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Develop Fundamentals to Unlock Potential

creativity

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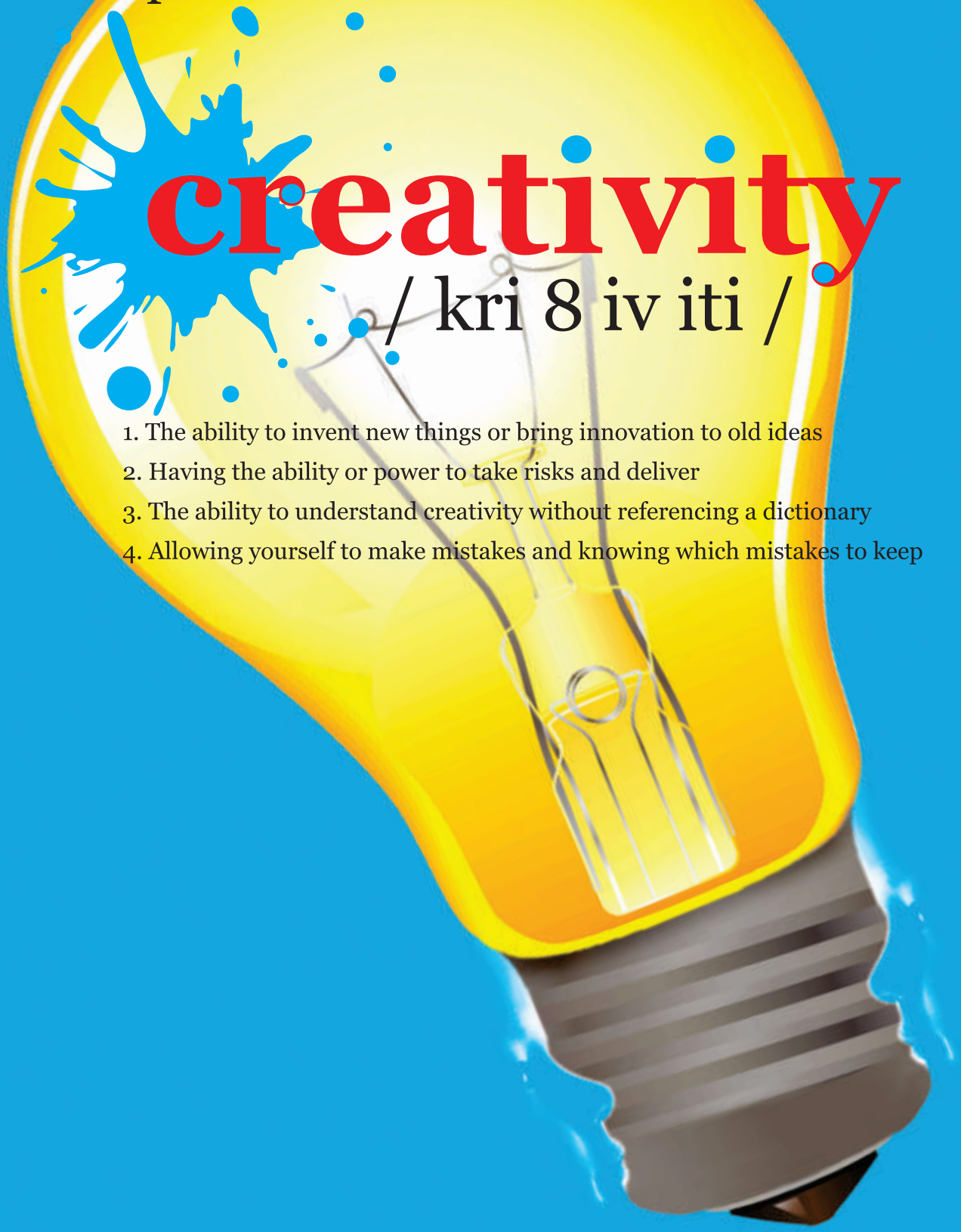
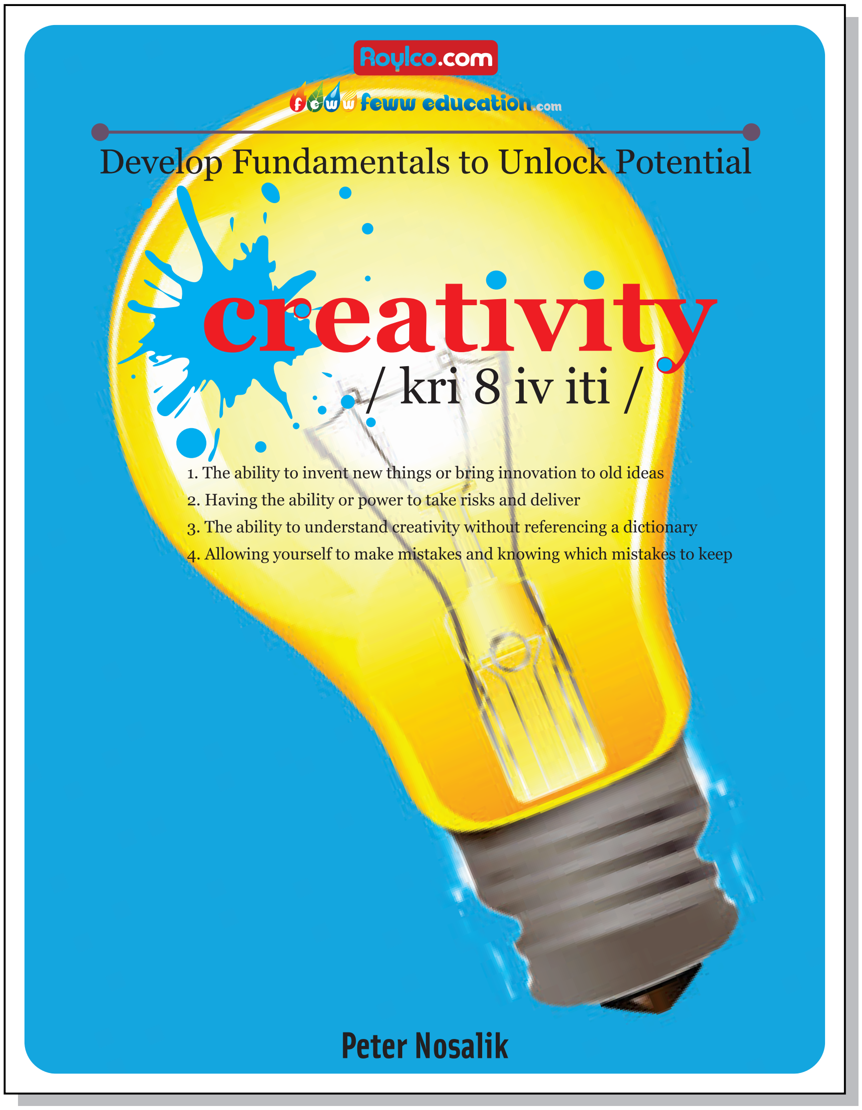
1. The ability to invent new things or bring innovation to old ideas
2. Having the ability or power to take risks and deliver
3. The ability to understand creativity without referencing a dictionary
4. Allowing yourself to make mistakes and knowing which mistakes to keep



Peter Nosalik

creativity



Canada: 30 Northland Road, Waterloo, Ontario, N2V 1Y1
USA: 3251 Abbeville Hwy., Anderson, SC 29624
Europe: 50 rue Liancourt, Paris, France, 75014
United Kingdom: Site E, Lakeside Business Park, Broadway Lane, South Cerney, Cirencester, Gloucestershire, GL7 5XL, UK

Peter Nosalik: 30 Northland Road, Waterloo, Ontario, CANADA N2V 1Y1
Email: peter@roylco.com **Twitter: @peternosalik**

www.roylco.com

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Introduction

Our world is changing. Think about a child entering kindergarten this year. For years and years we used to know hot to educate and prepare kindergarten children for the world they would face when they graduated from high school. But when a child entering kindergarten this year graduated from highschool in 12 years, 80% of the jobs available to him or her have not been invented yet. How do we prepare children for a world that we can't imagine or predict?

When I was a child I remember my mother driving her car to the gas station. An attendant would come out as she drove up and fill up her gas tank, clean the windows and check the oil. Just twenty years later, as a young man, when I pulled up to the gas station, I got out and pumped the gas myself. Twenty years after that I purchased an electric car. Now I plug it in at home each night and happily drive by the gas station without ever stopping. In twenty years from now, I expect that I won't even own a car. Instead I will use my cell phone to call for a car which will drive me to wherever I want to go. In other words, in my life time, not only has the gas station attendant become extinct, the whole gas station industry is becoming obsolete. That is just one simple example that illustrates how our economy is changing in a way that is both dramatic and dynamic.

Not only is our world changing, but the rate of change is increasing. How do we educate our students to deal with the pace of change? How do we prepare children for a world we can't even imagine? I believe the only thing we can do is stimulate our students to be creative. Developing creativity not only helps students prepare for the jobs of the future, creativity also enables students to contribute to this new world. Creative students will not only survive in the future, they will direct the course of change.

Creativity and motivation propel people forward. In fact, they are the only things that propel people forward. Creativity allows people to view problems though new eyes and motivation energizes people to implement these new ideas. I bet the first caveman to invent the wheel was no slacker, and I bet he was able to see the world and his place in it from a broader perspective.

The bad news is that you can't teach creativity. The good news is that you don't need to.

Let me tell you about some experiences I've had and the strategies I've developed to motivate students to work creatively. Once I give you a framework, I'll present some ideas and examples of the type of work we do. You can use these ideas to develop your own. My goal is to encourage creativity, so I encourage you to creatively alter these ideas to work with your students in whatever grade you teach and within your budget.

Photo Courtesy of Shutterstock

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Let's start with a brief look at the rules I've developed for encouraging creativity. After that, I'll expand on each of these rules. Next, I will describe some activities and exercises you can use with your students to reinforce the rules while developing creativity.

There are seven simple rules:

1. Try, try, try again.
2. Learn the rules and then break them.
3. Teach vocabulary to build confidence.
4. Teach techniques to build competence.
5. Fail often and fail big.
6. Steal like an artist.
7. Learn to recognize success.

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What is the opposite of success? Many people are inclined to answer "failure." I don't believe this way of thinking is productive, especially with young children. If they fail, at least they have tried. Failure is a part of the creative process. It's one of the last steps before success. One of my favourite quotes about creativity is this: "Creativity is allowing yourself to make mistakes. Art is knowing which mistakes to keep." So in my mind, the opposite of success isn't failure, it's not trying at all, or worse than that, just giving up. When a student succeeds at anything, they start to realize they can succeed at everything.

There is no success when tasks are too easy. Students need to challenge themselves and take risks. When students fail at these risks, the best outcome is for them to try again. Taking risks and trying again helps students develop confidence. Let's face it, you don't gain confidence by succeeding; you gain confidence by trying *until* you succeed. Knowing that you can overcome obstacles, teach yourself new skills, or exercise patience to keep working on a labourious project gives you the confidence to move forward and take more risks. Confidence is not about success....it is about overcoming failure. So, **my first rule of creativity is try, try, try again**.

Let's look at an example of a man who tried and tried and tried again. As a young man, he was fired from his job at a newspaper because he lacked creativity. From there he went on to create his first business which failed miserably. He then went on to start a second business which cost him all of his savings so he had to eat dog food to survive. That business still failed when his largest customer trademarked his main product and hired away his employees. Still early in his professional life, he created a character for a movie. He was told repeatedly that his idea was nonsense and in fact very scary. Who was the man and who was the character? Walt Disney was the man and Mickey Mouse was his creation.

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Let's move on to the second rule.

A creative writing teacher once said to me, "Students have to understand grammatical rules and storytelling conventions before they can break them." The same idea should be applied to art. Before Picasso could push the boundaries of art and explore the Cubist style, he had to understand the conventional techniques of painting. Picasso had to understand color, hue, shape, value, and more than that, he had to be able to describe the world he saw as well as the subjects he painted. So, **the second rule of creativity is to teach the fundamental rules first and then encourage kids to break them**.

Picasso, age 10 years.
Study of a Torso, After a Plaster Cast, 1893-94

Let me tell you a story..... One summer I was working with a group of students of various ages in a museum program. I was helping them with art projects that were designed around mathematical concepts. It was surprisingly fun to develop these activities. In one case we took a 3D object, an automobile, and covered it with a slow setting paint and then draped a huge sheet of cotton over top and pressed the fabric into the paint to make a 2D print. This isn't the story that I'm going to tell you, but it was an amazing experience of transferring a 3D object into a 2D print. Everyone loved it except the owner of the car.

While that was an amazing experience with a wonderful outcome, it didn't inspire any creativity. Students followed the rules, but they didn't get a chance to break them.

I wanted to create an activity that still had structure, but also allowed students to "break the rules." I was on a pretty tight budget, so I had to create an activity that worked within a restricted budget. Likewise, I knew there was a very wide range of ages so I needed something that young children could do simply while challenging older kids to use the same materials to create something far more complex. I decided to work with paper and paper folding.

I had worked on a project years ago that I really liked. It focussed on using geometric shapes to create beautiful, kaleidoscopic artwork. It was easy enough for the little kids, but challenging enough for the older kids and I knew that someone would try and "break the rules." I also knew that it took just one student to break the rules to empower the rest of the group to join in.

Appendix I contains the instructions and the reproducible art for this activity which I call *Shapegami*. Basically, you need to photocopy the lines of the artwork onto the back of craft paper and then instruct the kids to cut it out. Next, teach the kids how to fold all of the different shapes. Please reinforce the names of all of the shapes at the same time to make this an integrated Math and Art project. The final step is arranging the shapes on a sheet of paper or card stock and gluing them down. It sounds simple, and it is, but there is a captivating quality to this project. I find that it engages a lot of students because the shapes become mosaics which in a

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strange way propel students into the designs they create. Please give it a try. I am confident you'll enjoy it.

At first the students lined up the edges of the shapes. This is a logical and practical thing to do. The artwork is simple, symmetric and beautiful. However, they can break the rules by overlapping the pieces. That's when the project takes on a new and almost dangerous aspect.

Let's talk about my third rule of creativity.

One of the primary sources of frustration, which often goes unnoticed or unsaid, is the lack of vocabulary necessary to express thoughts and ideas. Just think of a time when you were in a lecture hall and the instructor used a term that you didn't know or understand. For me it was back in school when I attended a lecture on Semiotics. The professor did not define the term and I could see other students nodding their head in agreement with the professor's comments. I have to admit that I was freaking myself out. I kept trying to understand what semiotics were. Was it the study of earthquakes? No, that's *seismic* activity. Was it about Jewish people? No, that's *Semites*. Was it Jewish people who were shaking? No, that would be seismic Semites. Semiotics is the study of signs and symbols. It was made popular by Dan Brown in *The Da Vinci Code*.

I know this is a silly example, but I still remember the panic I felt when I was floundering to understand something that everyone else seemed to already know. I'm now brave enough to declare my ignorance, but as a child, and especially as a young man, there was no way I would have had the confidence to simply ask a question in a packed lecture hall. I bet there are a lot of high school students, both male and female, that feel the same way.

I believe that under every aspect of creativity is a mastery of the vocabulary involved. You simply can't be successful at any task if you don't have the language necessary to describe it. You won't have the confidence.

Imagine that I gave you all of the colours of paint in a rainbow and then I asked you to paint a *regenbogen*. Imagine me standing there with a smug look on my face as you pick up your paint brush and dip it into a pot of paint. "What does he want?" you might ask yourself, but you won't get an answer. Can you imagine the frustration you would feel? There are lots of times when we need to introduce vocabulary to students. I am asking you to reinforce that vocabulary. By the way, *regenbogen* is the German word for rainbow.

Creative vocabulary takes many forms. For music, the vocabulary consists of knowing the notes, chords, movements, tempos, melody, harmony and phrases, to name just a few. Writers need a broad vocabulary for colorful adjectives, active verbs and engaging nouns. Mathematics has a language that students must master in order to express themselves and communicate with teachers, parents and peers in terms of numbers and mathematical concepts. And artists need to know about color, shape, tint, hue, value, texture and so on.

Focusing on vocabulary is a great way to boost a student's confidence! Often, the frustration a student feels in class is not because they can't understand the material, but because they don't know what the teacher is saying or how to tell teachers what they know. Frustration sets in when students don't have the vocabulary to phrase a question or offer an answer. This barrier to communication always disheartens kids, and being disheartened not only quashes confidence, but it stifles creativity. So, **the third rule of creativity is to teach vocabulary**.

As an art activity, I want to describe shapes in mathematical terms. This process can be mind-numbingly boring, so let's add a little magic to our math and fold a circle. The complete instructions, along with reproducible artwork is in Appendix II.

I want to tell you about a specific incident that happened when I realized how important vocabulary is.

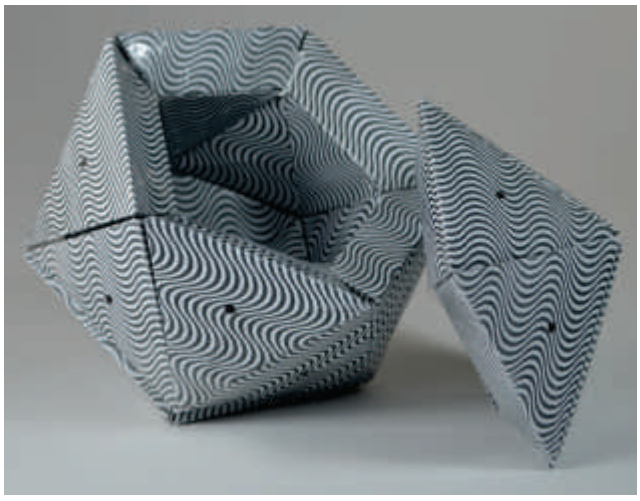
I want to turn back to the first time I worked with students on *Shapegami* projects. It all started off well enough one beautiful mid-summer day. I began by asking the kids to take one of the sheets of paper I had prepared and fold it into a square. I demonstrated and everyone got it. Next, I asked them to take another sheet of paper and fold a triangle. Again, everyone did it without any issue. I guess I was lulled into a false sense of confidence because I continued the lesson by asking the kids to fold a trapezoid. There was an instant and deafening revolt. It was almost as if they were waiting for me to ask them to do the impossible. I was shocked. Since then I realized that what I should have said was, "Now we're going to fold up a shape that I'm sure you're familiar with, but you may not know the 'official' name. Let me show you how to fold up an Isosceles trapezoid!" I think that would have been a far better way to handle it, but instead I lost them and it took some hard work to get them back. There are times when our students are looking for reasons to get frustrated and being inside a classroom on a bright summer day is certainly one of them.

Shapegami is a great activity, but it's important to reinforce concepts like vocabulary, especially technical vocabulary so I wanted to add a little magic to my math.

Let me tell you about *Fold-a-Circle.* The *Fold-a-Circle* activity does something more than just introduce vocabulary. It reinforces the vocabulary and makes connections between shapes in a hands-on way. That's important because words like trapezoid don't really have a lot of meaning in day-to-day life so we need to reinforce them. It's a worthwhile activity.

I'm using this story as an example of how something so simple as a lack of vocabulary can lead to frustration and in my case, a potential classroom revolt! In my experience, one of the greatest barriers to developing creativity is frustration. So, while we have to give students the opportunity to take risks and build confidence while developing their own unique creativity and self-motivatation, we need to start by finding ways to reduce or completely avoid frustration.

Take a look at Appendix II for the instructions and reproducible artwork for *Fold-a-Circle*. It is an ideal activity to develop math vocabulary while creating something really wonderful as a group project.



To foster creativity in young students you need to focus on process, vocabulary, risk and reward. I'm going to describe artistic projects, that tend to be cross-curricular in that they create opportunities to discuss language and other subject areas. Many of these activities introduce a technique that helps build foundational student skills. As we progress, we slowly increase the challenge level of the activities, however, students have the opportunity to master each step and advance at their own pace. Our "No-Fail" activities are a fantastic way to re-frame students' ideas about their own abilities. For example, a student who thinks they can't draw (and by extension can't "do art") will succeed at activities I will describe like Solar Painting, Chromatography Art, and Bubble Sculpting. Students—particularly young girls who have been told that math is for boys—will succeed in activities like *Fold-a-Circle*, and *Shapegami*. The success of the techniques will reward students who will then feel confidence to take more risks. So, **the fourth rule of creativity is to teach techniques**.

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A few years ago I was asked to help out with art projects for an after school club for boys. I didn't really have a good idea of what the teachers wanted, so I simply asked them about their objectives. One teacher told me that the art activity needed to be quick, clean and easy. I have to admit that I was a bit disappointed with that expectation. Another teachers told me that he wanted the activity to be creative and open ended. He felt that the rest of the club's activities were very prescriptive, i.e. there was only one way to do each activity the "right way" so he wanted something that the boys could do that would encourage their own creative ideas. Another teacher told me that the art activity could only take fifteen minutes. They would give the boys half an hour, but that needed to include set-up and clean-up time.

Yikes. I needed to come up with something that was simple, quick, clean, open ended, creative, easy to clean up and took fifteen minutes. I also had my own objective. I wanted the boys to have opportunities to succeed and improve their abilities. And one last thing....we had almost no budget for supplies. It felt like a tall order, but I had two great advantages.

My first great advantage was that I work regularly with a great group of teachers from several different countries on developing art projects and materials for classroom use. One of the teachers was super creative and worked in a very poor school district with almost no budget. She developed some ideas which inspired me that I will share with you.

My second great advantage was that I already knew I was going to work with paint. Paint is one of those materials which just makes everything better.

I started out by deciding to focus on one activity that we could develop over the weeks we spent together. Afterwards, we would have a stockpile of painted sheets of paper that we could use as craft paper in future collage projects.

I started out with some larger sheets of good quality, shiny finger paint paper we already had in our supply closet. I bought several roles of masking tape. I looked around the room for some paint tools and bought some of the tools that Roylco makes like 55009 *Shape Dip and Print Sponges*, 54560 *Animal Paint Scrapers*, 5454 *Paint Scrapers*, 54466 *Junior Paint Spritzers*, 5320 *Floppy Foam Brushes*. All of these tools are easy to clean which I knew was important to at least one of the instructors.

The most important element of this activity was that I was planning on repeating it each week for six weeks in total. That may sound boring or uncreative, but it was important for me to give the boys a chance to get really good at the technique. Let me describe it.

