1. Build a snake that is 10 studs long.
   How many bricks did you use? 3

2. Make another snake that is 14 studs long.
   Can you do it using only 6 bricks? Yes No

3. Now build the longest snake possible.
   How many studs was it? all of them no thanks
   How many bricks was it? I'll





BASE ✓

IS THIS A REQUIREMENT ?

AND HOW DO I USE THE WORKSHEET TO MAKE THE LONGEST SNAKE POSSIBLE?

Subjects:

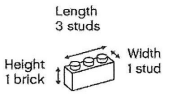
I enjoyed this project: ☺ ☹

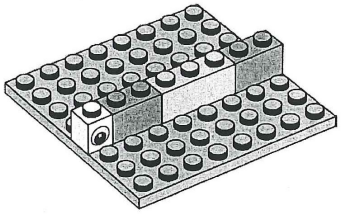
Name: Kinsey M. Age: 20

Math

More to Math

1. Build a snake that is 10 studs long.
   How many bricks did you use? 3
2. Make another snake that is 14 studs long.
   Can you do it using only 6 bricks? (Yes) No
3. Now build the longest snake possible.
   How many studs was it? It would be a lot
   How many bricks was it? _____





Subjects:

I enjoyed this project: ☺ ☹

Name: _____ Age: _____

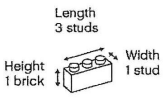
Math

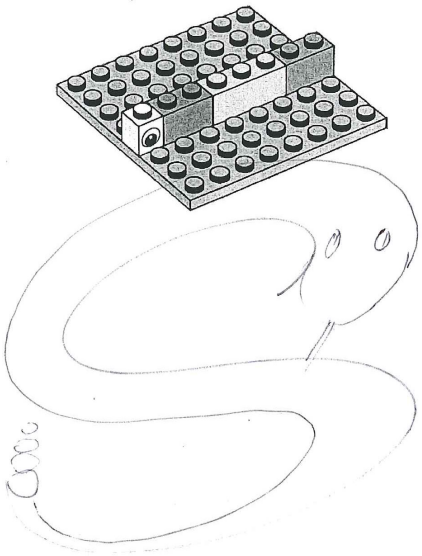
More to Math

1. Build a snake that is 10 studs long.
   How many bricks did you use? _____

2. Make another snake that is 14 studs long.
   Can you do it using only 6 bricks? Yes No

3. Now build the longest snake possible.
   How many studs was it? _____
   How many bricks was it? _____





Subjects: ~~📊~~ 🔤 📐

I enjoyed this project: ☺ ☹

Name: GaV Age: 14

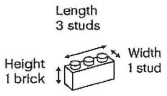
Math

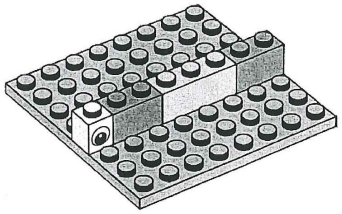
More to Math

1. Build a snake that is 10 studs long.
   How many bricks did you use? 4

2. Make another snake that is 14 studs long.
   Can you do it using only 6 bricks? (Yes) No

3. Now build the longest snake possible.
   How many studs was it? 16
   How many bricks was it? 6





Subjects:

I enjoyed this project:

Name: Anna Age: 34

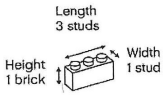
Math

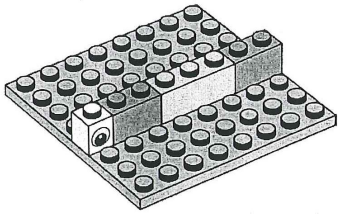
More to Math

1. Build a snake that is 10 studs long.
   How many bricks did you use? 2

2. Make another snake that is 14 studs long.
   Can you do it using only 6 bricks? (Yes) No

3. Now build the longest snake possible.
   How many studs was it? 28
   How many bricks was it? 4





Subjects:

