

THINKING OUTSIDE THE BOX

TRADE LINK: CARPENTER

TEACHER BACKGROUND

Duration: one (1) 45 minute class.

Group Size: individual.

Setting: indoors (classroom).

RATIONALE

This activity reinforces in the student's mind the prevalence of geometry in our everyday world. A simple design for a small cabin can be created when a 2-D design is translated into a 3-D model. The economics of packaging and design start on the 2-D plane and evolve to the 3-D product after much deliberation and study. One of the skills of carpentry is to be able to think freely between 2-D plans and 3-D products.

METHOD

In this activity, students do some backward design in terms of unraveling a pre-made package so that it looks like a 2-D polygon. The notion of not wasting any materials is important to the design and production processes. Students also do some forward thinking design by creating a 2-D polygon design that, when folded together, becomes their new 3-D "product". Students are asked to create a 2-D floor plan of a small cabin or house which, when folded together, becomes the end product.

MATERIALS

- Various cardboard containers – herbal tea boxes, toothpaste box, spaghetti noodle box, Kraft Dinner box, file folder box, cereal box, milk carton, etc.
- Ruler.
- Graph paper.

GETTING STARTED

In this activity, you will move back and forth between two-dimensional plans and three-dimensional models. Many people who work from plans or blueprints have the ability to do this with relative ease. You can too, with a little practice.

THE ACTIVITY

1. Take one of the cardboard boxes provided and try "backward design" – carefully unwrap or unfold it until it is a flat two-dimensional object sitting in front of you. Keep in mind that when this package was designed, it started out as an idea on paper like this 2-D object, long before it was ever put together.
2. Fold your package from step 1 back together and try to imagine it being unfolded in your mind as you sketch it on a piece of graph paper. Unfold it and compare it to your sketch.
3. Imagine that you are going to build a design for a small cabin or house out of cardboard. Sketch on graph paper what it would look like. Remember – the idea is to design it in such a way that it can be cut out as one piece and folded (just like a model of a polygon) into the final product. Cut out your design, fold it together and see how it looks. Be sure to put in some flaps for gluing and taping.

BRANCHING OUT (EXTENSIONS AND VARIATIONS)

1. Transfer your design to balsa wood, styrofoam or bristol board and construct your model.
2. Try adding little extras to your original design such as a front porch, stairs, maybe even a garage.
3. Try working with a CAD (computer assisted drawing) program to develop your design.
4. Put your model house on a landscaped lot.

SKILLS FOR SUCCESS

1. From your sketch, measure the longest side of your building in centimeters and inches. (Numeracy)
2. How many 45 degree angles are found in your drawing? How many 90 degree angles? (Reading)

INFORMATION BITE

Working with drawings and blueprints is a daily activity for a carpenter. This trade involves knowledge about the many materials used in construction, hand and power tools, and the science of building construction (footings, formwork, walls, roofs, floors, room finishes, etc.). It also involves the use of many different types of math including measurement and calculation math, estimation, and scheduling. An apprentice carpenter learns to construct, erect and repair structures and fixtures made of wood. Most carpenters are employed by construction contractors, are self-employed or perform construction or maintenance work for government agencies or manufacturing firms.

"QUOTE ME"

TRADE LINK: AUTOMOTIVE REPAIR

TEACHER BACKGROUND

Duration: Two 45-minute classes.
Grade: 7-10, Math, Automotive class, other career classes
Group size: 3 people
Setting: Indoor

RATIONALE

Auto repair shops are constantly preparing quotes for their potential customers. If you need your car fixed, you will usually shop around for the best price. Nobody wants to pay too much to fix their vehicles. Auto repair shops are usually the ones preparing those quotes and trying to compete for your business. Students will learn how to prepare a quote for someone who requires work to be completed.

METHOD

In this activity, students will utilize knowledge that they have, combined with online research, to prepare a quote for a customer who needs to have service and repairs done on their car. In groups of three people, each will prepare a quote for automotive maintenance work. The class will be competing for the instructors business.