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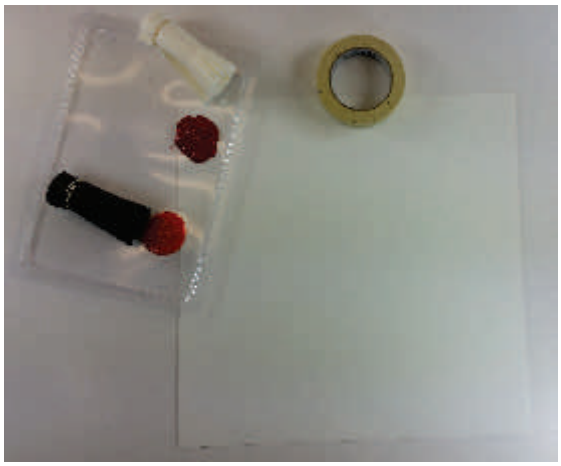
The basic technique is very simple. We take a sheet of the paper and then lay down straight lines of masking tape. You don't need a lot of these lines, but a few will produce dramatic results.



Next, encourage your students to cover the entire sheet with paint using any and all of the tools they want. Personally, I like focussing on simple color schemes because I intend to use these sheets later on in collage projects. Certainly if a child wants to take their artwork home at the end of the session, that's fine by me, but I've found that often the experience or process of painting, especially non-representational painting, is more gratifying than the result, so we use the result in other projects that are more representational. But whether you keep the art at the end of the day or send it home the result is the same. The students learn a specific graphic technique.

When the paint is still slightly damp, lift off the tape to reveal interesting art.

Here are some tips for this activity. Instruct the kids to hang the end of the tape over the edge of the sheet so it is easier to remove. Don't press the tape down too hard so it will come off more easily. Finally, remove the tape when the paint is still somewhat damp to avoid tearing the tape. To stretch your budget even further, you can instruct students to use both sides of the paper.

Let me now describe what happened. For the first session the boys responded in a good-natured way. They proceeded with the project without really being over enthusiastic about it. When it was time to strip off the tape, however, the boys got very excited. They thought it was cool!

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At the end of that first session, I told them we were going to repeat it next week. “If you have any extra time,” I told them as they were preparing to leave, “give some thought to how you can use this same technique, but change it up and make it even more interesting.”

The following week was even better than the first week. The boys now knew what they were doing and were confident. They quickly set up the area and started laying down their tape. One little guy tried to curve his tape as it was going down on the paper. Other boys were interested in his technique, but it didn’t really work out well. Another student, kept his lines parallel and perpendicular to the edges of the sheet which resulted in very Mondrian-esque artwork. One of the most successful techniques was made when a boy created chevron patterns out of the tape. It produced a very dramatic sheet of paper.

As the end of the session I was gratified to see that several of the boys wanted to take their paintings home. I announced to the class that it was fine to take their artwork home, but for those who wanted to leave it behind, we would make great use for it later on. I was trying to send a message that there was really no pressure to create a “masterpiece.” Instead, I wanted them to experiment and it didn’t matter if the experiment was a success or failure. We would be able to use everything.

Over the weeks the boys continued to experiment with different masking tape techniques. The only thing that changed was the color combinations of paint I put out. For instance, I might put out red, yellow and orange one day, blue, turquoise and purple another day and shades of green for another session. Sometimes the color choice inspired the kids, but other times they entered these sessions with ideas already in mind. One child cut the edge of the tape with pinking shears. Another boy cut out different circles from the tape. That was a really cool idea, but the tape circles were hard to remove so we developed a complementary technique where we cut circles from a foil potato chip bag we happened to have lying around and stuck them down with a loop of masking tape and then carefully sponge painted around these. The result was awesome because we were able to make circles of various sizes.

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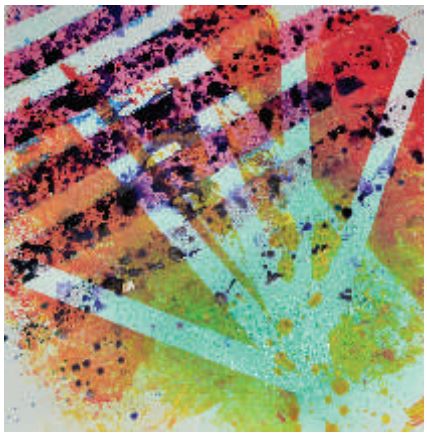
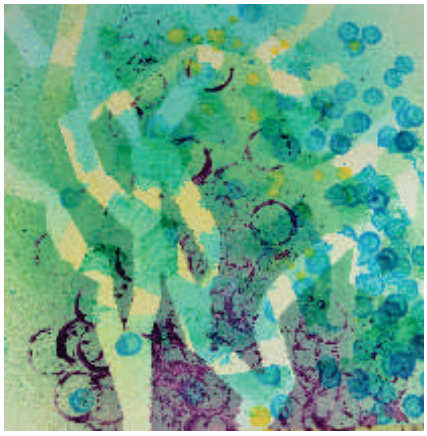
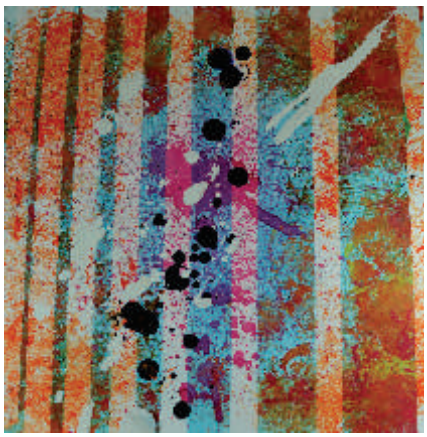
And then something really cool happened. One day a boy came into the session and instead of grabbing a new sheet of paper, he took one of the sheets he had done the previous week and laid tape over top of the painted surface. He then added a new layer of paint over top of the first layer. I remember I had to leave the room for a few minutes and when I returned I was astonished to see that all of the other boys were gathered around him waiting for him to remove the tape. This first experiment was impressive because it was bold, but the results weren't great. However, now that the idea was planted in everyone's mind, together the boys started to refine the idea. By the end of the six week session, the boys were making some impressive artwork. They could do several sheets in a thirty minute session and they almost always took their favourite piece home. This meant that we had a lot of homemade, colorful craft paper left over to make collages.







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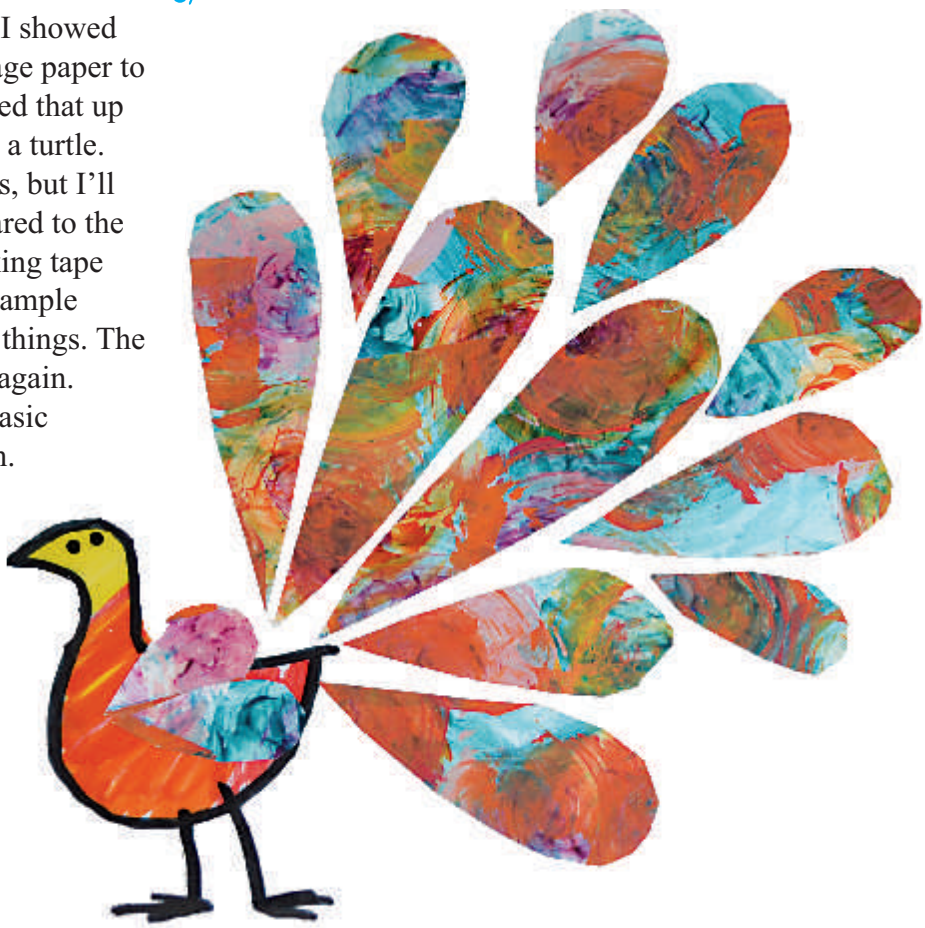
On the seventh week I showed them how to use the collage paper to make a peacock. I followed that up with a vase of flower and a turtle. They were all fun projects, but I'll admit that nothing compared to the sheer excitement of masking tape painting. I believe this example demonstrates a couple of things. The boys were try, try, trying again. They were taught some basic rules and then broke them. They developed competence and confidence in their technique. It was a great activity, so great, in fact, that the other instructors gave us more time to do art during the club meetings.



The fifth rule of creativity is to fail big and fail often. Personally, I think this should be made into a banner and prominently displayed in every art classroom. I think that by recasting failure as a good thing, we are really telling students to try new things without the fear of consequences. I don't recommend this motto for something like skydiving or javelin practice, but for art, I believe it is empowering.

Homer Simpson once said, "Trying is the first step towards failure." I think the next thing he could have said might be, "Failing is the last step before success."

I can recall many, many instances where I've failed in life. A few of these times have been impressively large failures. Some of these failures were technical. In other words, I either wasn't prepared or I had significant technical problems that either were or were not within my control. However, there were a few other failures that I now look back on and realize that I didn't fail: I was just ahead of my time. I may think this way in order to justify something, but I honestly don't think so. Sometimes, I was just ahead of myself.

There was another person who was ahead of himself. Claude Monet developed his style of painting which was later referred to as Impressionism, but his first great masterpieces went largely unnoticed.

For a long time the artistic "Seal of Good Housekeeping" in France was handed out by the Académie des Beaux-Arts in Paris. Each year they would organize a Salon and artists would submit their work to be judged for inclusion in this Salon. Van Gogh submitted and was awarded the Académie's top honours! But before Van Gogh could be successful in challenging traditional forms of paintings, others had to pave the way.

One of those people was Claude Monet. He tried several times to have his work displayed at the Salon and each time he was met with rejection. He failed and he failed big. Yet that didn't stop him. He, along with several "unknown" artists like Renoir and Pissarro held their first independent salon under the name, *Anonymous Society of Painters, Sculptors, and Engravers* in 1874. Can you imagine the gall they had to compete directly with the most influential board in their country? It must have been very exciting and completely nerve racking. As we know, the population embraced this new style and the rest is history. Not only did they introduce their work to the world, they also made it possible for other experimental artists like Van Gogh to be recognized and rewarded. Monet's story is a testament to trying, failing, trying again and failing until he succeed and succeeded in a tremendous way.

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Claude Monet
Impression Sunrise, 1872

The sixth rule sounds controversial, Steal like an artist. Let me explain. I first heard the term "Steal like and Artist" a couple of years ago when I discovered Austin Kleon. He's an inspirational writer and he focuses on creativity. In his book, he makes a lot of useful points, but I'd like to put forth his ten points that he wished he had known when he first started out:

1. Steal like an artist. (I'll expand on this later.)
2. Don't wait until you know who you are to get started.
3. Write the book you want to read.
4. Use your hands.
5. Side projects and hobbies are important.
6. The Secret: Do good work and share it with others.
7. Geography is no longer our master.
8. Be nice. The world is a small town.
9. Be boring. It's the only way to get work done.
10. Creativity is subtraction.

Before I focus on "stealing like an artist," I want to tell you about a few of Austin's other interesting points. One of his favourite sayings, which I think speaks directly to art teachers, is GIGO or Garbage In, Garbage Out. He is challenging us to provide students with rich experiences, rich examples, and rich influences. It is important to fill your classroom with examples of the best art you can find. Slides, books and posters are wonderful resources! I suggest to teachers that they display their own work in the classroom. It will have an impact on your students

Austin also talks about what a person needs to have on his or her pathway to creativity. You will need: Curiosity, kindness, stamina and a willingness to look stupid. I think those four attributes sum up well the characteristics an artist, or any creative person, needs to not only succeed, but to enjoy the process of creating something.

Now that I've introduced Austin Kleon to you, I'd like to expand on stealing like an artist.

A good artist honors the work he steals, while a bad artist degrades the work he steals.

A good artist studies the work he steals, while a bad artist skims the work he steals.

A good artist steals from many artists and reflects these influences in his own work while a bad artist steals from only one artist and basically copies the work.

A good artist credits those he steals from, while a bad artist simply plagiarizes.

A good artist transforms the work he steals, while a bad artist simply imitates the work.

A good artist remixes the work, a bad artist simply rips it off.

I want to share two experiences I had where I stole like an artist in what I consider to be a good way, and where someone stole from me in what I consider a bad way.

For my first example, I want to talk about our R54465 Foam Paint Bottles. I love this product. I've been in many classrooms where teachers have used food coloring and shaving cream to give kids a rich sensory experience. I am constantly learning from teachers and I'm always looking for ways we can improve the quality of teacher instruction by making products that help teachers prepare.

I love foam paint, but the process of mixing the food coloring with the shaving cream was messy and not really any fun. Plus, once you have the colored foam, all you can do is splash it around with your hands. You can't really paint with it. The worst part is that kids love putting their hands and other body parts into the colored foam. If you want richer colors, you need to use a lot of food coloring which stains everything it touches, so once kids stick their hands in the foam, they easily transfer it to other areas of the classroom and their hair and their clothes and their friends and pretty much everywhere else. I was once asked jokingly by a principal how to punish his kindergarten teacher and I suggested giving the entire class foam paint.

There is a company that makes cans of foam paint. I wanted to buy some for a project I was doing, but it's illegal to sell it in Canada. That made me stop and think. What could be so wrong with it that it's illegal in Canada? In Canada we like everything!

Finally, the foam paint that you can buy is crazy expensive.

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I developed a product based on foam paint. Let me work through the process with you.

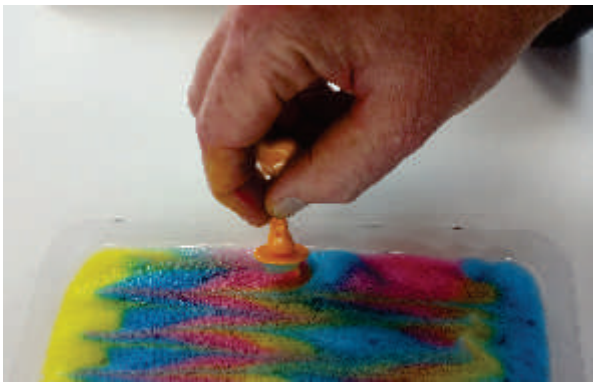
I started off by honoring the teachers and their students who enjoyed working with this material. I needed to create something that was similar. Foam paint is fun and textural, so I wanted to keep those elements.

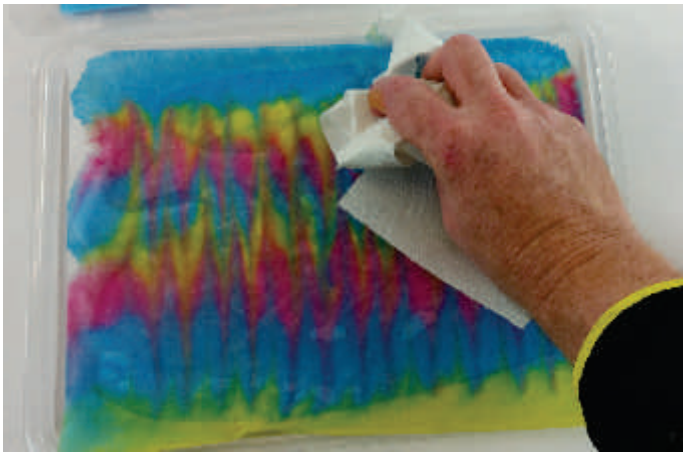
When I studied the situation I found on one hand that traditional foam paint could not be used to actually paint anything and oddly enough, on the other hand it stained everything. I needed to find something that could be used in paint activities while being easy to clean.

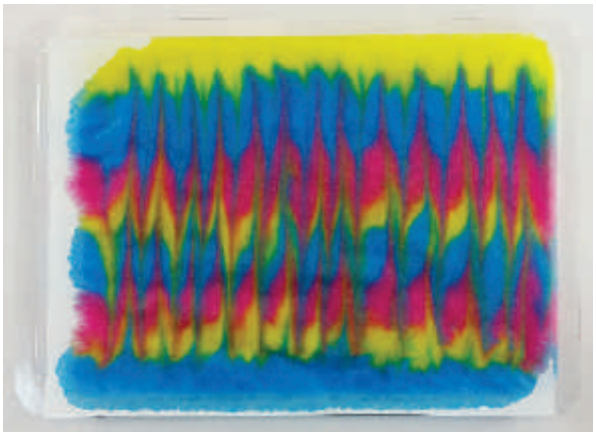
Next, I surveyed many teachers to learn about their techniques, tips and frustrations. Some had interesting ideas and others had high expectations. I enjoy talking to teachers so this was a fun exercise for me. The more I learned, the more excited I became because I knew I could find a way to reduce the frustrations, meet the expectations and share ideas and techniques.

Certainly for me, the best part of this experience was sending the products to the teachers who helped me. No one teacher gave me the idea I developed, but many teachers contributed to developing the product. I tried to credit each one by sharing the finished products with them. It felt wonderful when I got their comments back and because I did it early in the process, I was able to benefit from their suggested improvements.

The product that I ended up with was nowhere near shaving cream and food coloring. I doubt that it is the same as the foam paint you can buy in the United States because I was never able to get a sample. Instead, I transformed the material while still giving students the experience but with several improvements.







For product guide, see Appendix

So here is my remix. I created our R54465 Foam Paint Bottles. Basically, you get 3 paint bottles for just a little bit more than half of the Foam Paint cans you can buy online that are illegal in Canada. The bottles come empty. You simply squirt in some dish soap or hand soap, add some food coloring or liquid watercolor paint and fill the bottle with tap water. Kids then pump out beautiful, foamy colors which they can use as finger paint or they can use a squeegee or paint scraper to drag the foam across a sheet of paper while leaving a pastel trail on the paper. It looks almost like paint marbling. Because the base of the foam is soap, it is easy to wash up and really won't stain. I'm proud of our foam paint bottles. They work beautifully, you can use them with whatever color of paint you want and they will last a very long time. I may have stolen the idea, but I believe I delivered in the spirit of stealing like an artist.

While I'm talking about Stealing Like an Artist and describing my process of creating our Foam Paint Bottles, let me share a lesson plan I got from a teacher at the 2016 National Association of Art Educators.

Start with the foam bottles and fill them with a dollop of dish soap, a squirt of food coloring and fill partway with cold water. Shake to mix the ingredients. Test out your color by squirting some onto paper in a line or a puddle. Use a paper towel to wipe the foam off. You should see the shape of the foam line or puddle on the paper. Once you wipe off the foam, the paper will be a little damp, but it won't take long to dry. If you find that the color is light, add some more food coloring. If the foam is too watery, add some more soap. Try different ratios until you get a result that you're happy with.

Now it's time to marble. The ingredients in the bottles are inexpensive and will last a long time, so don't be afraid to let the students use a lot of foam for their marbling.

Start by dispensing a puddle or line of foam *directly onto an empty art tray*. Add different colors but keep the foam close together. Once you have piles of foam in the tray, use a craft stick to comb different patterns in the foam. When you are happy with your design, press a sheet of paper into the top of the foam, lift out and use a paper towel to wipe away the excess foam to reveal your marbled artwork.

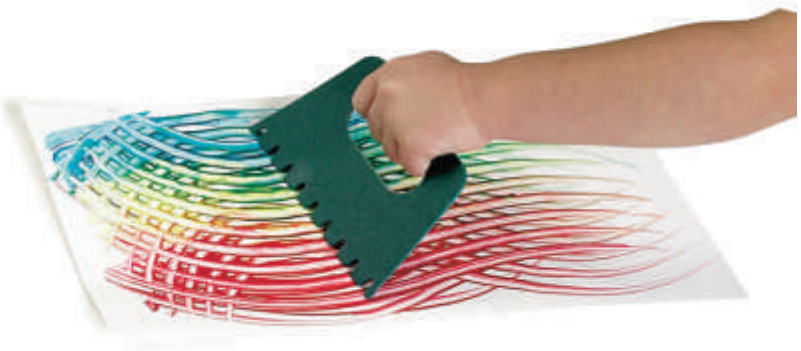
I love using the paper as stationery. Because I like to integrate the curriculum into art projects, I often ask students to use their marble paper to write poems. Black marker shows up beautifully on the pastel designs.

This technique works on paper plates so you can make awesome paper plate caterpillars or butterflies.

For product guide, see Appendix

Now I want to share the opposite experience. When I first started my career as a product designer I worked with a wonderful teacher, Bev Bos, and created our R5451 Paint Scrapers. Bev used cement trowels to etch designs into wet paint spread over paper. I thought we could do something that provided young children with more creative options, so we created a pack of four paint scrapers with different edges. It was a simple product, but it really worked well.

Years later, a company in China copied the product exactly. It was embarrassing when I discovered this. I was working with a company that sold educational products to teachers on selecting products for their upcoming catalogue. I showed them our paint scrapers and one of the buyers explained that they already had the scrapers in their catalogue. How could that be? I wondered. We're not supplying them. As it turned out, they were buying them from China at a lower price. When I looked at the designs, they were exactly the same as ours. The sad thing was that I had made a mistake in the original design and when I used them with children I found that one design did not work well. I subsequently changed that design, but the Chinese company never did. They did not transform or remix as Austin Kleon suggests. They stole from one person and plagiarized the product. Instead of improving the idea, they just copied it.



I contacted the company and asked them for their price on a pack of the paint scrapers they copied from us. Their price was incredibly low. I was shocked. Next, I asked them for their testing report. This is important information about the safety of the product and the materials used to create the product. They told me that they couldn't supply the reports. When I explained that I would have to have the scrapers tested by an independent laboratory, they simply explained that the material would not pass the safety test for children. Again, I was shocked. Clearly the product was designed for young children, so how could they sell it if the material was hazardous for young children? They simply explained that their product wasn't intended for young children; it was intended for professional, adult artists. That was ridiculous. That's the problem with copying someone else. You don't have the same commitment to the product or the people, in my case children, who use it. The whole experience made me sad. Needless to say, I did not work with that company. I could not trust their integrity and life is too short to deal with people who simply don't care.