I enjoyed this project: ☺ ☹

Name: Kathy Morley Age: 59

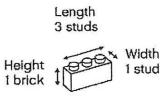
Math

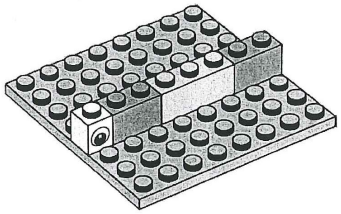
More to Math

1. Build a snake that is 10 studs long.
   How many bricks did you use? 5

2. Make another snake that is 14 studs long.
   Can you do it using only 6 bricks? (Yes) No

3. Now build the longest snake possible.
   How many studs was it? 16
   How many bricks was it? 7





Subjects:

I enjoyed this project: ☺ ☹

Name: Cass Age: 34

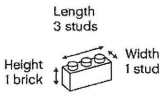
Math

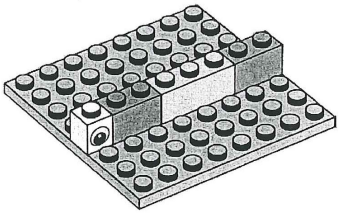
More to Math

1. Build a snake that is 10 studs long.
   How many bricks did you use? 5

2. Make another snake that is 14 studs long.
   Can you do it using only 6 bricks? Yes (No)

3. Now build the longest snake possible.
   How many studs was it? 15
   How many bricks was it? 8





Subjects:

I enjoyed this project:

Name: Fox Age: 28

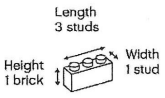
Math

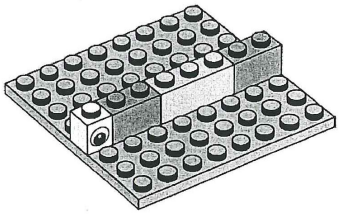
More to Math

1. Build a snake that is 10 studs long.
   How many bricks did you use? 3

2. Make another snake that is 14 studs long.
   Can you do it using only 6 bricks? (Yes) No

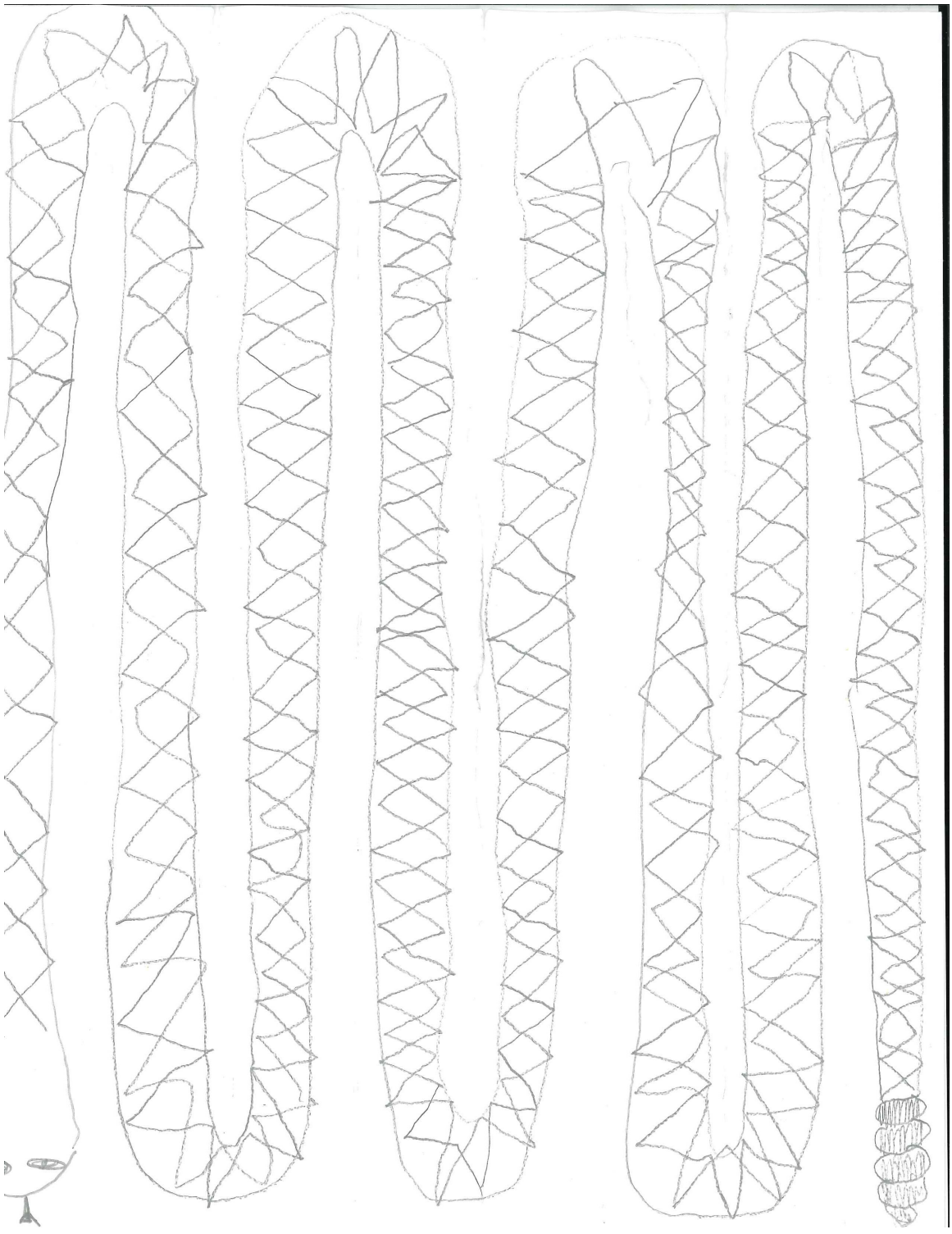
3. Now build the longest snake possible.
   How many studs was it? 256
   How many bricks was it? 72