To begin, the teacher will brainstorm different potential parts of vehicles, costs associated with having a vehicle, etc. If this is being taught in a location where many students don't have cars in the household, they could use a recreational vehicle – skidoo, 4-wheeler, boat, even a bicycle. If many do not have these and they live in a place with public transportation, use examples of buses and getting buses serviced. Whatever is happening in the place that this is being taught, use that example. The key is having this be practical and relatable for all students.

MATERIALS

- Computer with internet access
- Description sheet of parts and items needed

GETTING STARTED

Auto repair and servicing is something that many people require at one point or another. It might be because of an accident or just general service, but it may be required at some point down the road. In this activity, student groups will compete with their bid proposals to complete a repair on an automobile.

THE ACTIVITY (SKILLS FOR SUCCESS)

Students are given the following details to carry out this activity:

Labour cost: \$100/hour.

1. Each group will receive information with the make and model of the car as well as the parts and labour needed. It is the student's job to research online to figure out price, labour time, other costs associated with the work. (Reading)
2. Use manufacturers websites to read up on specifications of materials needed. (Digital)
3. Find the best price for parts and record them on paper or a spreadsheet make estimates on time needed to fix car. (Numeracy – Estimation)

4. Prepare a detailed and itemized "work order" or quote for the work needed. (Writing)
5. Present the quote to the teacher as well as the final price, based on the needs of the teacher. (Communication)

BRANCHING OUT

1. For younger students, have them receive the lists or prices for specific items and prepare invoices for the auto repair.
2. An extension could be to have students write a blog about a successful repair using technical language and research on the process of fixing and repairing cars.

INFORMATION BITE

Automotive mechanics make mechanical repairs and carry out scheduled maintenance on cars, trucks and other motor vehicles using a variety of testing equipment and tools. This process customarily involves the use of computerized diagnostic equipment, such as infrared engine analyzers, spark plug testers and compression gauges. An even greater variety of tools is used to complete the work, including pneumatic wrenches, lathes and grinding machines, jacks and hoists, and electronic service equipment. Besides repairing damaged and defective vehicles, mechanics also conduct routine and scheduled maintenance: balancing and rotating tires, replacing filters, performing oil changes, lubrications and tune-ups, and installing parts such as mufflers, shock absorbers, exhaust pipes, radiators and springs. These repairs and maintenance must be completed to exacting safety standards.

With all of the complex repair and maintenance machinery used and the new technology built into modern automotive components, knowledge of electronics is increasingly desirable in a mechanic. The new developments in engines, transmissions and suspension systems, and the increased use of electronic components are changing the mechanic's job into that of a technician, with more emphasis on vehicle diagnosis.

WHAT ABOUT SKILLS FOR SUCCESS?

As technology changes, a successful automotive mechanic is required to review new research and information to be up-to-date on advancements and new trends in the industry. The ability to conduct research and review documents is an important essential skill to have mastered.

With many repairs, there are options for the customers to choose. A good mechanic will have used the Skills for Success of thinking and problem solving to provide customers with the best options for their vehicle.

Since automotive mechanics are required to interact with their customers, communication is a key Skill for Success. Good customer service can often be the difference between return customer visits, and never seeing a customer again. Of course, people want to save money when servicing their cars however, a low price often isn't enough – good customer service can be the difference between a client that stops in once and one who returns year after year and refers their friends and family as well.

THROUGH THICK AND THIN

TRADE LINK: CAR PAINTING

TEACHER BACKGROUND

Duration: Two 45-minute classes

Group Size: Individuals

Setting: Outside

Grade: 7 – 9, grade 10
for extension activity

RATIONALE:

Viscosity is the measure of how thick and “sticky” a liquid is. Students should have the opportunity to explore the properties of viscosity through discovery. Students at this level will explore the viscosity of a number of different everyday products and determine the intermolecular interactions within a fluid.