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The last rule of creativity is often the hardest to teach. We can develop an activity and we can teach students a technique and we can give them opportunities to try, try, try again. During that process, they may not be satisfied with their results. At some point they may even become less satisfied with their results as they start to experiment more and break rules more often. In other words, they develop their techniques but then regress on subsequent iterations. Alternatively, an experiment may achieve unexpected and exciting results. The trick is knowing when to move on. So, **the final rule of creativity is recognizing success**, because it may not always be clear or obvious.

Let me tell you a story.... When I was in sixth grade the younger students in our school were asked to help the highschool students put on a performance of *The Wizard of Oz*. The little kids were going to be munchkins. I remember the performance and it was adorable. As grade six students, we were too big to be munchkins and too young to be performers, so we were asked to help decorate the auditorium with artistic interpretations of munchkins. To that effect, we worked with the kindergarteners and drew outlines of their body and then painted costumes on the outlines and cut them out once they were dry.

The teacher had only two instructions. First, use bright colours. Second, because we were using cheap powdered tempera paint, he instructed us not to let the paint drip into each other and make muddy colors.

So, one of the first things I discovered was that drips of paint can look really beautiful. The first drip was accidental. The following fifty drips were deliberate. The end result was a wild, Andy Warhol-esque munchkin. Personally, I think Andy would have liked it, but my teacher certainly didn't. Because I had broken his rule, he dismissed the painting without a second thought. I remember the night of the performance and looking up half expecting that my impressionistic munchkin would not be on display, but I found him. I thought he really stood out from the crowd. I was really pleased with myself. I recognized success, even if my teacher didn't.

Recognizing success is tricky. You need to be sincere when you praise a student for the work he or she has done. After a certain age, saying things about a child's artwork like, "Tell me what you are most proud of in this picture," doesn't really cut it. Here are some suggestions:

1. Ask students to compare their work from today with work they have done in the past. I love doing this. There are several basic art projects that we always do at the beginning of the year. I collect up this work and store it carefully for use later on. I repeat some of these projects before our winter break and compare them to the same projects we did at the beginning of the year. Kids can get very motivated when they see the progress they have made. This works for handwriting, too. Student progress can be gradual and can slip by unnoticed, so making comparisons between present and past work is a great way to visualize success.

2. As you are probably already aware, I believe in the iterative process and I give students time to tackle one project several times. I challenge them to experiment with techniques and break rules. Then, when we near the end of the process, I ask the students to take out all of the iterations and look at the evolution of their ideas and techniques. This can have a very dramatic effect. It is motivating to see improvement, especially if the improvement happens over a very short period of time.

3. Reward the unexpected. Look for opportunities to encourage students when they innovate. Likewise, explain more advanced techniques to students when they are ready.

4. Start by asking students what success feels like to them. Some of the answers will surprise you. I remember one boy telling me that success in art class would be to keep awake for the entire period. I have to admit that I was a little disappointed and a lot shocked by that answer. I thought I had a fun class. Maybe he was trying to be a joker, but I had noticed before that he wasn't engaged in what we were doing most of the time. I spent a little extra time with him that day and by the end of the lesson, I asked him if he felt good about staying awake. He didn't really answer, but the next time I had him in my class, I asked him again and his answer was different. He told me that success would be taking something home to show his mother that he was proud of. That day he worked differently. He was more sincere and focussed on his efforts. His idea of success propelled his efforts forward. I now ask all the students this question and I write down their answers and occasionally we review what they had said. Sometimes they revise their answers as they become more in tune with the artistic process and sometimes they don't, but in general, students tend to achieve what they think is important to achieve when we remind them.

5. Encourage peers to recognize success. There is absolutely nothing more motivating than having a peer recognize your success. Kids can be harsh, so take every opportunity to give students a chance to compliment each other on the work they do.

6. Set expectations and recognize when these have been met. I try to set very simple expectations. Something like, 'I'd like you guys to set up and be ready to go in five minutes.' They are almost always set up and ready to go when the time comes. Meeting these simple expectation empowers the students to meet more challenging expectations. I don't set challenging expectations very often, but I've had excellent success when I do.

7. Finally, recognize success as soon as it happens. Look for ways to encourage students *authentically* when they are moving in the right direction or doing something interesting or unique. The more you encourage, the more students will deliver. It is often very easy to give students discrete direction to improve the work they are doing. That's appropriate and relevant. However, encouraging students just as casually and just as often will go a long way in motivating their progress.

Creativity Builders:

Projects and Activities

Solar Painting

Solar painting is a wonderful, no-fail activity. All you need is water, paper, water color paint and a bright, sunny day. I've tried it in both the summer and the winter and they work equally well as long as the winter day is dry.

Here are the basic instructions. Coat a sheet of paper with water and drain off the excess. Place the wet paper into a tray or on a cookie sheet. Next, drip liquid watercolor paint over top of the wet surface. I like to use primary colors, but experiment with color pallets. Place different objects on top of the wet paint. Beads, buttons, small shells, acorns, or anything small and non-porous work well. Set the tray complete with the wet, painted sheet of paper with objects on top outside in the direct sunlight to dry. Note: To avoid spills, do the whole project outside.

The results are unexpected and beautiful and it's a great way to celebrate a sunny day. There are three other important aspects to Sun Painting: First, it's relatively cheap; you can create variations on this theme and really stretch your art budget by changing up the color palette or using different theme objects like our letter beads to make words, or objects from nature. Second, it's a great way to introduce science to younger children. There are two important scientific processes going on when you create this art: evaporation and osmosis. Third, the students are creating beautiful, colorful art through a thoughtful design process. In other words, it's a no-fail art activity because it focuses on process rather than the finished result—even though the finished result is spectacular.

Let me expand on the process. The trick to this project is choosing the right paper. You can use a good quality photocopier paper, or you can use one of our R15213 Color Diffusing Paper™ sheets. Our Color Diffusing Paper is something really special. Basically, it is a beautiful watercolor paper that is very economical. We have regular sheets in different sizes and we have cut out interesting shapes from the same high quality paper. I use this paper all the time and kids really like it because it's unusual and has a great texture. Put the sheet into an art tray. Flood the surface with tap water and pour off any excess water. Use paint pipettes like our R54460 Squiggle Pipettes or R54470 Junior Heart Paint Pipettes to sprinkle small amounts of liquid water color paint over the surface of the wet paper. I really like the Liquid Watercolor Paint sold by Discount School Supply. You need to cover the entire surface with the paint and the pipettes do a great job.

For product guide, see Appendix

Next, lay objects on top of the wet paint and put the whole tray outside in the bright sunlight. I like using our R2131 Bright Buttons and both R2184 Manuscript Letter Beads and R2186 Lower Case Letter Beads for this activity. I mostly work with younger students and it is nice to add a literacy component to an art activity. While you are waiting for the paper to dry in the sunlight, ask your students what they think is going to happen. Most kids will say that the paint will dry on the paper, but stay wet under the objects. They may also say that the paint under the objects will look darker than the paint on the rest of the paper. To be honest, this is exactly what I expected would happen the first time I tried this technique.

Instead, the paint on the paper dries, but when you remove the plastic objects, you see a white “shadow” under them instead of a dark paint color. If it is a particularly hot summer day and the paper dries quickly, you'll even get shadows around the taller objects like the letter beads. It's almost photographic. It is a very cool activity.

Here is what's happening: The science behind this activity is all about the nature of water. Water wants to distribute itself evenly wherever it is. That's why water flows across a sheet of paper. It doesn't want to be higher in one area and lower in another. It wants to remain level, so it travels across a surface until it covers it evenly.

When the sun shines on the paper, the water in the paint starts to evaporate everywhere except under the plastic/non-porous objects. The wetness under the objects wants to “level” out, so it migrates from under the objects and it pulls the pigment with it. Some younger children think this process is magic, but it's not: It is science!

Students will be proud to show their parents this artwork. When you pick the colors you are going to use for this activity, mix it up a little. I don't recommend using more than three colors. If students use too many colors, the end result will be a dull dark brown. So, stick with three colors and really talk to your students about why you have selected those specific colors. Remember, not only do the colors need to work together, but they will also mix once they are applied to the wet paper, so they have to work well when combined. Separate the class into groups of 4 and create specific color palettes for each group. Primary colors are going to work well, but talk to the kids about experimenting with different color groups. Now would be a great time to talk about the color wheel and how to use it to select the palette"s. The important point is that you talk about the colors you pick. Please don't just say things like, “I like the way these three go together,” but instead, talk about why they go together well technically. Children will be able to understand your process of selecting colors.

To take this process to the next level, try limiting yourself to one or two colors, and experimenting with additives and how you set the piece to dry. For example, try sprinkling table salt, sand, glitter, or other tiny particles over the Color Diffusing Paper. See what the result is. Challenge students to tilt the sheet, so it drains as well as evaporates. This is a no-fail activity, so no matter what students try, they will walk away with a unique piece of art. With that safety net and reward system in place, challenge students to be creative about the materials they choose to experiment with. Display the beautiful results of student's creative experimentation in the classroom.

For product guide, see Appendix

Chromatography Art

Chromatography is a great method to introduce young kids to science while exploring colors! Basically, the materials used in chromatography help to decompose a complex color back into its component pigments. I use Epsom salts and water to make the solution that causes this to happen.

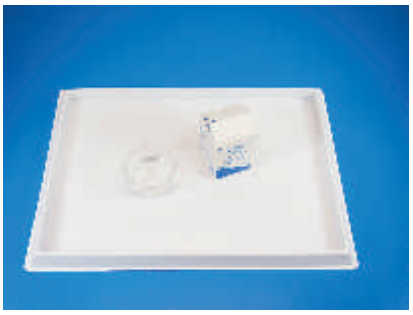
The Epsom salts push the pigment molecules in the paint and spread them across the paper. This is a great way to explore color mixing and how colors are put together to make new ones. No matter what colors students use in their project, the process of using materials and techniques to explore science is wonderful.

Let's get started. You will need some specific materials! I used our R2440 Color Diffusing Paper™ Flowers, some washable markers and a jar of water with a small amount of Epsom salts. Because markers are made with various pigments, you won't have to worry about staying away from primary colors. Note: In my personal experiments, I've included yellow just to add a colorful range to our chromatography flower, but as I've found, yellow is the only color that won't separate as well as the others.

In each pack of our Color Diffusing Flowers, there are several different shapes to choose from. Select your favorite flower shape and then count how many petals are on the flower. Students then choose a different color of marker for each flower petal. Tip: You can double up on some colors. Start at the center of the flower and draw a triangle pointing inwards with the base facing out to the petal. Color in the triangle. Mix one teaspoon of Epsom salts in one cup of warm water. This solution is what you will use to start the chromatography process! I used a wide, flat cup to help dip the flower evenly into the solution.

Pinch your flower at its center until you form a small handle underneath. This will scrunch the flower a little bit, but it's important to make this “handle” prominent enough that it will reach below the surface of the Epsom salt solution. Now dip the handle part at the center of the flower into the Epsom salt solution. See how the petals stick out from the center? The petals will hold the flower in place so it doesn't collapse into the cup. You can even curl the petals outwards so that they hold the weight of the flower out from the center.

Look at what happens over time! Not only does the whole flower get covered in pigment, but the various colors separate into their component colors!



For product guide, see Appendix

Let's explore what's happening. As the salt water flows up the fibres of the paper, the sodium molecules in the salt *push* the pigment molecules of the paint. The colors start to break down in a matter of minutes! The solution starts by grabbing all of the different pigments that make up the color. You can see the progress as the water creeps up the paper. The colors with the heaviest molecules drop out of the solution first, while the colors with the lightest molecules travel the furthest along the paper.

Once the water/salt solution travels up the full distance of the paper, the assorted colors cover the surface of the flower and have separated into the component colors that make up the marker colors. When the Color Diffusing Flower is fully saturated in water, remove from the cup and set on top of a dry container. Leave it to dry for about 15 minutes. Look at the separation in colors. You'll see the biggest difference comes from colors that have mixed amounts of primary colors such as orange, green or purple. It's interesting to note that colors such as brown and grey end up looking the most colorful through this experiment!

To make your designs extra special, string the flowers onto a pretty garland! Fold your flower in half and then cut two small slits near the center, at about 2″ (5 cm) apart. Unfold your flower. Next, weave one end of a length of ribbon through the first slot and back out through the second slot. Repeat for the remaining flower shapes and hang them up!

Combining science with art is lots of fun and gives students the self-assurance that their art is beautiful, regardless of the color combinations they use. Once students have mastered this activity, challenge them to add detail to their chromatography pictures using a black pen, marker, or colored pencil. Discuss how the pigments have moved across the paper. Ask students to identify shapes or patterns they see. Challenge students to see pictures, shapes and artistic elements in their chromatography art that can be enhanced with monochromatic line art. Even if students start by simply outlining the major concentrations of pigments, they achieve an interesting piece of take-home art. And with practice, students will refine not only their techniques, but their creative eye. They will be able to more quickly and artistically mix the chaos of chromatography with the elegance of monochromatic line art.

For product guide, see Appendix

After your students have explored the basic technique, it's time to get creative! Start by encouraging students to experiment with different design choices. For instance, instead of blocks of color they may choose to create large swirls of colors. They can weave the colors together in their design or keep them rigidly separated.

Try using different types of pigments. Water color paint will work. One of my favorite activities is to ask the students to mix colors using the paint and then separating them through Chromatography. Food dyes also work. Try combining washable markers with permanent markers. What are the results?

There is something really wonderful about this activity. It starts with a scientific principle and then leads into "accidental" designs. The more often students repeat the activity, the better they will get at predicting the outcomes. Once they start to understand the process, they can begin to make organic looking art that's interesting to look at and exciting to make.

For product guide, see Appendix

X-Ray Tracing

I like using x-rays in art. I know this seems a little weird, but it accomplishes a number of goals. Let me explain.

We produce several sets of x-rays. These were originally designed to teach biology to younger students. X-rays are fascinating to look at and when kids interact with x-rays, not only is their fear of the procedure mitigated, but they start to develop a better understanding of the way their bodies (or the bodies of other animals) are put together. Tracing the x-rays helps develop fine motor skills while introducing kids to the science of x-rays. And students come home with beautiful x-ray art! Roylco makes many different sets of x-rays. The most popular for this activity are R5910 Animal X-rays and Picture Cards and R5911 True to Life Human X-rays. For young learners, Roylco has X-ray and MRI companion (R59258) to the R59257 What's Inside Me Doll. We also have beautiful R5913 Shell X-rays and Picture Cards and interesting R5912 Insect X-rays and Picture Cards.

I love our animal x-rays because you can compare and contrast anatomy. For me it's been wonderful to see how children respond to the animal x-rays. Once they get over the initial excitement and wonder of seeing all of the different animals I ask them to name each one. Some are easy like the birds, fish and snakes. Others are a bit more challenging because they are just not that common. The joey or baby kangaroo isn't that common for us in North America, but once children know what it is, they love it. The animal x-ray kits include matching picture cards. Kids can lay the x-rays over the picture cards to see how the bones work inside of the body. Once children are familiar with the animals they can do two different things. First, they can categorize the animals by family: fish, birds, mammals, amphibians and reptiles. Second, they can compare and contrast the anatomies. All of the animals have skulls, ribs and spines. What else do they have in common? Look at shoulder blades, hips, legs, arms, fingers and toes. How are they different?

Now turn this science activity into an art activity! My favorite drawing activity for young children is animal sketching. This sounds hard because animals are hard to draw, but I made a discovery a few years ago that produces excellent results. My experience is that once children know they can succeed, they are more eager to develop their skills. Let's give them a way to succeed at something complicated!

For product guide, see Appendix

This art experience involves something that I call “imaginative tracing.” Start with a pack of our R5910 Animal X-rays and Picture Cards. Open up the package and separate the picture cards from the x-rays. Don't show the picture cards to the students. Instead, hand out the x-rays along with tracing paper if you are working on a regular desk. Hand out regular photocopy paper if you are working on a light table. If you are worried about damaging your x-rays, a sheet of clear vinyl (or an R59606 Light Cube Caddy) can help to protect your x-rays. Our Wipe-Clean dry-erase worksheet covers will also accommodate most of Roylco's X-rays. Alternatively, trace the x-rays by placing both the x-ray and the paper on a window.

The kids will want to take some time looking at the x-rays. They are pretty cool to look at. Compare and contrast all of the parts of the animal skeletons, the back bones, shoulder blades, hips, fingers and toes. This is an important part of the process. By examining the animals in detail, children are already forming a picture of what the animal looks like in their heads. Once the excitement has toned down, it's time to draw the animal. Working with just a pencil and paper, children will sketch the outer shape of the animal and start to add details based on the xray.

The results are excellent. I've worked with children as young as 4 years old who have made some impressive pictures using this technique. After students have sketched their animal, it’s time to add color and details. You can direct students to make realistic looking animals, fantastic creatures or completely imaginary forms. I like to talk with the students and ask them to think about where their animal lives, what it eats and what kind of animal might threaten it. It’s important for me to give students the opportunity to really think about animals and reflect some of their thoughts in their drawing. I remember once working with a student who created a snake that was plaid. When I asked why, she said it was a form of camouflage because her snake lived in her grandmother’s apartment with was full of plaid pillows. With that explanation I knew that she understood the assignment and used her own imagination and creativity to create her animal.

Once the students have completed their pictures, I will ask them if they want to see a picture of the real animal. Most will say yes, but some will say no. They are content with their own drawing. That's fine by me. For the rest, I show them the picture cards contained in the pack. It is amazing how close the kids get to create a nice drawing of a real animal. I like to compare and contrast their drawings with the real images. It’s important for me that students can discuss their design choices. If they can give me specific reasons for the decisions they make, then I know that thought has gone into the project and the student has succeeded.

Parents are especially impressed with these drawing. When students go home with a picture of an animal that they have drawn, especially if they can recite some of the facts about the animal contained in our teacher guide, parents develop a respect for their child's artistic ability. That's important because so many parents over the years feel that they themselves are “not artistic” and don't really know how or when to encourage their children. This gives them a great opportunity to express appreciation for a unique talent.

The beauty of this activity is that it combines tracing with design. Once the child has a strong outline of the animal’s body, complete with limbs in the right places and all of the elements proportionate to each other, they are almost guaranteed success when it comes to the design. Additionally, I’ve found that when students are impressed with their tracing efforts, they take more time on their design work and produce better results.

I want to use x-rays in one more way. Over the years I’ve worked hard to develop resources for children to make portraits easier for them to accomplish. Portraiture is hard because in my way of thinking, success is really not about learning a process; It’s about seeing details that we normally take for granted in a clear and exact way. That’s a very hard thing to teach.

A few years ago I did a lot of work on portraiture. I worked hard to find specific ratios of the features in relation to the face. While I had some interesting results, I have to admit that it wasn’t really a fun project for the students and it was only appropriate for older students.

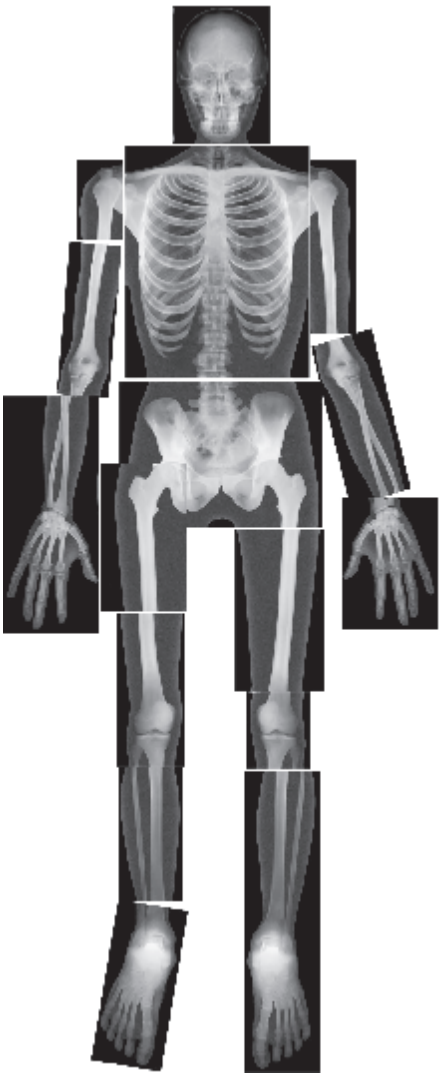
I wanted to find a very simple method that even young students, the kind of student I work with the most, could do successfully.

My solution was to use head x-rays. I started out with a R59601 Educational Light Cube and sheets of good quality paper. The head x-ray from our R5911 True to Life Human X-rays fits easily on an 8½ x 11” sheet of paper. I like to use good quality, thicker than normal photocopy paper for this activity. Children simply place the paper over the head x-ray and trace around the features lightly with pencil.

Next, students draw in features of the face using their sketch as reference for placement. After just one attempt at this activity, I’ve found that students skip the process of tracing the eye bones or nasal cavity and immediately start drawing on the facial features. This is an important leap forward. They are using the x-ray as a reference without having to recreate it.

Students start to succeed right away. Once they have their features in the proper places and in the right proportion, they again slow down their work and take more time refining details. It's wonderful to see.

Over the years I've collected different reference photos of people from a wide range of ethnicities and cultures that all share the same pose which matches the x-ray. I make these photos available to the children so they can be inspired to use some real life elements in their drawings. I don't want them to trace the photographs, but I encourage them to look closely at the details. I will cut out small enough windows from black construction paper so the children can place these over the facial features in the pictures and try to duplicate the details. I've found that it is an easier transition to start by copying details from pictures of strangers before creating self portraits. No one ever really sees themselves for what they are. We carry around too many ideas of what we look like based on impressions rather than reality.



The same technique can be used for drawing hands. I know hands are a challenge to draw, but tracing the x-ray makes it far easier because the drawings are anatomically correct. I like encouraging the students to design jewelry that will fit on the hand like rings and bracelets. It's a fun project and the results are impressive.

For product guide, see Appendix

Paint Pad Prints

Making prints is a wonderful way to develop technique while exploring texture, color and composition. Personally, I'm not a big fan of the lino block prints. The carving tools are hard to use and there is always the risk of injury. Likewise, if you make a mistake, there's really no going back. Lino block prints are a great activity for serious art students who are willing to make a bigger investment in time for their art, but for the majority of students, making simple prints can and should be a fun activity.

I love to use our R54480 Paint Pads. We've create an inexpensive jelly-like pad that you can paint directly on top of. When you press a sheet of paper over the wet paint, it transfers the design beautifully onto the paper. Normally, you can make three prints off each design. I've found that the first print transfers too much paint and the details are obscured. The second print is usually the one I keep, while the third print does double duty. It helps clean off the excess paint from the pad and can be used later on as cut and fold paper in collages and other art projects like paper sculpting.