Subjects:

I enjoyed this project: ☺ ☹



Music

Make Some Noise

PS3 ... frozen, ...

Enter your score and contact information in the logbook of high-scores for a chance to compete in the Level Up Rocksmith™ Challenge. The winner will receive the competition guitar. The competition will be open all week. Top two scores will compete in the finals on the last day.

Contact:	THEAUDIODIARY@AOL	Score:	12,011
Contact:	hvr3@txstate.edu	Score:	71,330
Contact:	yasiel.figueroa@live.com	Score:	3,000
Contact:		Score:	
Contact:		Score:	
Contact:		Score:	
Contact:		Score:	
Contact:		Score:	
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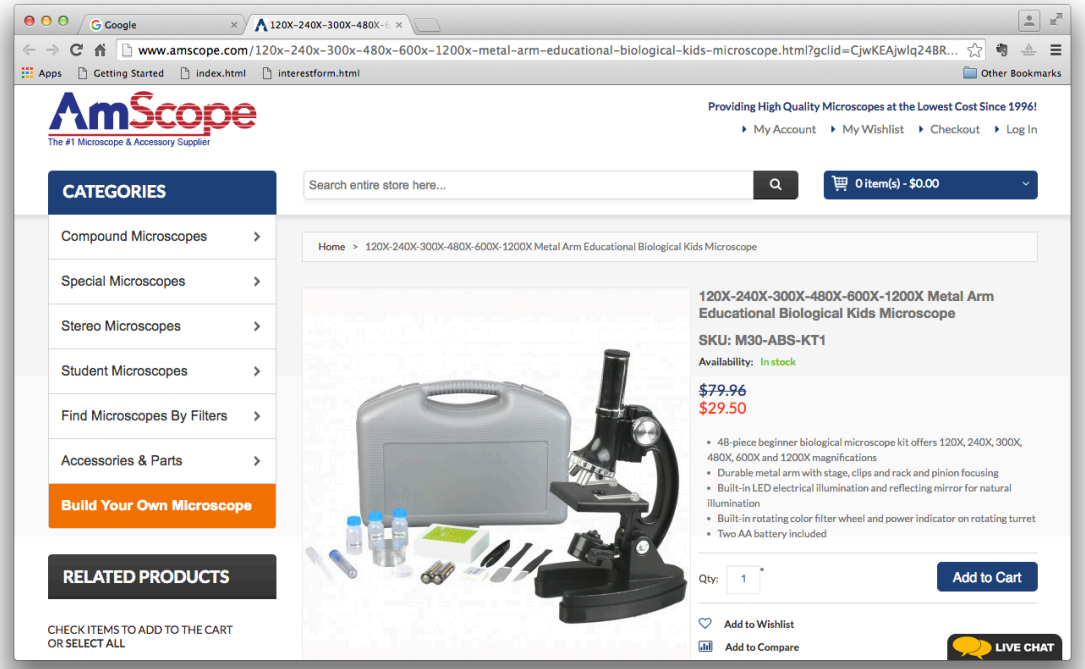
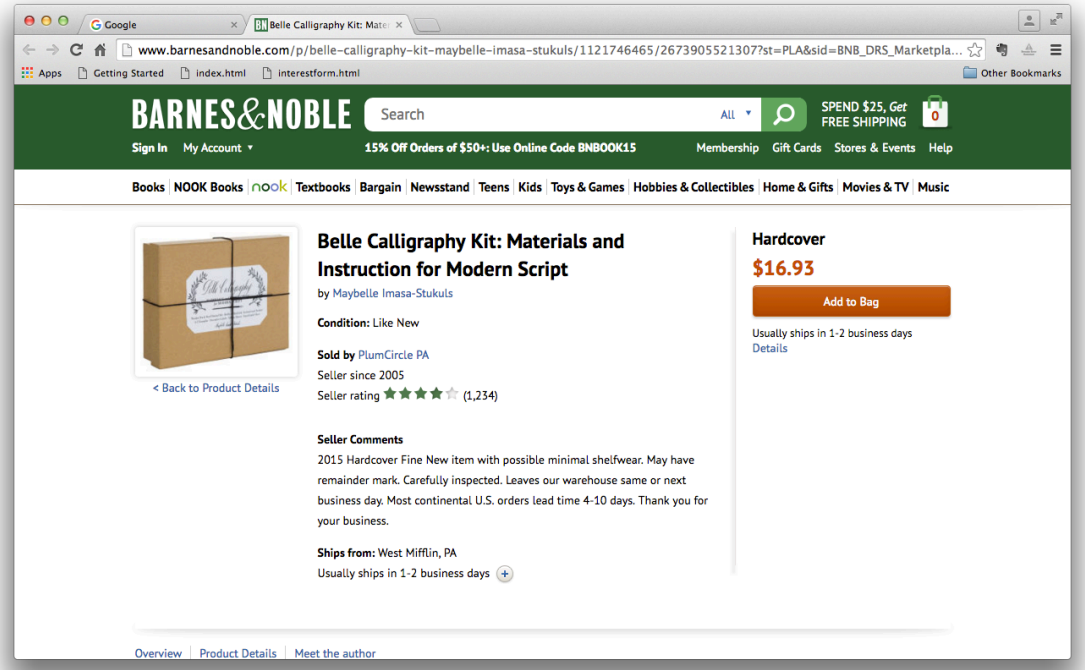
Subjects:

APPENDIX E: LEVEL UP LEARNING LAB KIT PIECES

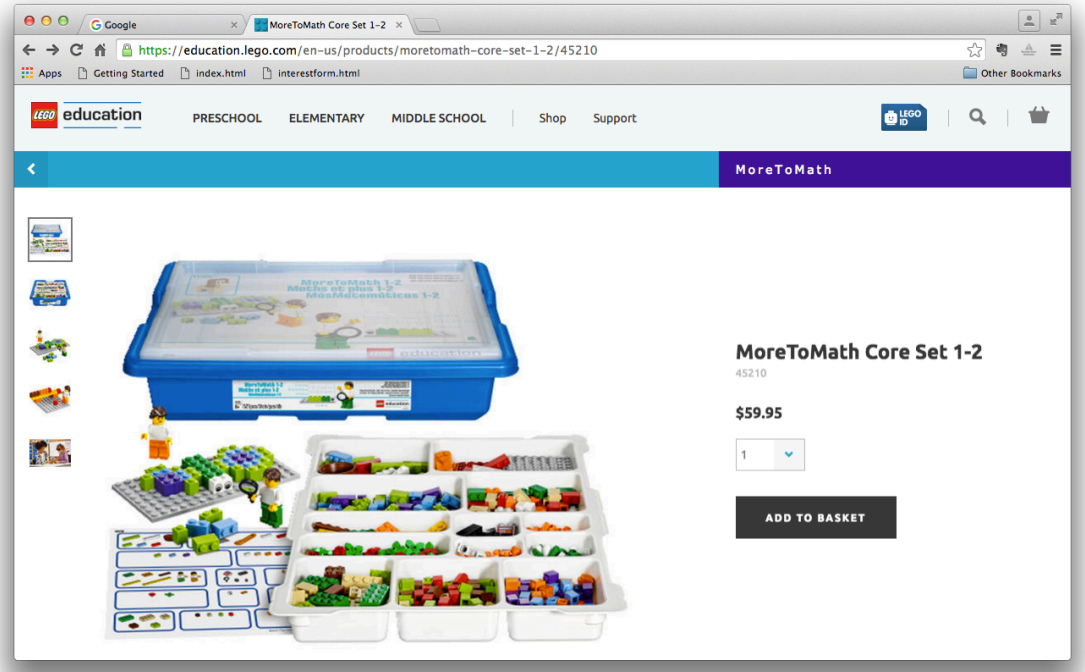
Science Station



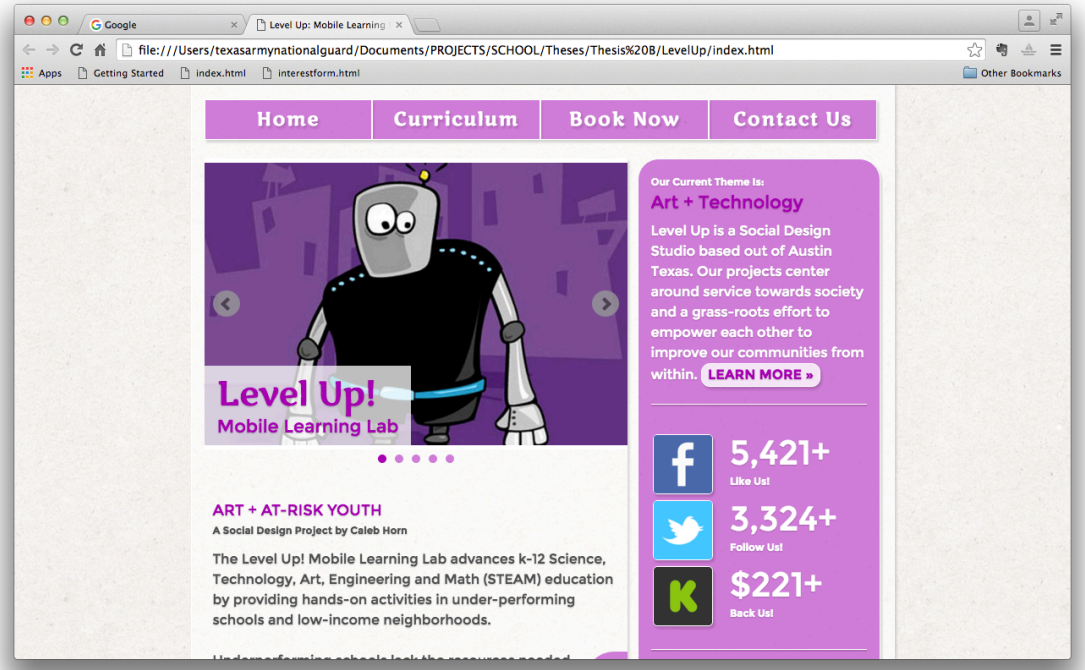
Art Station



Math Station



APPENDIX F: LEVEL UP WEBSITE MOCKUP



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