Students will relate this activity to car painting, that is one of the contest areas found in Skills Canada competitions. This is an excellent example of putting Skills for Success to work – if students understand viscosity, they will have a greater chance of understanding one of the important elements that people in the car painting industry must understand and apply in their day-to-day careers.

METHOD:

In this activity, students will be asked to “test” the viscosity of a number of different products and “rank” the viscosity of each to determine the effect that viscosity would have on items, such as painting a car. Students will be responsible for testing viscosity in both hot and cold temperatures. Students will begin by pouring liquid from one cup to another and charting how long it takes the liquid to transfer. Then, students will be asked to drop a marble into each of the cups to view the effect viscosity has. Students will then view a demonstration of viscosity levels after items have been refrigerated. Lastly, students will test viscosity and pipe flow by having them drink edible products through a straw. Students will then be able to determine why viscosity is a factor in painting a car.

MATERIALS:

- Dixie Cups
- Graduated cylinders
- Stopwatch (or use stopwatch function on smartphone or ipod)
- Marbles
- Corn starch
- Water
- Liquid glue
- Nail polish
- Yogurt
- Honey
- Smoothie
- Tarp (something to contain the mess)

GETTING STARTED:

Viscosity is a measure of how thick or “sticky” a liquid is. It is evident by how things are poured and how long those things take to pour. If two cups were sitting on a tabletop, both spilled, which one would you need to clean first? In this activity you will be exploring and charting the viscosity of a number of products. The goal is to determine which one flows fastest and slowest. At the end of the activity, students will know more about density and how the density of fluids impacts different careers, specifically car painting.

THE ACTIVITY (SKILLS FOR SUCCESS):

The teacher will decide what method is more appropriate for their class. Discuss with the class what viscosity is, why it matters for different careers. Discuss the car painting skilled trade with students so they understand what this trade entails.

There are a couple of ways to measure viscosity of liquids. One way is by measuring the amount of time it takes marble or steel balls to fall given distances through the liquids. The other way is to calculate the density of the fluid in question. The teacher should determine what method is best to use with their particular class. (Numeracy – Measurement)

TO FIND THE DENSITY OF A FLUID:

1. Have each group choose a fluid to measure the viscosity of (or assign each group a fluid).
2. Have students calculate the density of the fluid.
 - Weigh the empty graduated cylinder.
 - Fill the cylinder with fluid, and record the volume.
 - Weigh the full graduated cylinder. Subtract the weight of the empty graduated cylinder to determine the weight of the fluid.
 - The density of the fluid is the weight over the volume.

$$\rho_f = \frac{\text{weight of fluid [kg]}}{\text{volume of fluid [cm}^3\text{]}}$$

Note: 1 cm³=1 ml.

THROUGH THICK AND THIN

(CONTINUED)

DAY 1:

Students are given the following details to carry out this activity:

1. Watch Mythbusters clip on viscosity – <https://www.youtube.com/watch?v=V4TEqb-728k>
2. Discuss with the teacher viscosity and which liquids students think will flow slowest and fastest.
3. Set-up area and pour liquids into Dixie cups and set them up for inspection.
4. Pour liquids from one Dixie cup to another and time how long it takes to transfer all of the liquid from one to the other. (Numeracy)
5. Make sure Dixie cups are at the same level and drop a marble from a foot in the air into each of the fluids. Determine how much splatter was created on the side of the cup, did any spill over? Record the number of “drops” on the side or outside the cup. (Numeracy)
6. Use the edible items and time how long it takes you to drink the variety of items through a straw.
7. If using the optional method to calculate density, teachers will set up graduated cylinders, scales, measured fluids and give students directions on how to carry out finding density. (Numeracy)

DAY 2:

1. Collect data from each test and chart results obtained by each of the students. (Numeracy)
2. Discuss how viscosity would affect painting a house, car, etc. Would the viscosity make any difference on the end product? (Communication)
3. Chart viscosity information in a digital form for record keeping purposes. (Digital)
4. If the teacher chooses to use this as a formal lab report, have students write up their findings of density. As an application, have them include how this fits in with the car painting trade. (Writing)

BRANCHING OUT:

1. Older students should be able to calculate viscosity using the appropriate formulas and make accurate predictions based on information.
2. Younger students can watch a demonstration and work together to determine what affect viscosity has on everything.