I love our Paint Pads because they are so versatile, easy to use and clean. You can use a good quality children's paint with the pads or a cheap acrylic paint. Personally, I won't use block printing inks because they're harder to clean up and I want this to be easy. In terms of clean up, I like using baby wipes. I'm amazed at what baby wipes clean. I've used them to get ink off a rug. When you think about it, it seems wrong that they are so effective. What's a baby's bum made out of anyway?

Traditional monoprinting uses a hard base, such as a wooden block, metal plate or linoleum pad that has been carved into a permanent image. The base is then painted and pressed onto a sheet of paper. Historically, artists would add individual details to the prints to make them more "customized" and less mass-produced.

With our activity, we will be using the R54480 Paint Pad from Roylco. The Paint Pad is a pad that is made of a wonderful gel-like substance. It feels great and won't absorb paint, so it's great for making monoprints. Add only a small amount of tempera or acrylic paint and cover the whole surface. You can use just one color or cover the surface with several colors. For instance, you can achieve some very pleasing effects by mixing red, yellow and purple together!

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Use a brayer to roll and spread the paint evenly across the Paint Pad or cover the surface by finger painting on it or carefully brushing the paint. Next, create the design. You can use different tools to "etch" a pattern into the wet paint. Try our R58624 Gear Stencils, R5841 Optical Illusion Rubbing Plates, R55004 Super Value Leaf Dip and Print Sponges, R5320 Floppy Foam Brushes, R5451 Paint Scrapers and R57015 Junior Goo Spreaders to create beautiful designs. Once the design is in place, cover with a sheet of paper and press lightly. Lift the paper to see the print. I like to make two or even three prints of the same artwork for three reasons: First, the first print may be too wet if the student has used an excess amount of paint. The second print will be better. Second, by making two or even three prints off the same design it makes cleaning up the gel pad much easier. Third, you can use the other prints to make more artwork so nothing needs to be thrown away.

Here is an example of the process that I like using:

First, I'm going to start by cutting a shape out of one of the sheets from our R22054 Lace Design Paper. After covering the gel pad with a thin layer of paint, I lay the cut-out shape on top of the paint and then cover with a sheet of paper and remove to see the monoprint which is dominated by the negative space that resulted from the Lace Design Paper. I then carefully lift off the Lace Design Paper and then make a second print. The details of the Lace Design Paper come out almost photographically. This technique works with paper doilies and fabric lace.

Second, I clean off the gel pad and re-paint it with another color. This time I'm going to use the same technique, but I'm going to do it with leaf shapes from our R15333 Botanical Cuts Paper. Once again, I'm going to make a print with the leaves on the gel pad and then again after I've removed the leaves, but this time, instead of using blank paper, I'm going to use one of the sheets of paper I originally printed with the Lace Design Paper.

Third, after I clean off the pad again, I'm going to apply a small amount of a new paint color. This time, I'm going to draw an image on the pad using our R57015 Junior Goo Spreader. The groves on the Goo Spread make interesting lines in the paint. Once I'm happy with the design (remember that it will print "backwards" so you need to be careful with letters and numbers) I'm going to use some sheets of paper from the first two rounds to make interesting designs. After going through this process, every student will have unique, creative and "fridgeworthy" art!

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At this point I want to talk about why this type of art experience is good for students. Here are some of the reasons: First, it allows students to develop a technique for making prints. The “art” is in producing the design.

Second, I want to give teachers opportunities to talk about colors. I've worked with a lot of art teachers who never really talk about colors unless there is a color blind student in the class. I strongly suggest that when you develop a palette that you talk about why the colors work together. You can do this technically by talking about the color wheel and color theory or you can talk about why you think colors go together on a more emotional level. All of your students, not *just the color blind* ones, will appreciate an insight into your color world so this gives you an opportunity to talk about it.

Third, students can produce beautiful, colorful artwork without the stress and pressure of choosing colors. I like to compare this to cooking. You can be given specific ingredients and a specific technique can be described, but the variation in terms of how the ingredients are used and the way the technique is employed can result in very creative interpretations of the recipe. That's what we're doing here. We're giving kids the colors of paint and we're providing the tools, but after that, the students can develop their own designs. I think this is a wonderful way to develop creativity.

Fourth, when you are developing the color palette for the activity, I would suggest doing it in front of the kids. You can mix the colors and you can describe the resulting colors. I've seen this done with students, although I've never done it myself, and it's almost poetic. The words art teachers use to describe mixing paint and the resulting color is really wonderful. Don't deprive your students of a great opportunity to get inside the head of an artist. It really brings colors to life and it reveals so much meaning behind colors. It's an important thing to do for all of your students.

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Volcano Painting

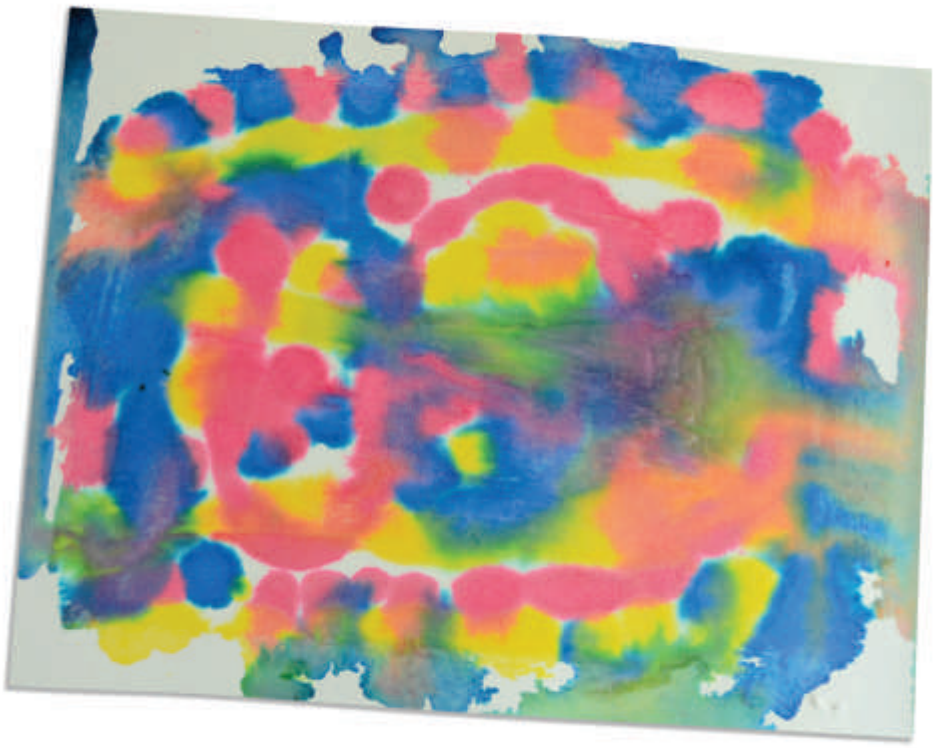
Few things are as much fun to watch as chemical reactions! Some students may have had the opportunity to see experiments like “Elephant Toothpaste,” where a reactant is mixed with water to create foam. If your students have never seen this experiment done, there are plenty of very cool YouTube videos demonstrating the experiment. This experiment is hard to do in the classroom, and it can't be used to create art. Everyone loves a good baking powder and vinegar volcano, however, and we have developed a fun way to create art with this fizzy mixture!

I’ve just begun working on this technique and I love it. Students are completey engrossed by it and it holds their attention. It’s amazing!

To begin Volcano Painting, ask your students to mix (or pre-mix and provide them with the solution) 2 tablespoons white glue and 4 tablespoons baking soda into a paste, and spread the paste onto the dull side of a small, 15 x 15 cm (6 x 6”) square of cardstock. Paper doesn't work very well for this activity because it becomes too saturated and won’t lay flat.

At this stage of the activity, let your students choose how thickly or thinly they want to cover their cardstock. Just remind them that the thicker their solution is applied to the paper, the longer it takes to dry. Students can experiment with the tools they use to apply the solution—if they want to use paint brushes, that's fine. Roylco's Goo Spreaders are excellent tools for spreading the thick solution. While the cardstock sheets are drying, mix one part liquid watercolor paint or slightly diluted food coloring to two parts vinegar.

Once the cardstock sheets have thoroughly dried, challenge students to pipette their vinegar paint onto their prepared cardstock squares. They will love the bubbly reactions!



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This is a great activity to do in groups, so students can compare the reactions they see. Students who have used a very thick paste should notice that the reactions take a little longer to happen, but once they do, they foam up beautifully. Once the foam dissipates, they will see a pockmarked texture in their solution. Students who used a very thin coating of the baking soda paste will see faster reactions that spread farther across their cardstock. As the vinegar solution dries, they may see the colors mix and bleed like they do on our Color Diffusing Paper. Some students might pipette a whole bunch of vinegar-paint solution onto their cardstock. Depending on the amount of baking soda paste those students use, they might not see much of a reaction at all. This is because the amount of baking soda to vinegar has to be proportional. If you don't have enough of one or the other, the reaction will be tiny or will not occur. If you have too much vinegar, it overwhelms the baking soda, so there will be little or no reaction.

The other thing students might notice is that after they have used the right proportions of baking soda and vinegar, there comes a point where the reaction just stops. This means that all of the baking soda and vinegar have already reacted—basically, they are out of energy!

While baking soda and vinegar reactions aren't new, we can add a creative dimension to this art activity. First, talk about this from a scientific basis. Talk about vinegar and it's reaction with baking soda. Here is a quick scientific description of what happens:

Baking soda is sodium bicarbonate: each molecule of baking soda contains a sodium atom, a hydrogen atom, an oxygen atom, and a carbon dioxide molecule.

Vinegar contains acetic acid, each molecule of which contains a hydrogen atom, and an acetate ion.

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When combined, the hydrogen atom in the acetic acid meets up with the hydrogen and oxygen atoms in the baking soda to form a molecule of water, while the acetate ion grabs onto the sodium atom and forms a salt, sodium acetate. The carbon dioxide molecule, free of its other chemical bonds, can now escape, and bubbles forth as a gas.

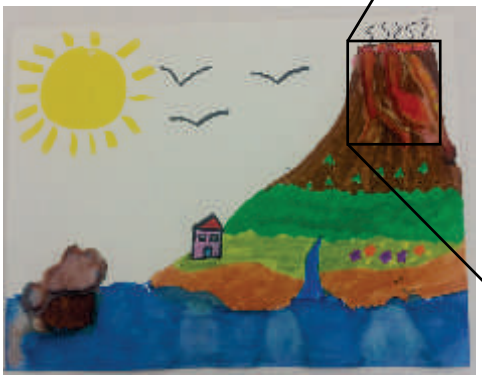
After having the scientific conversation with your students, we want to have an artistic conversation. Challenge students to come up with adjectives to describe the results of their practice artwork. The reaction causes a unique texture on the cardstock. Where can we see this kinds of textures in nature? Some of them might suggest water-eroded sandstone or coral. Suggest to your students that they consider more places in nature where they might see a similar texture.

Unlike other practice pieces for other techniques we've discussed so far, practice volcano painting projects aren't a great fit for your craft paper bin. Dried baking soda paste can get flaky, and is very difficult to cut through—especially if a student has used a thick layer of paste. So these practice pieces can either be sent home as artwork in their own right, or used as part of the science curriculum to demonstrate the results of baking soda and vinegar experiments.

Once students have mastered their preferred technique for volcano painting, challenge them to create bubbly art using multiple mediums. Challenge students to create a scene with tempura paint, markers, crayons or colored pencils, and use the baking soda solution to add elements that will either foam up and create a textured area, or fizz and create a rippled, color diffused effect.

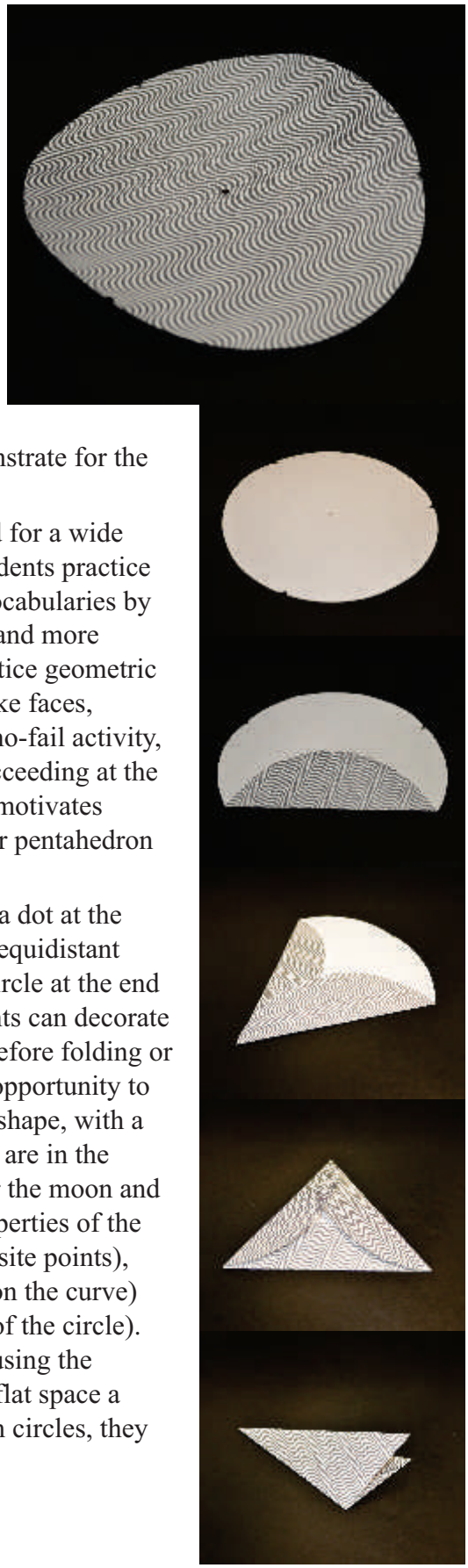
A very young student might enjoy creating an artistic representation of the typical, 3D baking soda volcano. Using Tempera paints, the student can draw their own volcano, with trees and animals on the slopes if they want. Then, they can use the baking soda paste to add in the exploding lava! Once the paint and paste have dried, use red, yellow (which will mix to create orange) liquid watercolor in vinegar to create the volcanic reaction! This activity is great for young kids because any thickness of baking soda paste will work. This can be a no-fail activity for young students, and it creates some beautiful textured art.

Older Students can challenge themselves to create more sophisticated works of art, consciously using different thicknesses of baking soda paste. For example, they might want to create an ocean-view seascape, with water and water-eaten sandstone. Older students can choose their preferred art tool to create the background. Once the background is created, they can add accents of very thin layers of baking soda paste to the water, and thick layers where they want the rocks to be. Similarly, a coral reef in an underwater picture would look beautiful with the texture that is created by volcano painting.



Remember, part of the effect is balancing the amount of baking soda paste with the amount of vinegar paint you use, so practice is a must!

Fold-A-Circle



In order for creativity to flourish, students need a solid understanding of the fundamentals. What underpins the fundamentals is vocabulary. A student has to be able to describe their world and what they see before they can change it and create new things. This activity is a great way to connect the visual aspect of shapes to the vocabulary that students will use for their entire academic careers. Fold a single circle first into 2D then 3D shapes, while getting as detailed as your students are ready for. In the classroom, it might be useful to copy the circle onto an overhead transparency or a sheet of clear Mylar so you can demonstrate for the whole class as you take them through this lesson.

What's great about this activity is that is can be used for a wide range of ages and developmental levels. Very young students practice their fine motor skills while they fold, and build their vocabularies by identifying the basic shapes they are making. For older and more experienced students, this activity is a great way to practice geometric vocabulary while learning technical aspects of shapes like faces, vertices and angles. Even better, at every level this is a no-fail activity, so while students are practicing vocabulary, they are succeeding at the basic folds. The small success bolsters confidence, and motivates students to take risks. When students put all their regular pentahedron together, the icosahedron is a colorful reward.

Begin by giving student a paper circle marked with a dot at the center, and three dots on the outer edges of the circle at equidistant points. We have included reproducible artwork of this circle at the end of this book. For a brightly colored final product, students can decorate their circles with crayons, pencil crayons and markers before folding or you can cut the circles out of our craft papers. Use this opportunity to talk to your students about circles. Circles are a regular shape, with a single face. Challenge students to think of where circles are in the world. They might suggest bicycle or car tires, pizzas or the moon and sun. Older students can talk about the mathematical properties of the circle, like the diameter (the distance between two opposite points), radius (the distance from the center to any single point on the curve) and the circumference (the distance around the outside of the circle). Challenge your students to find the area of their circle, using the formula $A = r^2$. A stands for area. Area is the amount of flat space a shape takes up. Once your students are comfortable with circles, they can start folding!

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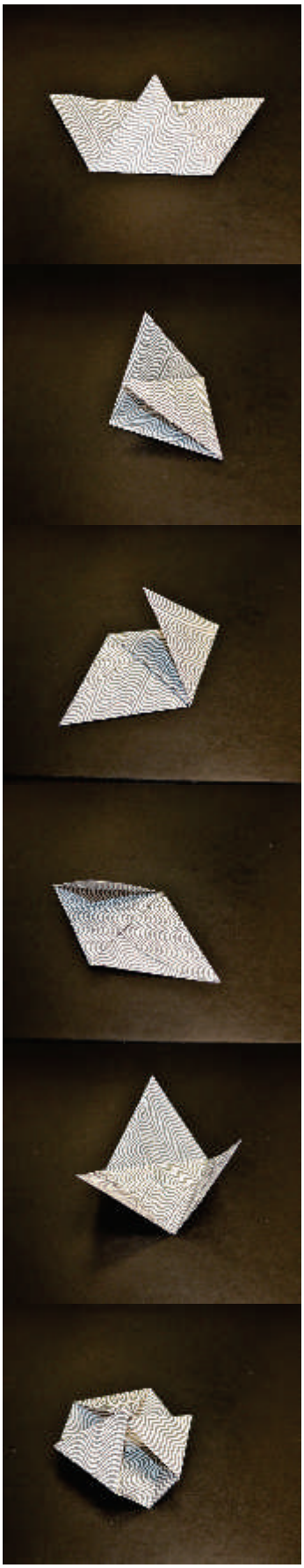
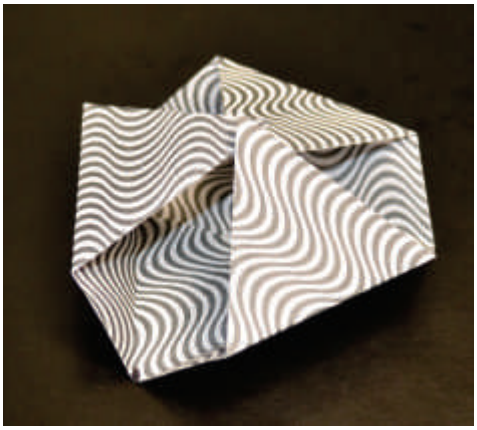


First, bring each dot on the edge of the circle to the center dot, creasing the edges firmly as you fold. You should have a triangle. Talk about the attributes of a triangle: 1 face, 3 line segments, and 3 vertices. More experienced students can talk about the three angles, and how they all add up to 180 degrees. Challenge young students to identify the shape and find examples in the classroom. They might point out a slice of pizza, or half a sandwich. This is a great moment to ask if a diagonally sliced sandwich and a slice of pizza are the same shape. Some students will say yes, the sandwich and the pizza are both triangles. Other students might say no, because the pizza and the sandwich are shaped differently, and not just because they are different sizes. This is a great way to introduce students to the three kinds of triangles. The triangle you have folded now is called an Equilateral Triangle. An equilateral triangle is unique because it is the only kind of triangle whose sides are all the same length (the sides are all equal). Your pizza and your sandwich probably have sides that are different lengths. If you fold your paper triangle in half, you still have a triangle, but its sides are all different (or unequal) lengths. This is called a Scalene Triangle. Your particular scalene triangle is also a Right Triangle, because it has one angle that is 90. Not all scalene triangles are right triangles, but some may be!



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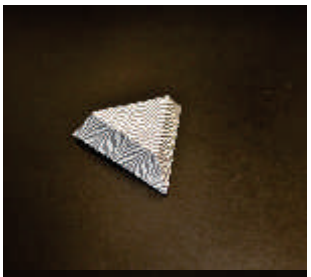


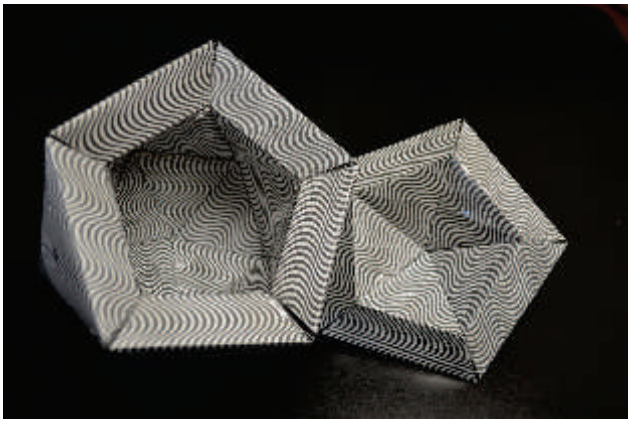
Unfold your scalene triangle, and fold the top point of your triangle down so that the point touches the center of the opposite line segment. Then fold the two triangles on either side over top, so you have a small triangle. Now you can talk about an Isosceles Triangles. Isosceles triangles have two line segments of equal length. Your slice of pizza probably looks like this!

Unfold two of the small triangles. Now you should have a trapezoid. Discuss the attributes of the trapezoid with students. Next ask your students to fold one of the triangles back over, and ask them what shape they have. Most of them will probably say they have a diamond. Remind your students that “diamond” in mathematical terms is called a Rhombus. If they turn their rhombus 90°, they will have a parallelogram. Unfold your parallelogram so you have a large equilateral triangle again to make the next shape.

Ask you students to fold down the tip of each triangle so the three points meet in the center. You should have a Regular Hexagon. Once you have talked about the attributes of a regular hexagon with your students, talk to them about the difference between 2-Dimensional shapes and 3-Dimensional shapes. So far, all the shapes they have folded have been 2-Dimensional; flat, with length and width, but no height. The next three shapes we make will be 3-Dimensional, with the added attributes of height and volume.

Unfold your hexagon so you have your equilateral triangle again. By this point, your paper should have lots of crease lines. Fold the three points of your triangle up, along the creases closest to the center, so that the points meet. You should have a Triangle-Base Pyramid. Your students should be very familiar with this shape; some of their blocks might be this shape, and older students may make the connection to the pyramids of Egypt. There should be a fold line in the center of each of your triangle-base pyramid's faces; fold along those creases so that you now have a Pentahedron. Once everyone has pentahedron, you can combine 20 of them to create a Regular Icosahedron. I suggest using clear tape to attach the pentahedron together rather than glue.

This activity is great for a few different reasons. First, it's easy to do; as a no-fail activity it's entertaining to students of all ages and it boosts confidence. Second, it's an easy-to-scale activity. I can fold a circle with four year olds or fourteen year olds, and the conversations can reinforce basic shape names or basic geometry. Some of the shapes we fold are uncommon, so reinforcing them in this activity is important.



Silly Stencil Monsters

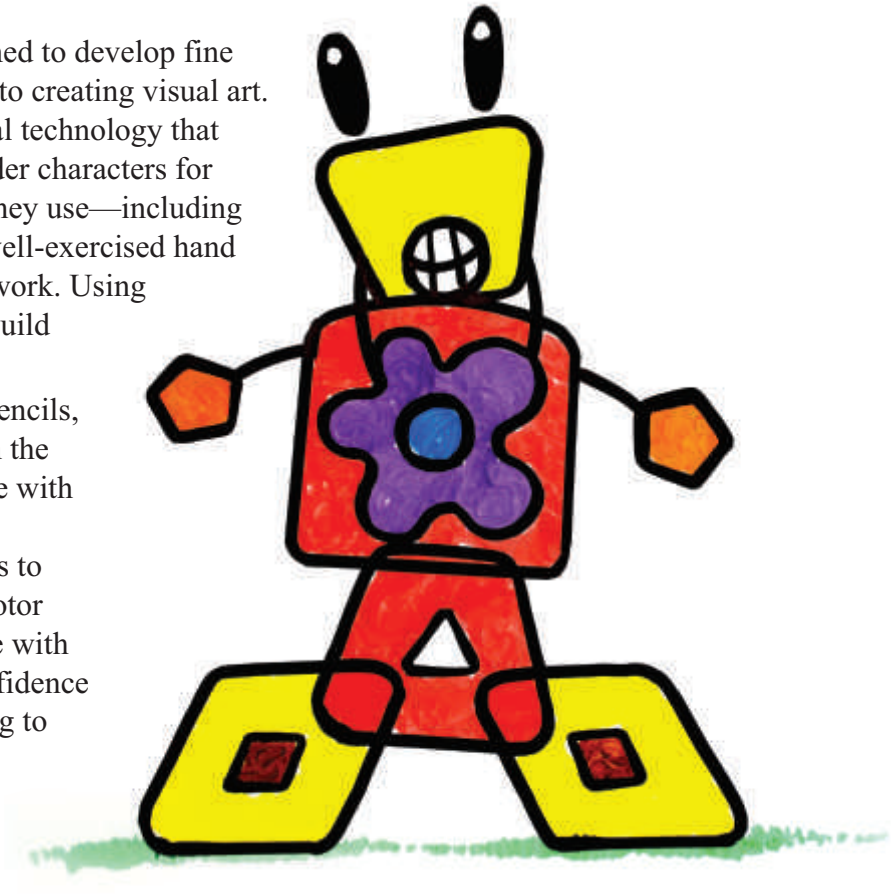
Stencils can be the ultimate creativity killer, but this fun activity transforms the creativity killer into a truly creative cross curricular project! Students will develop fine motor skills learning how to creatively combine design elements. Silly Stencil Monster can be expanded into a literacy activity when students give their monsters descriptive names, back stories and create stories that combine several different characters in dramatic settings.

Monsters are interesting. They are completely imaginary so they can be anything the student wants. They can have special powers and abilities. Monsters can be the inspiration for different creative exercises. As an extra bonus, by describing the monsters that the children create, students can work through some issues they have around fear and anxiety.

Students combine shapes to create monsters. The instructions are simple, so the creativity comes when they combine the shapes to create the outline of the monsters.

Our Silly Stencils come in three different levels of difficulty: The yellow stencils are the easiest to use. These stencils feature basic shapes that are fun and easy to trace. You can ask students to name the different shapes and experiment with tracing the stencils onto scrap paper before beginning the project. The red stencils provide the second challenge level. These stencils feature more curves and are more challenging to trace. Some of the shapes will be familiar to students as they trace them, such as stars, hearts and clovers. The most challenging stencils are blue. The blue stencils feature shapes like spirals, leaves, hand prints and flowers. All the stencils feature a square border with a center shape that can be popped out and distributed to students who wish to use both the outside and inner shapes of the stencil.

Our Silly Stencils are designed to develop fine motor skills which are essential to creating visual art. Even with the advances in digital technology that allows artists to graphically render characters for cartoons and movies, the tools they use—including digital drawing pads—require well-exercised hand and finger muscles to create artwork. Using stencils and templates helps to build muscle strength in fingers.



In order to effectively use stencils, children must place one hand on the stencil and secure it as they trace with the other hand. Practicing with individual stencils helps students to build confidence in their fine motor skills. Even practice pieces done with stencils can help bolster the confidence of students who might be starting to feel like they can't draw. Plus, students have beautiful take-home artwork that they can show to their parents.

Start simply by talking with your students about the different shapes of the stencils. Students will undoubtedly recognize geometric shapes like the square, triangle and oval and even some of the non-geometric shapes, like the hand or the clover. When it comes to shapes that aren't geometric or recognizably concrete, don't simply name the shapes by saying “this is a squiggle.” Take the opportunity to really discuss lines and curves with your students. Talk to them about the term “irregular shapes,” and discuss what regular and irregular shapes have in common and what makes them different. This activity is a great way to reinforce vocabulary. Ask students if they can identify places in the real world where irregular shapes are found. Once students start to practice tracing inside stencils or around templates, ask them what shapes are easiest to trace. Which shapes are hardest to trace? We have color-coded the stencils based on the complexity of the shapes and their corresponding difficulty. Ask students if they agree with our coding. You might be surprised! Tip: Save the paper students use for practice; the shapes can be cut out and used later for collage projects.

Once students are confident in their abilities to trace around templates and inside stencils, up the ante! Talk with your students about how individual shapes fit together to create a larger object. Start by asking your students what shapes they see making up different classroom objects. How many different shapes can they find on their desks or in their work area? How do the shapes fit together? Once they understand how regular, geometric shapes fit together to create larger objects, try using our R55401 Poseable People Stencil to have a conversation about what different shapes might be used to make up a human body. Remind students that while some monsters can have arms and legs like people, other types of monsters have different body shapes!

Using the 27 different templates and 27 stencils included with our Silly Stencils, challenge students to fit shapes together to create a monster. When using stencils AND templates remember that templates will fit inside shapes drawn with stencils, and stencils usually fit around the outside of a shape drawn with a template.

No two monsters will be exactly the same! Students' monster can be silly, scary, funny, big, small and colorful. To expand the activity and really engage in cross-curricular learning, ask students to describe their monster either verbally or by writing our a description. What is your monster's name? What does your monster eat? Where does your monster live? Is your monster nice or mean? By describing their monster, students have another avenue to demonstrate their creativity while practicing their descriptive words. They will have to use shape names, color names,

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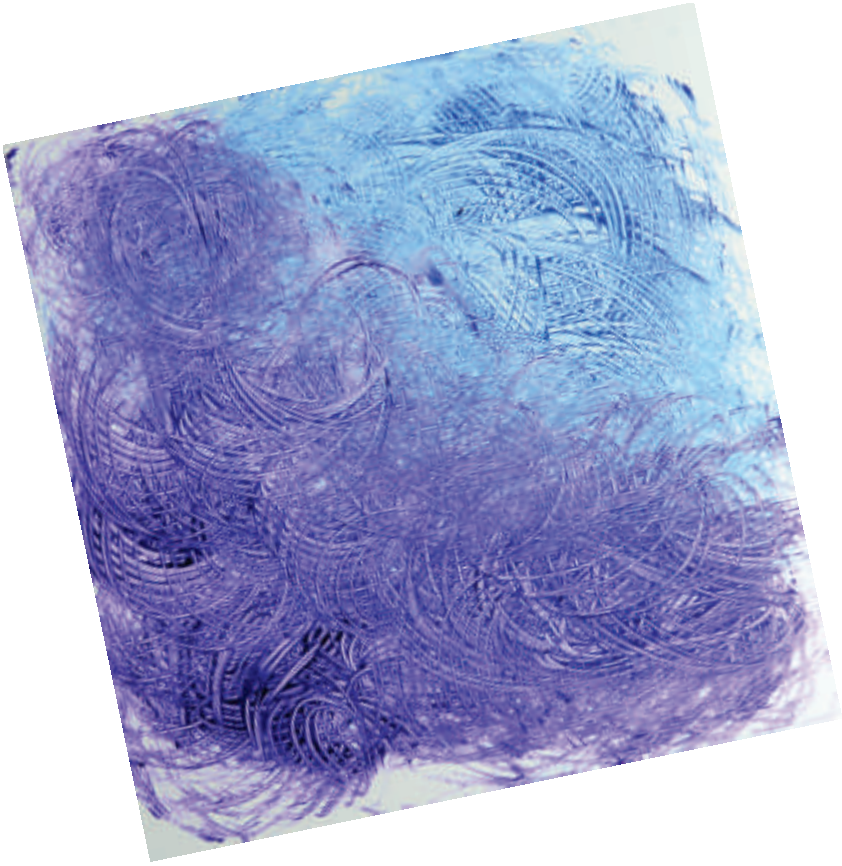
Self-Made Collage Paper

I love craft paper. Roylco makes a wide range of printed craft papers including animal, bug and sea life designs. While this paper is great for a lot of different activities, sometimes I want children to create their own collage paper that they can cut and paste in interesting ways.

There are two important reasons why I encourage students to create their own collage paper. First, they develop skills in using different tools for applying paint to paper. This is important to me because while it develops their fine motor skills, it also gives them a chance to explore the tools without the pressure of producing "artwork." These explorations are intended to be freeform so children can try new ideas without any risk. Second, I've found over and over again that children respect the materials they create themselves. Respecting materials is a fundamental value that I want to instill in students. I've tried several ways to encourage students to value craft paper and the very best one is to simply get them to make it themselves. Once they start respecting the paper that they create, it is easy to extend this respect to the material I buy.



Because the collage paper that we create in the classroom is doing double duty, in other

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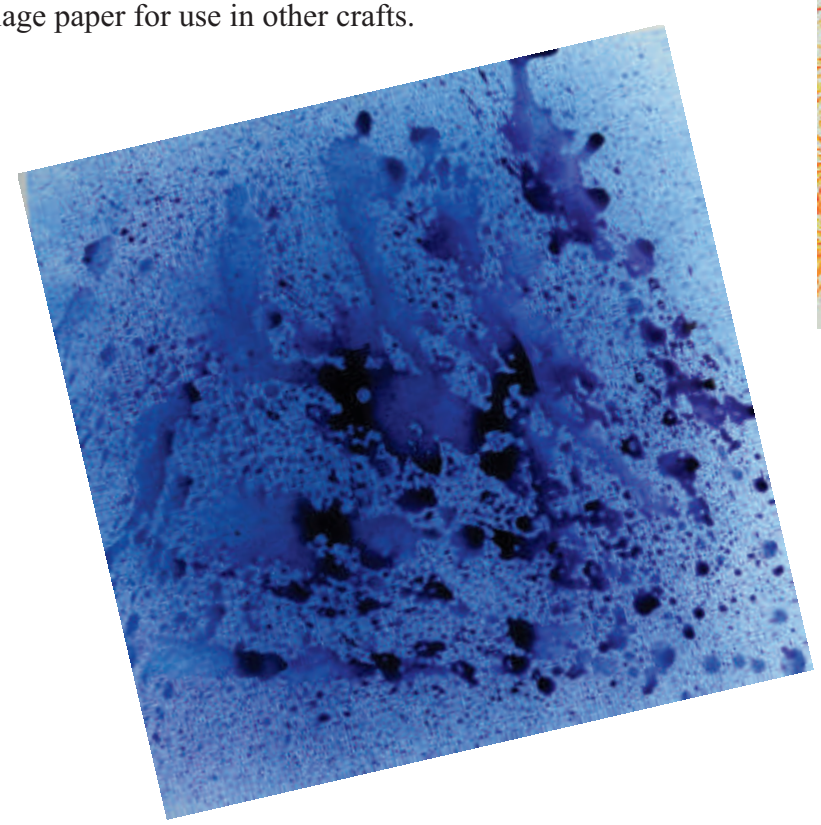
Because the collage paper that we create in the classroom is doing double duty, in other words, because we are using this activity to develop fine motor skills and explore techniques while creating paper that we will use in other activities, I try to limit the number of colors of paint the kids use. I've found it much easier to create a spectrum of different colored paper rather than using all colors of paint on one sheet of paper. Personally, I find this approach results in beautiful artwork and it reduces the amount of paper children use in the collage projects. In other words, if a child wants to add a yellow flower to their collage, they can start by cutting one corner of a yellow sheet of paper and then cut the flower from this smaller piece rather than searching through a fully colored sheet and cutting out the one small patch of yellow from near the centre.

Here is a range of papers made from some of our paint products:

R55004 Super Value Leaf Sponges
R54560 Animal Paint Scrapers
R5451 Paint Scrapers
R54466 Junior Paint Sprizters
R5320 Floppy Foam Brushes
R5419 Paint Bellows

Use these tools alone or in combination to create interesting collage paper for use in other crafts.



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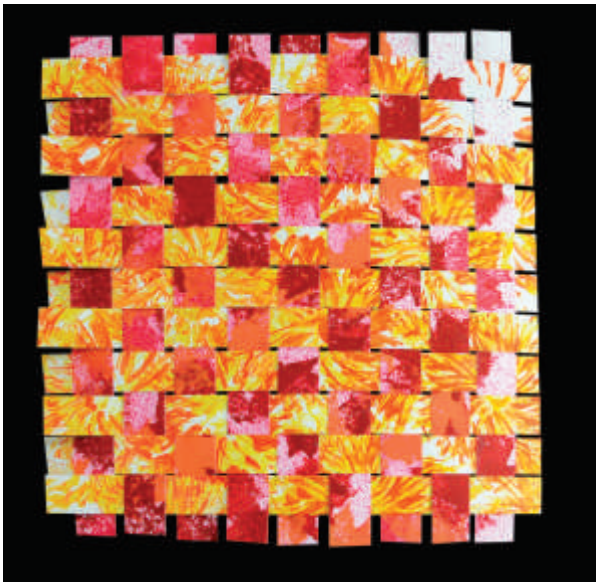
Collage Paper Crafts: Paper Weaving

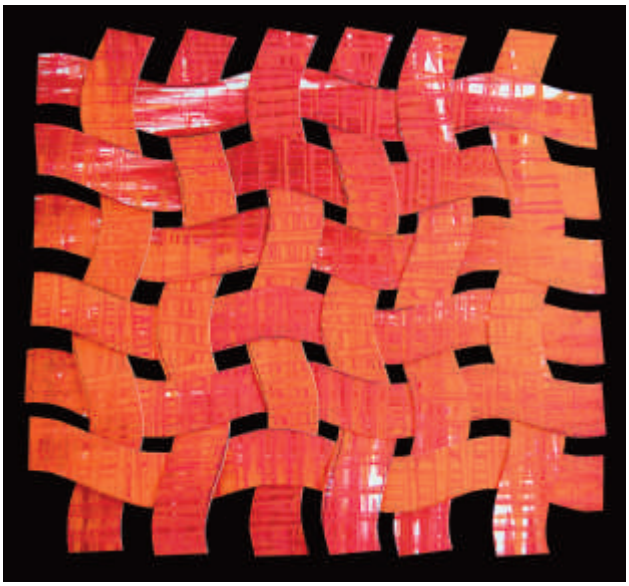
Students can use their personalized collage paper in a full range of craft projects. Here are some quick examples of projects that use student-made collage paper

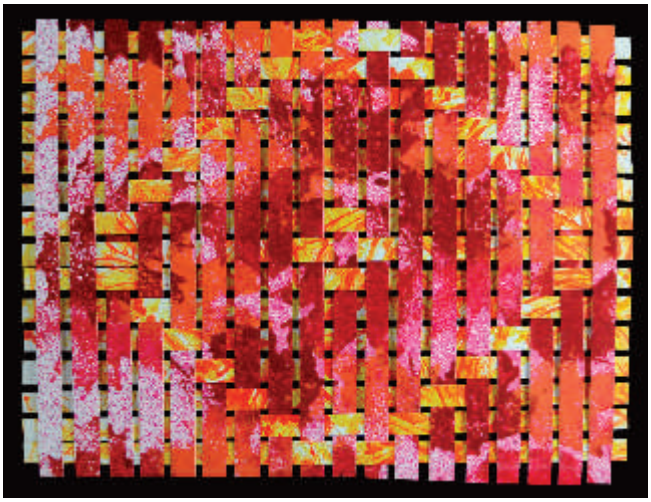
Paper weaving: Roylco makes a range of weaving mats including our very popular R16006 Little People Weaving Mats and our fun R16001 Wild Weaving Mats. Your students can experiment with their own weaving mat designs by cutting their collage paper into strips and using a second sheet of regular paper or another sheet of collage paper, folding it in half and then cutting slices into it. This second sheet becomes the base that the collage paper strips are woven into.

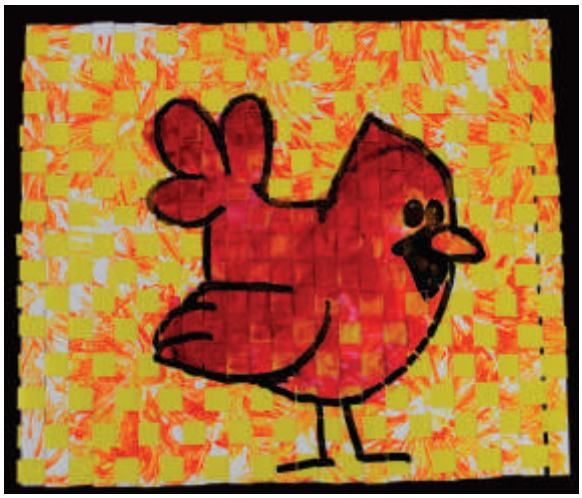
Once children have learned the basic technique, they can explore all kinds of weaving designs, from pop art designs to picture weaving.

For younger children, after we've made a few weaving mats, I encourage them to draw pictures in black over top of the colorful designs. The results are interesting illustrations that look a lot like psychedelic art from the 1960's









For product guide, see Appendix

Collage Paper Crafts: Paper Sculpting Lanterns

Paper sculpting is a great way to develop composition skills and fine motor coordination. Personally, I find paper sculpting a lot more challenging that it looks. As a result, I've come up with a basic process for leading children from simple 3D crafts into fully developed paper sculptures.

I start by exploring 3D crafts. My favorite is the classic Chinese lantern. We sell a kit for making Chinese lanterns using our Rubbing Plates, R22021. The beauty of this kit is that we've developed a technique that allows for a range of artistic possibilities. Let me share that with you now.

The normal paper lantern is simple. Your start with a long sheet of collage paper and fold it in half and cut slots across the fold. You then open up the sheet and form it into a cylinder. Tape the two ends together and add a handle and you are done.

Our technique is similar but with one added feature that transforms this basic craft into something a little more special.

We start with a cylinder of paper that goes in the centre of the lantern. We then proceed with the normal steps and tape the folded sheet onto the cylinder. Not only does this result in a more colorful lantern, it also allow you to create different effects. For instance, you can spiral your lantern by taping the bottom along the bottom of the interior paper cylinder and then offsetting the top by rotating it by a few centimetres before taping it in place. The results are beautiful and through this process, students will start to learn about how paper reacts to tension, folding, bending. It's a great way to introduce paper sculpting in a simple way that produces excellent results.

For product guide, see Appendix

Collage Paper Crafts: Paper Sculpting Topography

One paper sculpting technique that is often overlooked is very simple and can be very effective. Instead of curving, scoring or forming the paper, simply use a spacer to separate shapes on the paper and build height.

Start with your collage paper and encourage kids to cut out shapes. Next, ask them to arrange the shapes in any way they want. You can suggest arranging the shapes by size with the larges on the bottom all the way to the smallest shape on top, or you can suggest arranging the shapes by color.

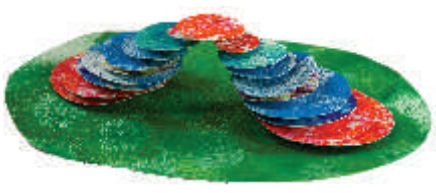
Next, you need to create a spacer between two shapes to give your sculpture some height. For a topsy turvy look, you can simply tell your students to cut a strip of paper and fold it in a zigzag fashion three of four time and glue one end to the bottom shape and the other end to the top shape. This can produce a dynamic looking paper tower.

For a more regular and consistent look, I suggest using straws as spacers between the different shapes. Buy some cheap plastic straws from the grocery store. They come in two different sizes, drinking straws and milkshake straws. I like using the regular drinking straws and cutting them into 4 cm (1½") lengths. Pour a puddle of white glue into a bowl and encourage the kids to dip the straws into the glue to cover both sides. Note: The glue does not have to extend all the way to the edge of the straw so kids can hold one end of the piece of straw while rotating it in the glue.

For a uniform look, use two straws for each shape to keep the sculpture level. If students want to make a more abstract look, they can use just one straw between the different layers.

There are lots of things students can do with this technique. Build a paper tower by stacking similar shapes on top of each other, create a topographical map by stacking ever smaller shapes on top of each other, or go wild and make an undulating sculpture by stacking a series of ever decreasing shapes and the another series of ever increasing shapes on top of each other.

With this type of activity, you can extend it by adding a photographic element. I encourage students to take pictures of their dimensional sculptures. We discuss how lighting can add drama to their images. Let kids explore photography by taking images from different angles. The results can be spectacular.



Collage Paper Crafts: Paper Sculpting

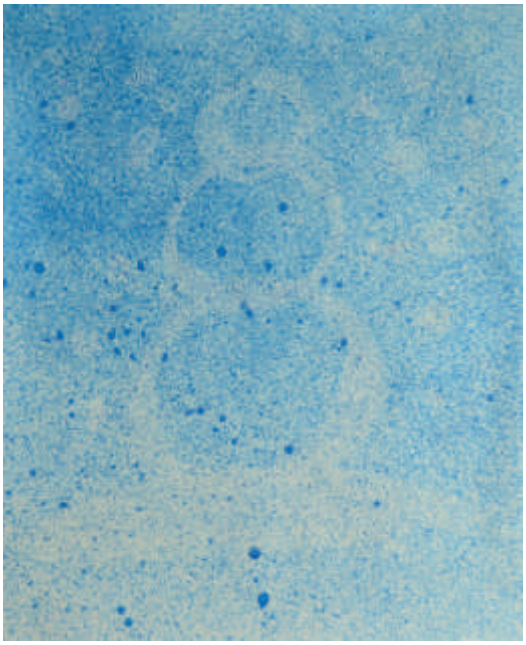
Combine paper sculpting elements to create interesting art. For this activity, encourage students to fold, bend, cut and score their paper shapes and then glue or tape them onto a card stock base. The base needs to be strong enough to remain flat when all of the paper elements are adhered to it.

In the past I've encouraged students to create whatever they want in three dimensions, but I found that students struggle with just how open ended this project can be. Now I like to give them themes and let them explore the themes through paper sculpting.

My favorite themes are water, garden and flowers. To inspire students, we've created a paper folding techniques poster. Please see Appendix IV. You can provide each student with a copy or enlarge it and put it on your wall.

For product guide, see Appendix

Wax Resist Art



There is something magical about Wax Resist art. When children work with white crayons on white paper and then flood the sheet with colored paint that magically avoids adhering to the crayon design, they are rewarded by the sudden reveal of a beautiful piece of art. It can be a wonderful technique, but it's not without it's frustrations.

I've tried a lot of different techniques and materials and I've finally come up with two approaches that work well.

The first approach uses white or colored crayon. I've tried both and while white produces a more interesting experience, colored crayons can produce a better end product. Let's focus on white, but feel free to mix it up in your classroom.

Use the white crayon to draw an image or write words onto coated card stock. Most card stocks you have access to will have a shiny surface and a dull surface. Use the shiny surface for this activity.

Draw on the coated card stock and then drip a few drops of good quality tempera paint over the design. Rub with a paper towel to disperse the paint over the sheet and reveal the crayon. I like to flatten out the paper towel to transfer the texture of the towel onto the wet paint.

This technique results in beautiful, vibrant colors. Students need to be careful not to wipe all of the paint off of the surface of the card stock, while working quickly enough so the paint doesn't have time to dry on the crayon. Once again, the students need to practice the technique in order to achieve a level of proficiency that works for them.

The second technique is a little more interesting. For this activity I use our Color Diffusing Paper either in sheets, like our R15213, 9 x 12 (23 x 30 cm) sheets or shapes, like our R2446 Sealife Shapes.

Draw over the surface with crayon and then spritz or drop liquid water color paint over the design. The paint will bleed and flow into itself to create beautiful patterns. You can sprinkle salt over top to get small star burst designs over your resist art.

This technique feels a little more artistic to me. The materials work well and feel special. Likewise, the colors are intense and the patterns they create as the paint swirls on the sheet are interesting. Once the paint has completely dried, I ask students to trace some of the patterns created by the paint in black or colored crayon. It makes a visually interesting piece of art.

For product guide, see Appendix

Once students have explored the technique, encourage them to get creative. I like to show pictures of ethnic textile patterns and animal prints to inspire the students. My absolute favorite activity with color resist is using a range of our Rubbing Plates.

Rubbing plates are great because they are fun to use and really promote fine motor skills. There are a range of designs, but the ones I like best are the R48231 Junior Rubbing Plates and our R5841 Optical Illusion Rubbing Plates. The Junior Rubbing Plates feature simple animals filled with interesting textures. Children can either rub the whole plate to create a picture, or they can rub the textural elements in patches onto paper to create unique designs.

The Optical Illusion Rubbing Plates have six different geometric patterns that can be used alone or in combination to either create interesting visual elements or vibrating optical effects. I especially love the idea that when children rub the design onto the Color Diffusing Paper, they really can't see what their doing. Once they spritz the paper with liquid water color, the pattern is revealed. It can be a very special moment for budding artists.For older students, introduce Batik as a artistic form. I've watched traditional batik techniques in villages in India and it's both interesting to see and impressive. Artisans work diligently to create their designs either free hand or with something that looks like large rubber stampers. The end result is wonderful.

Our crayon resist technique doesn't use the same principle as traditional batik, but the end results are similar.

As students become more and more proficient at their design, encourage them to apply liquid water color or tempera paint in more precise ways to achieve a more uniform design. This is an advanced technique, but one that will serve students well in other areas of art.

Crayon resist is popular because it's magical, but it's worthy of teaching to your students because as a process and technique, there is a lot of creative possibilities. Explore these possibilities with your students.

For product guide, see Appendix

Paper Mesh Stitch Art

Over the last five years, I've noticed a serious decline in young children's fine motor skills. One of my goals has been to focus on products and ideas that help to develop fine motor skills in young children. This year, we developed a product that meets these needs in a fun and interesting way: R15401 Paper Mesh. We take thin rolls of paper and weave them together to get a great woven texture. It's perfect for activities like monoprinting with our Paint Pad, using with crayon, marker or paint, but my favorite thing to do with this paper is to stitch it.

I've seen cross stitch kits at craft stores for years. They tend to fall into one of two groups: either they're incredibly complex and clearly meant for adults, or they are so simple that they wouldn't challenge a child. These pre-made kits often use metal needles which are hard to thread and not safe for young children in a classroom setting. Finally, these kits are creativity killers. The fabric is usually pre-printed with indicator colors that don't allow for any creativity. Cross-stitch kits are not kid or creativity friendly. That's where Paper Mesh comes in. I love doing this activity with kids of all ages. Not only is this a try, try, try again activity, there are lots of opportunities for students to break the rules and steal like artists.

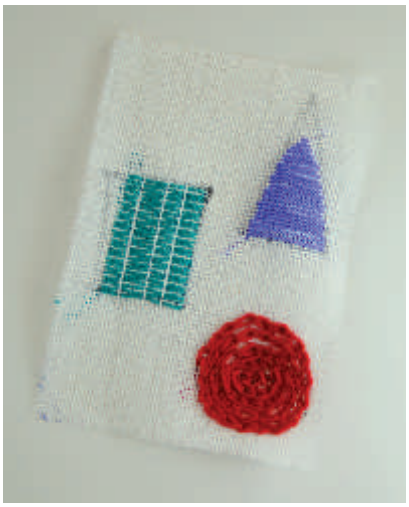
Students start by drawing shapes on the paper mesh in pencil, pen or marker. Once everyone has their designs, use Roylco's R5601 Plastic Lacing Needles and yarn to fill in the shapes. Our lacing needles are excellent for young children because they are easy to thread and they are flexible, with rounded points, so no one's fingers will get pricked.

Ask students to start by using long stitches that go from one side of the shape to the other. This makes for a very smooth look, and students will find that they can fill a shape relatively quickly. Once the shape has been filled in, the student can carefully cut out the shape from the sheet. These practice pieces are beautiful as take-home ornaments, by simply adding a loop of yarn to the top. Students can accentuate their stitched shapes by adding fringes or beads as decoration.

To add a bead to a stitch, simply thread the bead onto the Plastic Lacing Needle and complete your stitch. Small stitches hold beads in one place. Larger stitches allow beads to move back and forth along the length of the stitch. Both of these techniques look beautiful, and they add a 3-dimensional aspect to a stitching project.

Fringes are easy to add to a project. Simply tie a knot at the end of your yarn, and thread three or four beads onto the yarn. I like to use our R2170 Brilliant Beads or R2183 Fancy Stringing Rings for this part. Then stitch through the edge of your shape, leaving a tail. Thread 3 or 4 more beads onto your yarn, tie a knot in the end where you want the length to stop and cut off the excess yarn. Repeat this until you have a fringe that is as long or short as you like. To further personalize these ornaments, students can stitch either the first letter of their names, their initials, or their whole name onto the ornament over top of the flat stitches filling in the shape.

For product guide, see Appendix



Once Students have mastered this basic stitch, challenge them to use short stitches to fill in the shape. This method will take longer and it will produce a different visual and tactile texture. Encourage older students to experiment with different-sized stitches. This method of stitching creates a knobbly texture and because there are multiple stitches, the piece will have two sides that look different.

Here is an excellent opportunity to re-frame the idea of art for you students. Good and bad sides of fabric and stitching projects are conventional terms that refer to the side of a project that audiences are meant to see and the side that hides all the knots. However, there can be beauty, cool textures and interesting patterns on both sides. Make sure to talk about the artistic attributes of both sides of student stitching projects.

Once students master the simple stitches, they can practice cross-stitching or other embroidery stitches. One of my favorites that is relatively simple to do but looks very beautiful is the chain stitch. To do this stitch, you make a relatively short stitch but don't pull the thread down flat! Leave a small loop. Fold the loop down so it lies flat against the paper mesh. Come up for your next stitch inside the loop from the first stitch, and go back down through the paper mesh right next to where you came up, leaving a small loop. Repeat. Each successive loop will hold down the previous one, and the resulting line of stitches looks like the links of a chain. Students who are really excited by this project can look online for different stitches to experiment with.

Older or more proficient students can design their own scenes or pictures to stitch. A student might choose to draw a cat on a sheet, and fill in the outline with a variety of colors, using different stitches to add detail to their cat.

Use beads to accentuate stitch projects.

Stitch art helps exercise fine motor skills and supply beautiful take-home art. Not only that, but it can be included as a cross-curricular art activity to complement social studies or history assignments. Sewing, cross stitching and embroidery have served important roles over the course of history. It is one of the first visual narrative art forms. Tapestries rich in color, texture and meaning often told Biblical stories or retold heroic tales. Tapestry techniques were used to decorate clothes and pillows.

Sewing is a skill that comes in handy. When a button pops off a student's shirt or sweater, it is useful for them to know how to stitch it back on! It is such a simple thing that provides many benefits.

Paint Spritzing Art

Graffiti isn't something we want to teach students how to do, but the painting techniques employed by street artists like Banksy have many applications. Freehand and stencil spray painting techniques can be successfully adapted for a classroom environment. In addition to teaching an art technique, this is a great opportunity to talk to children about stealing like an artist.

Children might know the phrase “good artists copy, great artists steal.” This quote has been attributed to T. S. Eliot, Pablo Picasso and Steve Jobs. No matter who said it, stealing like an artist doesn't mean copying someone exactly and presenting the results as your own work—that is plagiarism! Stealing like an artist means using a technique you admire from an artist and innovating that technique to create a unique final product.

Our Junior Paint Spritzer process incorporates all the rules of creativity we have explored so far: students must learn the vocabulary surrounding the technique and practice it until they are confident and competent. This process will involve failure, but once students have learned that with practice and through failure come rewards, they will be ready to go through the process again and then push it to the next step: Stealing like an artist!

Spray paint cans are unwieldy for small hands, expensive, and can create a huge mess in a very short amount of time. In order to give students a tool to safely and affordably practice spray paint techniques, Roylco developed our R54466 Junior Paint Spritzer. These bottles fit perfectly into small hands, and the adorable elephant-head nozzle encourages young artists to practice fine motor skills along with art skills. There are lots of videos on YouTube that demonstrate really beautiful and amazingly executed spray painting techniques. Inspire students by watching one or two of these videos with them. Be careful to preview videos to make sure they are age and content appropriate for a classroom! Alternatively, choose images of spray paint art or appropriate images of graffiti to provide inspiration for your students. Really talk with them about the techniques used. Ask students to notice how the artists make thin and thick lines by adjusting how far they hold the can from the canvas. Draw student's attention to things like layering and mixing paint colors, and the use of objects to preserve a layer of paint in a specific shape while other layers of paint are added around the object.

Students can start by practicing basic techniques with the Spritzer. Spend time making dots and dashes. Practice controlling the thickness of the spritzes. Experiment with some basic techniques such as the speed you move the Spritzer over the paper; the distance you hold the Spritzer from the paper; the pressure you use to depress the Spritzer; and, the angle that you hold the Spritzer.

Once students are proficient at controlling the Spritzer, introduce various objects into the mix. Try colanders, perforated spatulas, fly swatters, beads, buttons, or Roylco's R16003 Weaving Baskets and R5519 Classroom Bowls. Spritz through and around these items to achieve beautiful patterns and shapes in layers of paint.

For product guide, see Appendix

Experiment with other techniques for creating dynamic effects. Try using our Roylco's R5725 Goo Spreaders or crumpled up newspaper to gently scrape layered paints to reveal mixed colors or designs underneath.

Once students have mastered freehand techniques with the Paint Spritzer, they can use any of Roylco's stencils and templates to practice their paint spritzing techniques. Using a Paint Spritzer to fill in a stencil seems easy, but it's harder than students think! Controlling the spritzer is crucial, especially if you only want the inside of a stencil to show up on your paper. If you hold your paint spritzer too far away from the stencil, you'll see the outline of the stencil around the painted image that you wanted. You also have to be careful when you are holding the stencil down that the force of the pain spraying doesn't lift the stencil off the paper, blurring the lines of the image. The best technique I've found is to slowly spritz a stencil in chunks, holding down each section of the stencil with your fingers so the paint can't get underneath the stencil. When you lift the stencil, try lifting just the very edge of two corners to get a grip on the stencil, then lift straight up so you don't smear the paint.

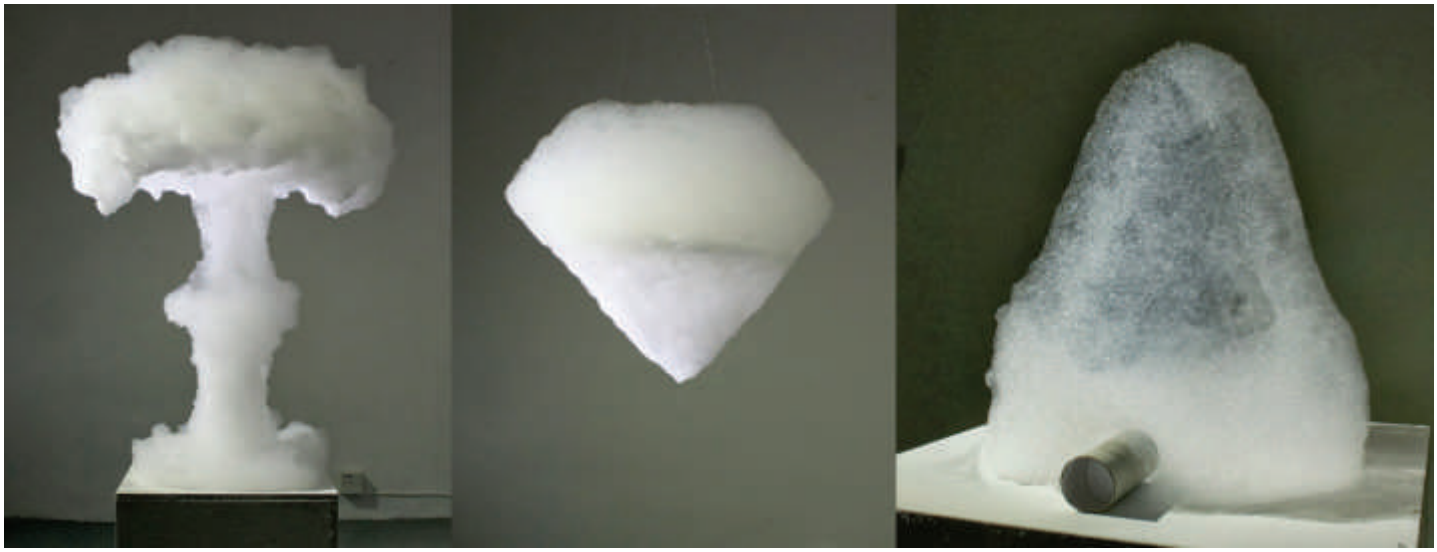
Templates are a little different. When you use a template with your paint spritzer, you will have a fuzzy corona of paint around a clear image. Again, I have found that the best way to keep the lines clear is to work around the template slowly, holding the edges down as you spritz them. Students will get paint on their hands during this activity, but I've never been deterred by a little mess! If parents are concerned, one strategy I have found effective is to send home a note the week before doing this activity, asking parents to send students to school in clothes that they don't mind getting stained or messy. Art smocks are a possible solution, but even the best smocks can slide or drip paint in unexpected places, so it's best to warn parents ahead of time. Once a template has been spritzed around, it can be hard to lift without disturbing or smearing the corona of paint. One easy solution to this is to use a loop of masking tape to grab and lift the template once it's been spritzed around. Just be careful to lift straight up! Students can practice their stencil and template paint spritzing with single colors; lots of stencil art is monochromatic (one color) or dichromatic (two colors). Once they have mastered one or two colors in a single stencil, they can mix their freehand techniques with their stencil techniques and experiment with multiple colors in a single stencil.

Even though graffiti has a bad reputation, the combination of a paint spritzer, good technique and stencils equals really beautiful artwork that students can feel proud to display. And remember, the idea is not to teach kids how to do graffiti. The idea is to teach a painting technique and to foster student creativity.

For product guide, see Appendix

Bubble Sculpting

Bubble sculpting is exciting and energizing for students of all ages. One of my favorite Bubble Sculptors is Justin Chow. Justin creates some truly incredible, evocative sculptures using little more than bubbles. Videos of his work are available on YouTube and they are a great way to get kids excited about the idea of bubble sculpting.



I've tried for years to make homemade bubbles that will last long enough to use in experiments and demonstrate principles to students. I tried all of the different kinds of recipes on the internet and really couldn't develop anything that was good enough at a reasonable budget. I remember one instance where in desperation I went to our local university and talked to a professor of chemical engineering who specialized in soap. I walked into his office and he proudly showed me a bubble he had blown and put inside a glass case more than two years previously. I was impressed. When I asked him what the secret to long lasting bubbles was, he told me that it was easy. It's all about the glycerine you use. When I asked him what he used, he simply told me he used nitro-glycerine. He told me this as if it was something I should have known. I told him I worked with teachers and students. He said that he had used his formulation with many, many students. *Okay*, I thought, *there is a difference between university students studying chemistry and preschoolers studying finger paint.* That distinction, I found, was lost on him. Over the subsequent years I worked with a different chemical engineer to make a reliable, affordable and interesting bubble solution.

Check out our F66525 Demonstration Bubble Concentrate! You mix 3 parts cold water to one part bubble solution. The bubbles aren't permanent, but they will last long enough to for students to practice sculpting with deliciously tactile bubble foam. To achieve the volume of bubbles you need for this activity, I have found that the most effective method involves our Sensory Tray and Super Bubble Pump. Simply mix up the bubble solution, and pour it into the Sensory Tray or a large, relatively shallow vessel such as a turkey roasting pan or shallow plastic tub. Once your bubble solution is in your vessel, submerge the red, perforated cap of the Super Bubble Pump in the solution and pump up a tub full of frothy bubbles!

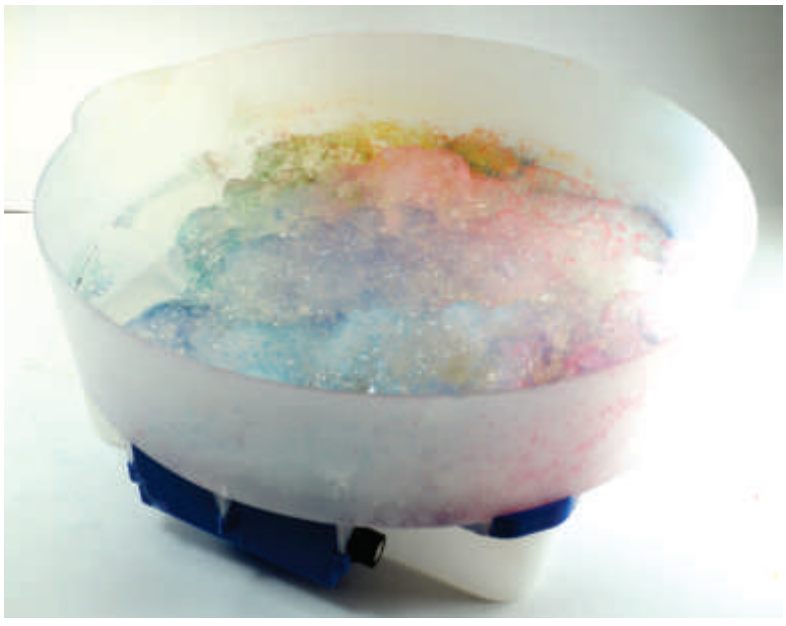
For product guide, see Appendix

Before you fill your bubble tray, however, students will need to build themselves a sculpting platform. Using our R6085 Straws and Connectors™, challenge students to create a platform around which to sculpt. Their platform can be designed to sit on a desk or tabletop, or it can be designed to be hung from the ceiling at a height students can easily reach to be sculpted on. Justin Chow's platforms are often very simple; he uses a round disc suspended on the ceiling, a square platform, and slender wire loops. Remember, stealing like an artist means to honor the original artist, while rejigging their techniques and materials to innovate and transform the original into something new. Encourage students to innovate with their Straws and Connectors™ sculpting platforms. Challenge students to experiment with shapes, and open spaces. Do larger open spaces support more bubbles, or do bubbles need more support and structure to create effective sculptures? The possibilities with Straws and Connectors™ are almost limitless!

When it comes to the actual sculpting process, students can grab bubbles from the Sensory Tray and take them over to sculpt on their platforms. One key rule to remember with bubbles is this: dry surfaces pop bubbles, wet surfaces preserve bubbles. Use a spritz bottle—or Roylco's Junior Paint Spritzers—filled with water or liquid water color paint to dampen the Straws and Connectors™ platforms and student's hands before starting to sculpt to help make the bubbles last longer. Bubbles work better in cool, humid conditions, so if you try this activity outside encourage students to find shady spots to sculpt in. Damp hands are fine to sculpt bubbles with, but every great artist uses at least a few tools. Cut yourself some sculpting tools out of cardboard! Justin Chow uses a large square of cardboard to great effect.

Students can also use the Bubble Pump to add bubbles to their sculptures, and create the broad strokes of their sculpture before using their hands and cardboard sculpting tools to add in details.

Remember that bubbles, despite all our efforts with the bubble solution, are ephemeral things, so make sure to have a camera on hand to document student's final sculptures. iPhone and iPad cameras work well for this activity.



For product guide, see Appendix

Crafty Leaf Cutout Bowls

Here is another activity for students to practice stealing like artists. Henri Matisse was best known as a 19th and 20th century painter, but at the end of his career, Matisse started to experiment with paper cut-out art. In 1947, Matisse's work in this new medium was published in a book entitled *Jazz*. These prints were accompanied by Matisse's handwritten notes about his work and process. The twenty different art prints explore a variety of themes with an autobiographical slant. The title of the collection, *Jazz*, suggests the intertextual connections between art and music. Exposing students to this fabulous collection is not only inspiring, but it helps to start conversations about art. Matisse's work was mostly flat collage and decoupage projects, so I wanted to steal like an artist and innovate a new style of art using Matisse's techniques.

Over the years, we have created a variety of different paper "popz" and cut outs, including the contemporary funk R15298 Gizmo Paper and the beautifully realistic R15334 Crafty Leaves. To teach you the technique, I am going to use the Crafty Leaves.

For this activity you will need the Crafty Leaves, Roylco's R5519 Classroom Bowls, a paintbrush and regular white glue (mod podge or some other kind of craft shellac can be substituted, but thinned out white glue works well).

I love this technique because it is relatively simple at heart, but students have the opportunity to break the rules and create some really beautiful art. The basic iteration of this technique begins by coating the inside of the bowl with glue. Then, simply lay the Crafty leaves in the glue to form a bowl shape. Once you have covered the inside of the bowl, add another layer of glue to laminate everything in place. The glue will take a while to dry, so pop the bowls up on a shelf for a day or two before returning to them. Our bowls have just enough flex to them that popping the leaf bowls out the plastic form is pretty easy. The result is a sturdy, utilitarian and beautiful bowl.

When they are just learning the technique, students might be inclined to overlap all the cutouts and create a bowl that functions as a bowl. That's a great method, and it is true to the process. However, once students have mastered this technique, encourage them to add some creativity to the process. Remember, stealing like an artist involves innovation and experimentation! Students who stopped at the rim of the plastic bowls could leave leaf fronds hanging over the edge of the bowl, and when they pop the bowl out, they can curl the ends of the leaves for a pretty fringe.

For product guide, see Appendix

Create lacy bowls! Rather than covering the whole interior of the classroom bowl, challenge students to think about the "negative space," or the areas that are not covered by crafty leaves. By designing a leaf bowl with open areas, students will discover a new way to visualize artwork and the delicate, lacy look is belied by the sturdiness of the final product. This method might leave students with films of dried glue in the spaces between leaves. They can decide if they want to leave the film as part of the artwork or if they want to trim it away with scissors. If they want to leave the glue films intact, challenge students to experiment with colored glue. Simply mix a small amount of tempera paint into the glue before brushing the glue over the bowl and leaves. The tempera paint adds color, but because white glue dries into a translucent film, students will have a stained-glass effect.

The most important part of this activity is to encourage students to innovate with the process. Encourage them to experiment by indulging their inspired ideas: what if they added yarn to their bowls? Encourage students to cut out their own paper designs. If they want to change the shape of their finished product, have them try other forms. Shiny plastic forms, like our Classroom Bowls, work the best. The glue won't adhere to the shiny plastic in most cases. Avoid wood forms. Alternatively, partially air-filled balloons work really well to make bigger objects.

This activity definitely has limitations, but sometimes limitations add to the creative process rather than discourage it. Encourage students to get creative with the process.

Matisse once said that, "An artist must never be a prisoner of himself, prisoner of a style, prisoner of a reputation, prisoner of success." Talk to your students about these points and what they mean. Encouraging students to challenge their own ideas and assumptions about art leads to creative new ideas with which to take a basic technique to entirely different levels.

For product guide, see Appendix

Shapegami

Learn about mathematics and explore geometry by folding colorful paper Shapegami and make beautiful patterns. Learn the names and basic definitions of 9 shapes. Fold up and arrange the shapes to create simple or elaborate patterns. Join individual patterns together to make a quilt-like masterpiece!

Use our easy-to-follow instructions to fold the shapes. Let's start by examining a sheet of our special reproducible artwork. There are two different sheets. One sheet has a large rectangle at the top. The second sheet replaces the large rectangle with smaller ones to increase the number of paper shapes you can fold up. Choose one sheet and photocopy it onto colored paper. Tip: Photocopy the lines onto Roylco's R15294 Terrific Tree Paper for extra special artwork!

Older students can examine the relationship between length and width. Measure the length and width of all of the shapes and create a formula to determine other proportionate sizes. Hint: The formula is:

$$\text{width} = \frac{\text{length (p2)}}{2} \quad \text{eg.} \quad \text{width} = \frac{5.5\ (1.41)}{2} = 3.88$$

After students cut out the rectangles, it is time to learn about the individual shapes. Reproduce the instructions for folding the shapes and hand them out to students individually or in groups. Fold each shape and discuss it with the students. For younger children, tell them the name and definition of the shape. Ask each child to make a Shapes Log. They can record the name and definition of the shape on a sheet of paper and then look for objects that resemble that shape in the classroom or at home.

Older children can examine each shape and measure the sides, angles and calculate the perimeter. Add these measurements to the Shapes Log.

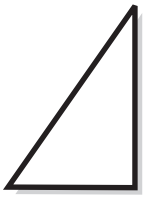
Once students have a working knowledge of the shapes, they can use them to make patterns. To inspire students, look on the web or in the library for information about quilt making. Quilt artists use simple shapes to create beautiful artwork. Shapes are cut from fabric and sewn together to create repeated patterns (quilt blocks) or scenes. Our shapes can be used the same way by gluing them onto sheets of construction paper. Tip: A black background gives the shapes a dynamic look.

Let's make a classroom quilt! Give each child a square sheet of black construction paper. Divide the class into groups and give each group folding instruction sheets. Encourage students to make their own unique patterns by arranging the shapes so that they join together along at least one edge. Start by arranging the shapes on the black paper and once a pattern has been finalized, glue them down.

Explore symmetry! Start by folding a square sheet of paper into four equal quadrants. Create a pattern in one of the quadrants and reproduce the same pattern in the other three. Join all the symmetry quilt blocks together by taping them onto the wall to create a wonderful classroom quilt.

As students become more familiar with the colors, sizes and attributes of the shapes, they will create outstanding and highly complex designs and patterns!

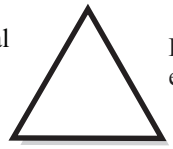
Triangle: 3 sides and 3 angles. The sum of the 3 angles is 180°. There are special types of triangles:



Scalene Triangle: All 3 sides have different lengths.

....a scalene triangle can also be a....

Right Triangle: A triangle with a 90° angle. Note: Our right triangle is also a Scalene (unequal sides).



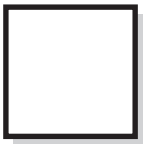
Equilateral Triangle: A triangle with 3 equal sides and 3 equal angles, 60°.

Isosceles Triangle: A triangle with 2 equal sides.

Kite: A quadrilateral with 2 pairs of congruent and adjacent sides.

Trapezoid: A quadrilateral with 1 set of parallel sides.

Isosceles Trapezoid: A trapezoid with 2 equal base angles (both examples are Isosceles Trapezoids).



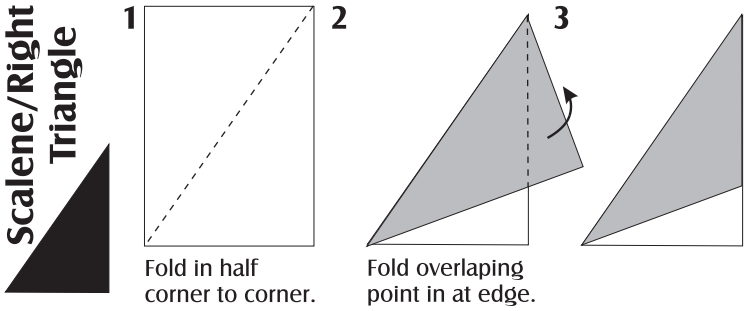
Square: A quadrilateral with 4 equal sides and 4 right angles (90°).

Parallelogram: A quadrilateral with 2 pairs of opposite sides that are equal and parallel.

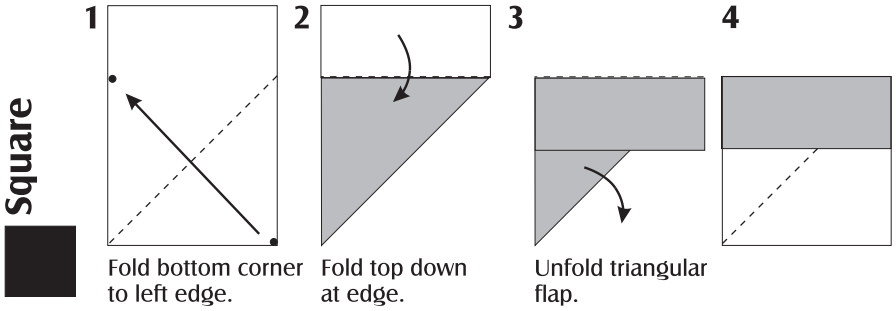
Rhombus: A parallelogram with 4 equal sides, but no 90° angles. You can fold up two different Rhombuses.

For product guide, see Appendix

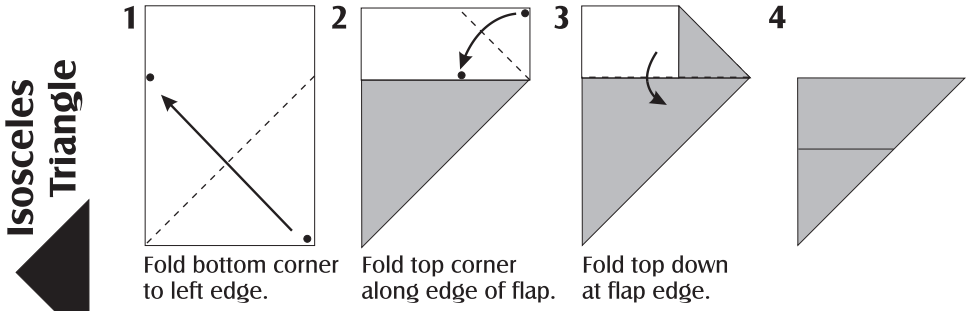
Scalene/Right Triangle



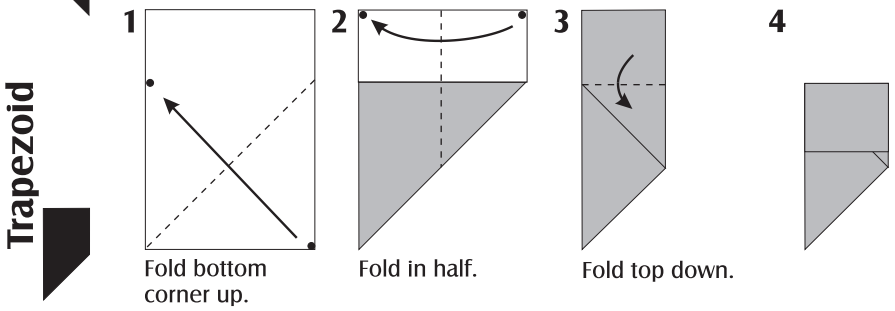
Square



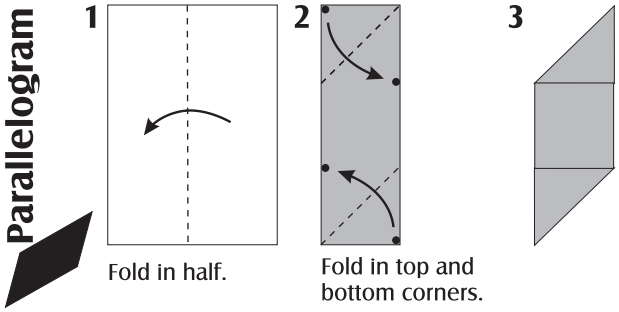
Isosceles Triangle



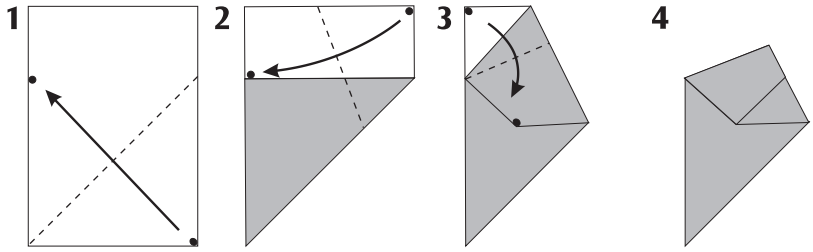
Trapezoid



Parallelogram



Kite

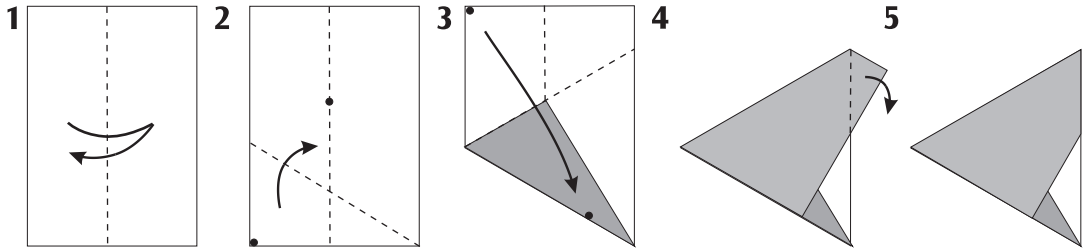


Fold bottom corner up.

Bring top right corner down to meet folded corner.

Fold top corner down to meet middle point.

Equilateral Triangle



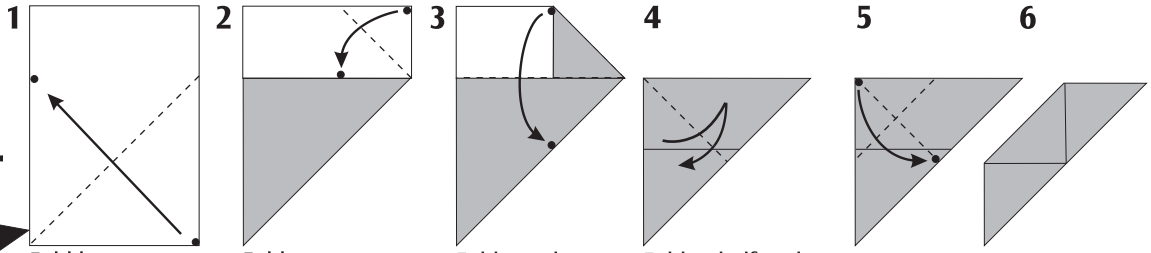
Fold in half and unfold.

Fold bottom corner to middle crease.

Fold top down along edge of flap.

Fold in the overlapping corner.

Isosceles Trapezoid



Fold bottom corner to left edge.

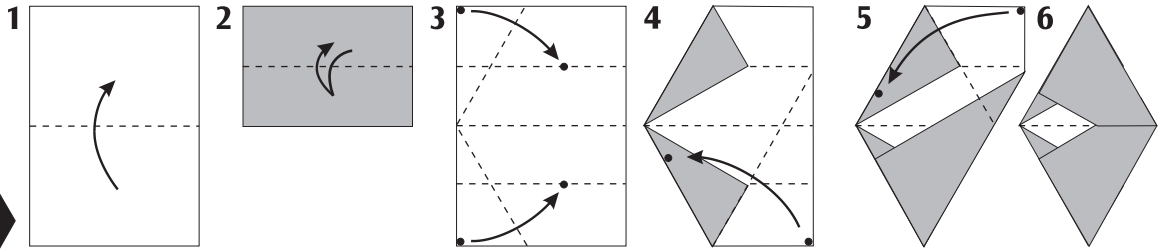
Fold top corner along edge of flap.

Fold top down at edge of flap.

Fold in half and unfold.

Fold top corner down center line.

Rhombus



Fold in half.

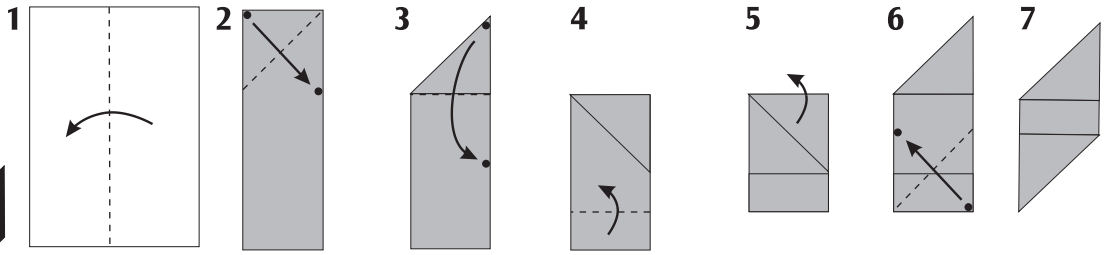
Fold in half again and unfold.

Fold left points in to creases.

Fold bottom corner along flap edge.

Fold top corner along top flap edge.

Rhombus



Fold in half.

Fold top corner down.

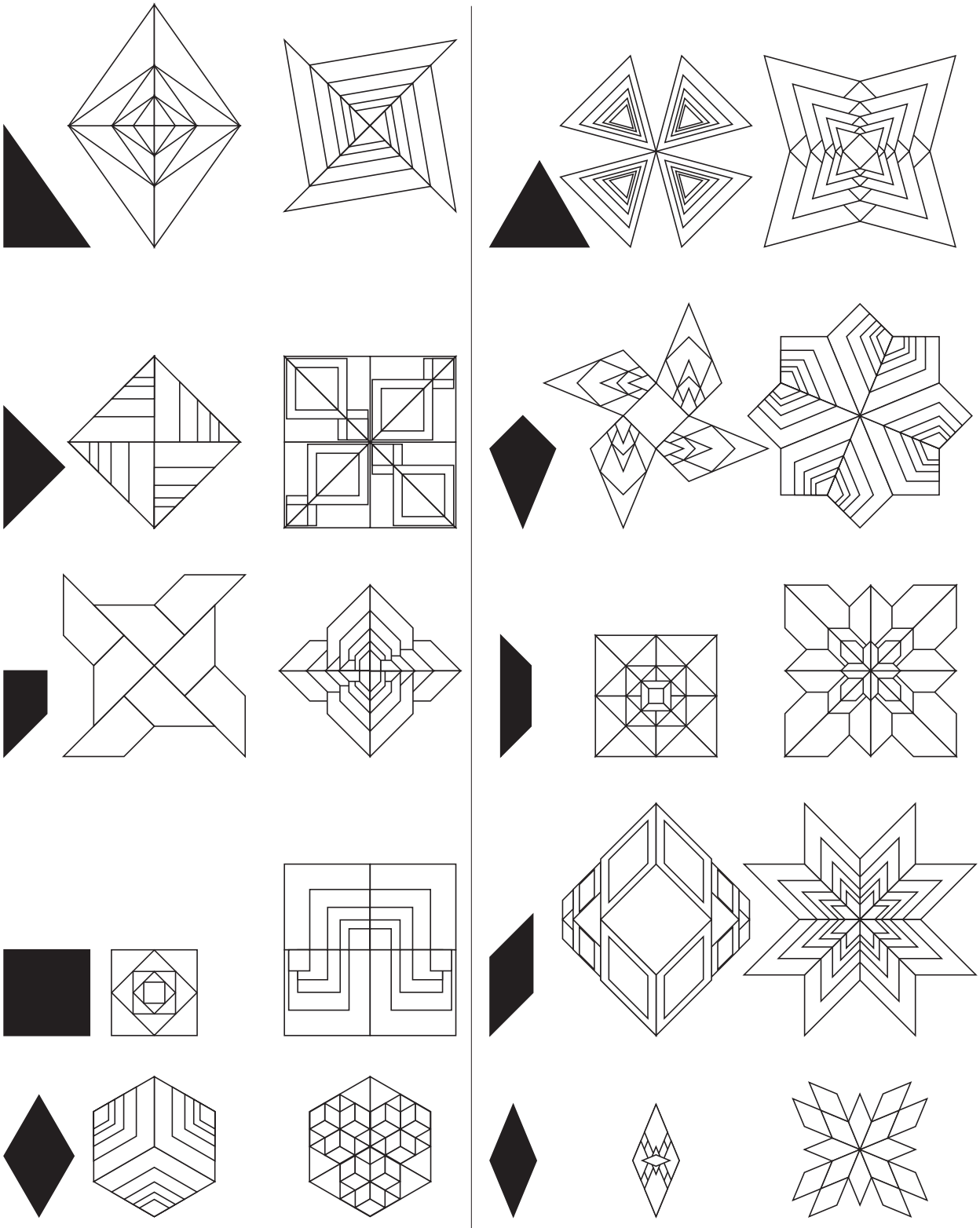
Fold top point down along edge.

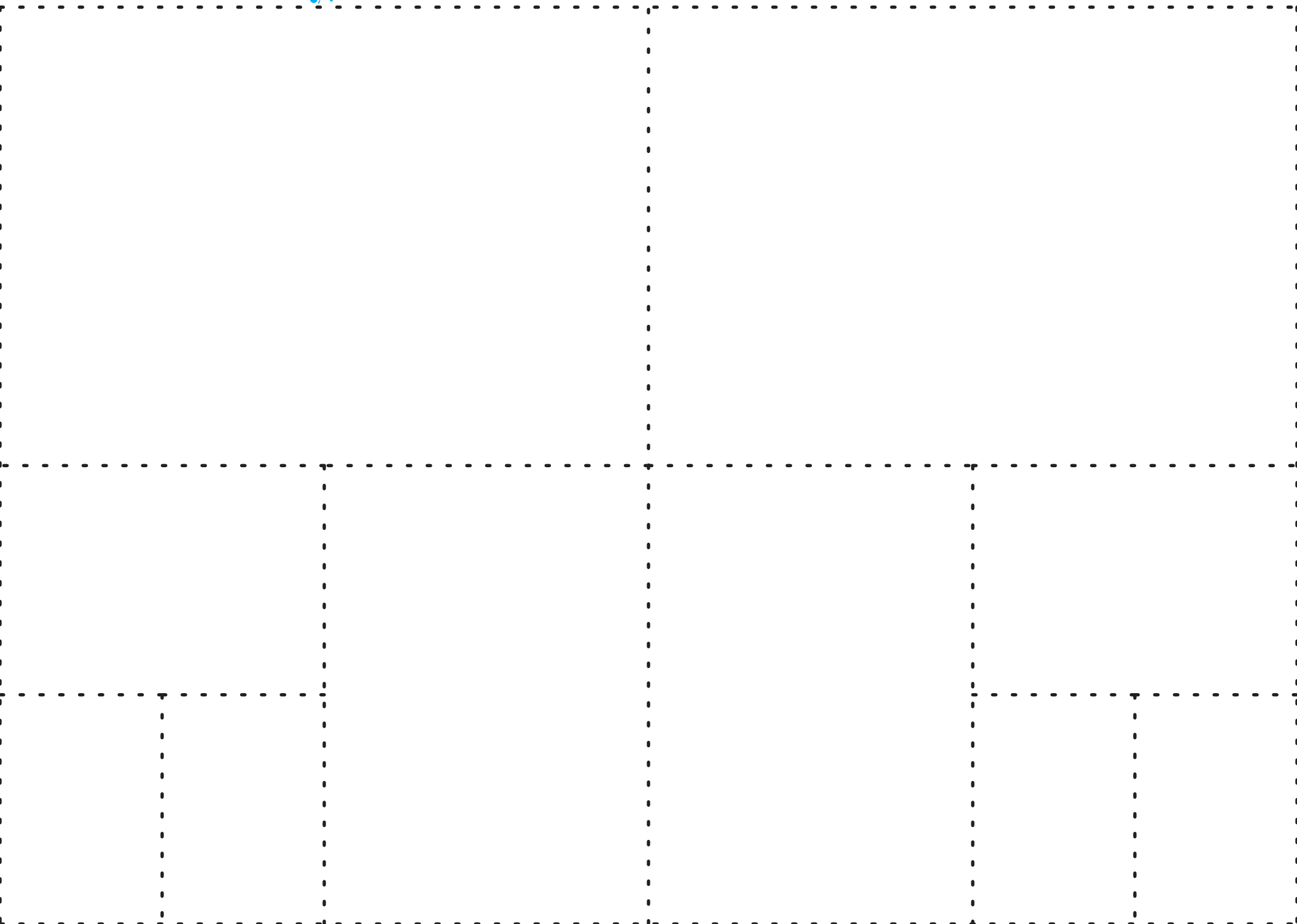
Fold bottom to meet point.

Unfold top.

Fold corner up.

Inspirations





Fold a Circle

Learn the names, attributes and formulae for 9 different shapes.

Start with a simple paper circle and fold up 9 shapes. Learn the attributes of each shape while developing math and geometry vocabulary. Explore concepts of area and volume. Finish off with great art projects! Our system is designed to make learning fun.

Learning the vocabulary used in mathematics is fundamental to understanding the concepts. Sometimes this vocabulary can be difficult. Our goal is to make learning difficult vocabulary easy and fun. Once children know the name of a shape, you can lead them on an exploration of the attributes of the shape. Finish off your exploration by learning and using the formulae to calculate the area and volume (where applicable) of the shapes. Use this activity to introduce shapes to students or to refresh their memories.

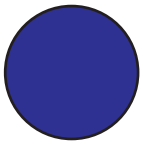
We've included everything you need for a basic exploration of the shapes. You can use reproducible artwork to further explore shapes and have a fun art project.

Follow the instructions to explore all 9 shapes. Demonstrate how to fold each shape. Let students fold their own shape. After folding the shape, tell students the name of the shape or ask them to name it. Spend some time discussing the shape's attributes. For younger students who are just learning about geometry, list the attributes. If you are using the activity as a refresher with older students, record the attributes on your overhead projector sheets as the students list them off. We've provided you with a sheet of paper containing illustrations of all of the shapes. Tip: Photocopy this sheet and hand it out to students so they can record all of the attributes on their own.

Once you've gone through the all of the shapes from circle to pentahedron, work in groups to create the icosahedron. Students can build the icosahedron by taping together 20 pentahedrons. As a finishing touch, decorate the icosahedron.

Shapes & Formulae

Circle
$A = \pi r^2$



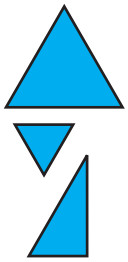
Triangle
$A = \frac{1}{2}bh$

Equilateral Triangle

Isosceles Triangle

Scalene Triangle

Right Triangle



Trapezoid
$A = {}^{h}/_{2}(b_1+b_2)$

Isosceles Trapezoid
A = 1/2(a+b)h

Parallelogram
A = bh

Rhombus
A = bh

Regular Hexagon
$A = [({}^{h}/_{2})({}^{a}/_{2})]6$

Triangle-Base Pyramid (Regular Tetrahedron)
SA = B+(½sℓ)
$V = {}^{1}/_{3}Bh$

Pentahedron
SA =[triangular pyramid SA]-[(small triangle A)(2)]
SA =[B+(½sℓ)]-[(½bh)(2)]
V = [large triangle pyramid V]-[small triangle pyramid V]
$V = [{}^{1}/_{3}B_1h_1]-[{}^{1}/_{3}B_2h_2]$

Regular Icosahedron

$SA = 5\sqrt{3}a^2$

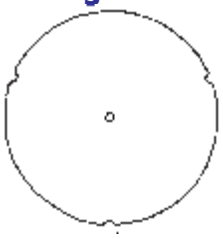
$V = {}^{5}/_{12}(3+\sqrt{5})a^3$

A = Area, units squared (²)
SA = Surface Area, units squared (²)
V = Volume, units cubed (³)
a = side, length of one side
b = base, length of base side
h = height, shortest length from base to top side
r = radius, length of radius
B = base polygon area
s = perimeter of base polygon
ℓ = slant height
π = 3.14

Fold a Circle

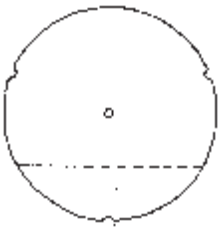
Step-by-Step Folding Instructions

Step 1: On a flat surface, position the circle with one notch pointing down.

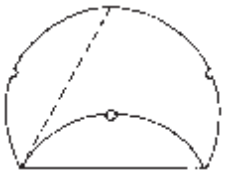


Step 2: Discuss the attributes of a **Circle**.

Step 3: Align the bottom notch to the center hole. Fold the paper.

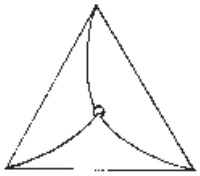


Step 4: Align the left notch with the center hole and fold.

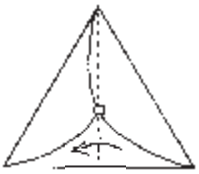


Step 5: Align the right notch with the center hole and fold.

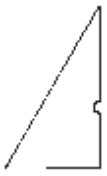
Step 6: Discuss the attributes of an **Equilateral Triangle**.



Step 7: Fold the triangle in half.

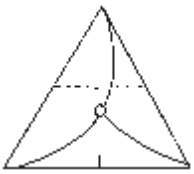


Step 8: Discuss the attributes of a **Right Triangle**.

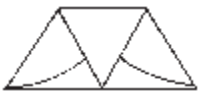


Step 9: Unfold the triangle. Note: There is a crease mark bisecting the equilateral triangle in two.

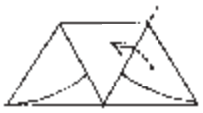
Step 10: Align the top tip of the equilateral triangle with the center crease with the base of the triangle. Fold.



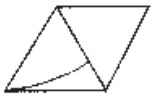
Step 11: Discuss the attributes of a **Trapezoid**.



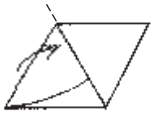
Step 12. Align the bottom right vertex with the top left vertex and fold.



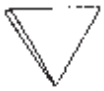
Step 13: Discuss the attributes of a Rhombus.



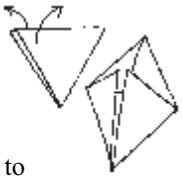
Step 14: Align the bottom left vertex with the top right vertex and fold.



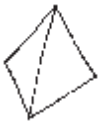
Step 15: You have just made another **Equilateral Triangle**, but this one is smaller than the original. Tip: Estimate how many of these smaller triangles will fit into one of the large equilateral triangles from step 6. Discover the answer by unfolding to reveal 4 triangles inside the larger triangle.



Step 16: To make a three dimensional shape, unfold the small equilateral triangle and bring together all three vertices to a common point above the base to form a **Tetrahedron** (**Triangle base Pyramid**).

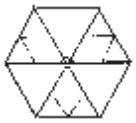


Step 17: Discuss the attributes of a **Triangle Base Pyramid**.

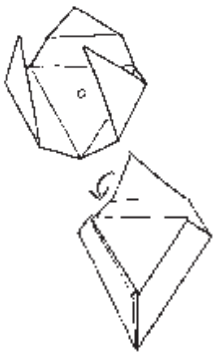


Step 18: Unfold the pyramid and lay flat. Align each of the three vertices to the center hole of the triangle and fold.

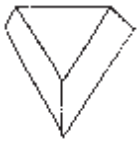
Step 19: Discuss the attributes of a **Hexagon**.



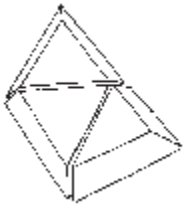
Step 20: To make the second three dimensional shape, fold in and overlap each of the vertices.



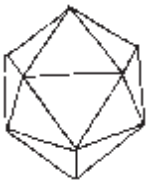
Step 21: Discuss the attributes of a **Pentahedron**.

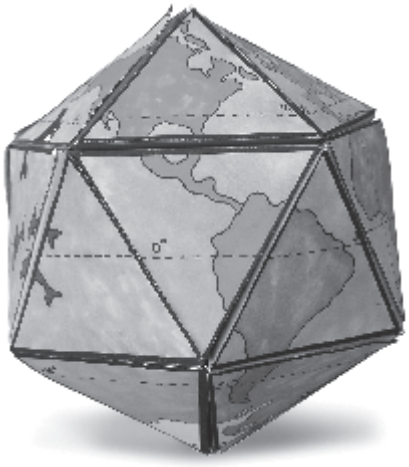


Step 22: Tape or glue the Pentahedron closed. Use 20 penta-hedrons and tape them together with the larger triangle base facing out to form a ball-like shape.

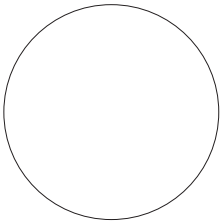


Step 23: Discuss the attributes of the **Icosahedron**.

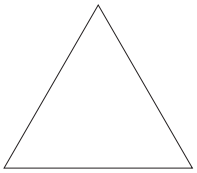




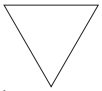
Attributes & Formulae* List

Circle

- 1 face
- a closed curve
- a regular shape
- all points on the curve are the same distance from the center
- the radius is the distance from the center to any one point on the curve
- the diameter is the distance between two opposite points on the curve passing through the center point
- circumference is the distance the outside of the circle

A (Area) = πr^2

Triangle

- 1 face
- 3 line segments
- 3 vertices
- sum of angles is 180°

A (Area) = ½bh

Equilateral Triangle

- all the attributes of a triangle
- 3 congruent angles, 60° each
- has some attributes of an Isosceles Triangle
- 3 congruent line segments

Isosceles Triangle
- all the attributes of a triangle
- 2 congruent line segments

Scalene Triangle

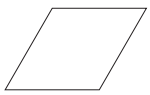
- all the attributes of a triangle
- a triangle made from 3 unequal line segments

Right Angle Triangle
- all the attributes of a triangle
- 1 of 3 angles is 90°.
- may have the attributes of a Scalene Triangle

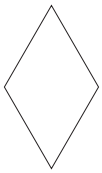
Trapezoid
- 1 face
- 4 line segments
- 4 vertices
- 4 angles totaling 360°
- quadrilateral: 4-sided polygon
- 1 pair of parallel sides

A (Area) = $^{h}/_{2}(b_1+b_2)$

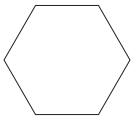
Isosceles Trapezoid
- all the attributes of a trapezoid
- base angles are equal
- left and right side lengths are equal

Parallelogram

- 1 face
- 4 line segments
- 4 vertices
- 4 angles totaling 360°
- quadrilateral: 4-sided polygon
- 2 pair of parallel sides
- 2 pair of congruent sides
- 2 pair of congruent angles

A (Area) = bh

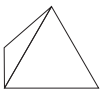
Rhombus

- The same attributes as a parallelogram with...
- 4 congruent sides
- 2 pair of congruent angles
- also known as a diamond

A (Area) = bh

Regular Hexagon

- 1 face
- 6 line segments
- 6 vertices
- 6 angles totaling 720°
- 3 pair of parallel sides
- 6 congruent sides
- 6 congruent angles

A (Area) = $[(^{h}/_{2})(^{a}/_{2})]6$

Triangle-Base Pyramid (Regular Tetrahedron)
- polyhedron—a 3-dimensional solid formed with polygons
- 4 faces
- 6 edges
- 4 vertices
- consists of triangles which are attached to the base and meet at a common vertex (the "apex")

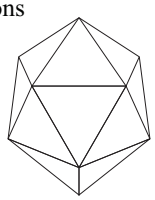


SA = B+(½sl)
V = $^{1}/_{3}$Bh

Pentahedron

- 5 faces
- 9 edges
- 6 vertices
- 2 parallel triangular faces
- 3 isosceles trapezoid congruent faces
- 2 sets of 3 congruent dihedral angles

SA (Surface Area) = [triangular pyramid SA]-[(small triangle A)(2)]
SA (Surface Area) = [B+(½sl)]-[(½bh)(2)]
V (Volume) = [large triangle pyramid V]-[small triangle pyramid V]
V (Volume) = $[^{1}/_{3}B_1h_1]-[^{1}/_{3}B_2h_2]$

Regular Icosahedron

- a 3-dimensional solid made with polyhedrons
- 20 faces (equilateral triangles)
- 30 edges
- 12 vertices
- 10 pairs of parallel faces
- 20 congruent dihedral angles

SA = 5_p3a^2
V (Volume) = $^{5}/_{12}(3+_p5)a^3$

* A = Area, units squared (²)
SA = Surface Area, units squared (²)
V = Volume, units cubed (³)
a = side, length of one side
b = base, length of base side
h = height, shortest length from base to top side
r = radius, length of radius
B = base polygon area
s = perimeter of base polygon
l = slant height
π = 3.14

Area
The number of square units that covers a shape or figure.

Base
The bottom of a plane figure or three-dimensional figure.

Circle
The set of points in a plane that are a fixed distance from a given point, called the center.

Congruent
Exactly equal in size and shape. Congruent sides have the same length. Congruent angles have the same measurement.

Dihedral Angle
An angle formed by intersecting planes.

Edge of a Polyhedron
Edges are the line segments where the faces of a polyhedron intersect or meet each other.

Equilateral Triangle
A triangle that has three equal sides.

Face of a Polyhedron
One of the flat, polygon surfaces making up a polyhedron.

Hexagon
A polygon with 6 sides.

Isosceles Triangle
A triangle with at least two equal sides.

Kite
A quadrilateral with 2 pairs of congruent and adjacent sides. Opposite angles are perpendicular.

Line Segment
Two points on a line, and all the points between those two points.

Parallel
Two lines are parallel if they are in the same plane and never intersect.

Parallelogram
A quadrilateral with opposite sides parallel.

Perimeter
The sum of the lengths of the sides of a polygon.

Pi
The ratio of the circumference of a circle to its diameter.

Plane
A two-dimensional, flat surface extending in all directions.

Polygon
A closed two-dimensional figure made up of several line segments that are joined together.

Polyhedron
A three-dimensional solid that is bounded by plane polygons, no curved surfaces or edges.

Prism
A solid with parallel and congruent bases that are both polygons. The bases must be oriented identically. The lateral faces of a prism are all parallelograms or rectangles.

Pyramid
A three-dimensional figure that has a polygon for its base and whose faces are triangles having a common vertex.

Quadrilateral
A polygon with 4 sides.

Radius
The distance from the center to a point on a circle; the line segment from the center to a point on a circle.

Rectangle
A quadrilateral with four 90° angles and 2 pairs of parallel lines.

Regular Polygon
A polygon in which all the angles are equal and all of the sides are equal.

Rhombus
A parallelogram with four equal sides.

Right Triangle
A triangle that contains a right angle.

Scalene Triangle
A triangle with three unequal sides.

Side of a Polygon
Any of the of the line segments that make up a polygon. For example, a triangle has three sides.

Square
A quadrilateral with four equal sides and four 90° angles.

Surface Area
For a three-dimensional figure, the sum of the areas of all the faces.

Trapezoid
A quadrilateral that has only two sides parallel.

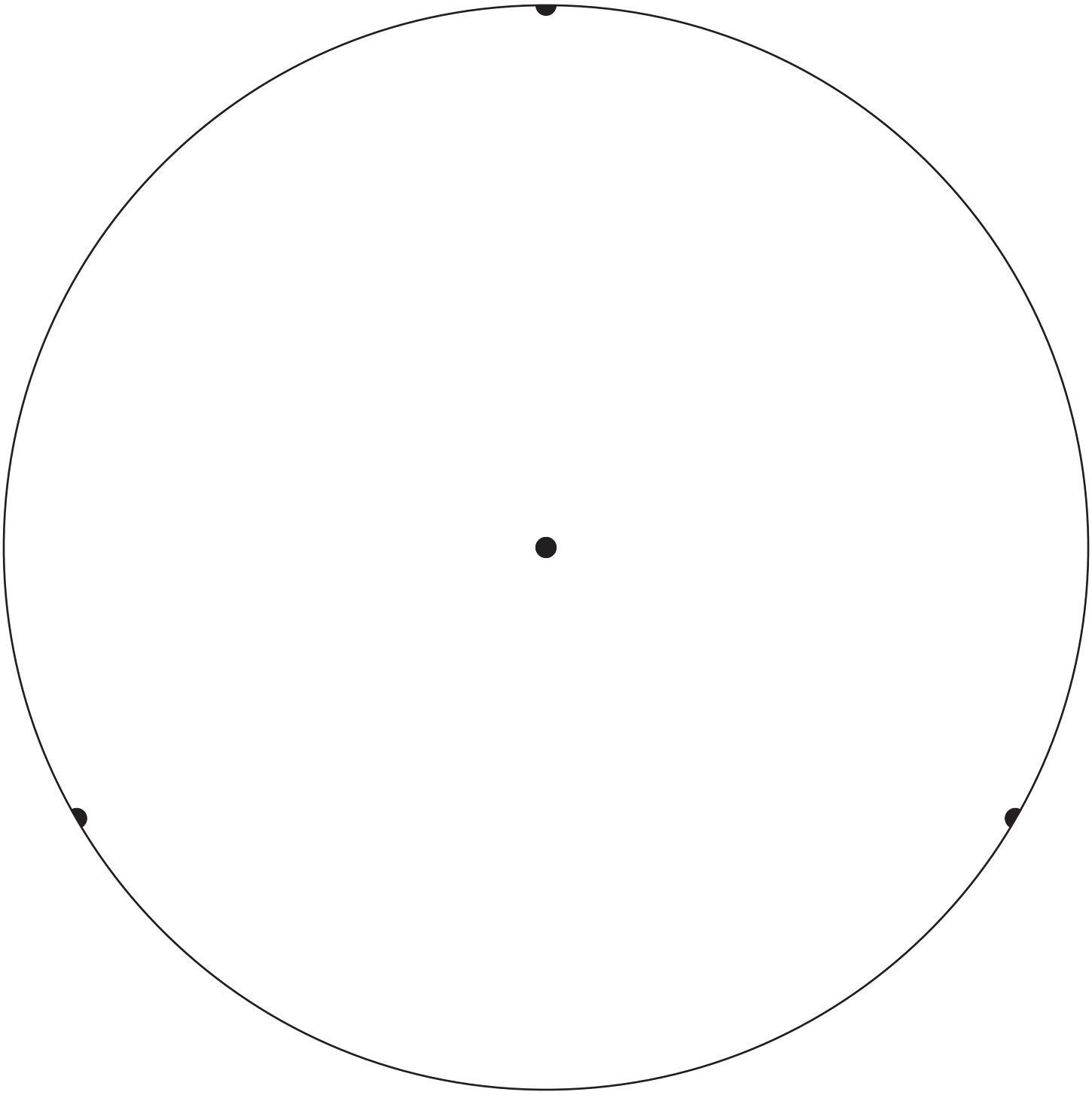
Triangle
A three-sided polygon.

Vertex (plural: Vertices)
The point on an angle where the two sides intersect.

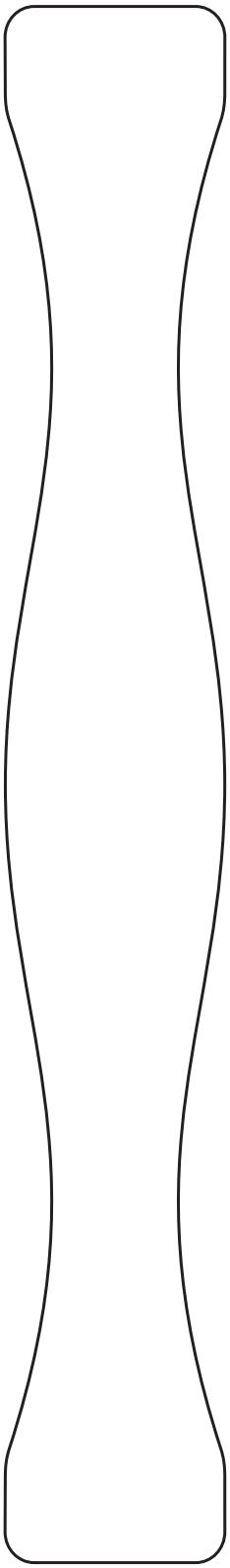
Volume
A measurement of space, or capacity in cubed units.

For product guide, see Appendix

Fold a Circle



Appendix III 70
Chinese Lantern



For product guide, see Appendix

Appendix: Product Information

We've listed items as they appear in the book. Some items are used throughout the book, but are only listed once. For more information about our products and to watch useful videos, please visit our website: www.roylco.com

Page#	Item No.	Description
12	F66529	Geometric Bubble Forms
14	R59421	Color Vision Perception Kit
15	F66525	Demonstration Bubbles Concentrate
17	R6085	Straws & Connectors™
19	R62301	Scents Sort Match-Up Kit©
21	R62010	Body Poetry: Animal Action Cards
22	R62011	Body Poetry: Yoga Cards
23	R62013	Stepping Stones Exercise Balance Kit
25	R15212	Color Diffusing Paper™
25	R5601	Plastic Lacing Needles™
25	R55006	Super Value Capital and Lower Case Letter Sponges
25	R59040	Wipe Clean Worksheet Cover
26	R59601	Educational Light Cube
26	R5901	Highlight Strips
26	R5902	Finger Pointer Reading Strips
26	R49703	Light Learning: Uppercase Letters
26	R5951	Sight Word String Ups
29	F66531	Super Bubble Pump
29	R54465	Foam Paint Bottles
33	R60310	Crystal Color Stacking Blocks
34	R59630	Sensory Tray
34	R60450	Skyscraper Building Cards
37	R2183	Fancy Stringing Rings
38	F66560	Solid Water Sensory Gel
40	R2152	Straws to String
41	F66570	Educational Molds
42	R7512	Fingerpaint "No Mess" Tray™
42	R5449	Paint Pipettes
42	R54460	Squiggle Pipettes
42	R54470	Junior Heart Paint Pipettes
43	R2185	Math Beads
43	R2131	Bright Buttons™
43	R2184	Manuscript Letter Beads
43	R5725	Goo Spreaders
46	R59254	Look Inside Me MRI Scan
46	R5911	True To Life Human X-Rays®
47	R59257	What's Inside Me Doll
47	R59258	First Look: Inside Me
47	R59270	My Body In Action
48	F66547	Wire Weaving World
53	R75415	Finger Paint Sensations Kit,
54	R54480	Paint Pad and Tray
55	R58624	Gear Stencils
55	R5841	Optical Illusion Rubbing Plates
55	R55004	Super Value Leaves Sponges
55	R5320	Floppy Foam Brushes™
55	R5451	Paint Scrapers™
55	R57015	Junior Goo Spreaders
56	R22054	Lace Design Paper
56	R15333	Botanical Cuts
58	R49592	Explore Emotions Photo Cards
59	R49591	Explore Emotions Super Doll

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