INFORMATION BITE:

A career in car painting involves cleaning and preparing panels for paint applications. Car painters are required to mix and apply undercoats and clear coats as well as refinish plastic substrates. They perform the prepping and painting of objects on steel body panels. In addition they remove surface paint defects on automotive parts. In these cases, they perform a colour tinting to a blendable match. Car painters use a variety of equipment including sanders, blow guns, painting tools, spray guns and polishers.

WHAT ABOUT SKILLS FOR SUCCESS?

The Skills for Success that are most in use in this trade are numeracy, thinking, and document use. As car painters are mixing together different substances and these must be mixed in certain ratios, it is very important that they have a very good grasp of numeracy. Car painters working with different equipment need to know the best equipment to use for different projects and must plan their time accordingly. Using reading and collaboration are other Skills for Success that will be important in this trade. This career also requires good communication and interpersonal skills as car painters are in contact with customers to determine requirements and cost estimates.

ACTIVITY: COOKIE CONSTRUCTION

Description

In this activity, students will learn different welding weave patterns, and practice their ability to keep a uniform weld. It will help them practice their hand eye coordination, and show students that it takes skill, a steady hand and attention to detail to produce the perfect weld!

Duration

20 minutes

Materials

- Graham crackers and icing.

Activity Instructions

TUTORIAL

This video tutorial will be available on the Skills for Success Stage during the event.

Post a photo of the finished product on social media using the hashtag #LevelUpWithSkills to have it appear on the event's Media Wall.

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ACTIVITY: TOILET TECHNOLOGY

Description

In this activity students will learn how a simple siphon works and will be able to see it in action. Toilets use a siphon technology, and technically don't require any electricity to run. The science behind siphons might seem quite complex, when in reality it is just atmospheric pressure between the water in the bowl and the surge of pressure from the tank when the lever is pulled. This experiment will demonstrate how the water in a toilet bowl actually flushes down the drain without using a pump or electricity.

Duration

10 minutes

Materials

- Paper cups
- Straw
- 1 cup water.

Activity Instructions

TUTORIAL



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ACTIVITY: LIVE YOUR WILDHOOD

Description

In this activity, students will be asked to act as an RV Lifestyle Consultant and make suggestions to a family of four on purchasing an RV and helping them plan their first RV road trip. Three scenarios will be presented using different RV types and two vehicles. Students will first learn about the various RV types available to today's consumers. They will then be provided information on three hypothetical families that have just purchased their first RV. Acting as the Lifestyle Consultant, the students will then research a trip itinerary by estimating the cost of the trip and present it to their client, the teacher.

The teacher will provide web links to research types of RVs, cost of campground stays, use of google maps to determine total distance, a formula to calculate total fuel cost, and average grocery cost per family.

Duration

Two 45-Minute Classes

Materials

- Computer and web browser
- Trip configurations and parameters (provided)
- Student Worksheet (provided).

[Student Worksheet](#)

[Student Instructions](#)

[Teacher Instructions](#)

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ACTIVITY: CREATE A 3D MODEL NAMEPLATE

Description

Work with Drew from InkSmith to create a custom 3D printed nametag in TinkerCAD. You'll learn the basics of CAD design for 3D printing, including navigating the work plane, adding, manipulating, and combining shapes, and exporting your file for 3D printing.

Duration

15-20 minutes

Materials

- Computer
- Web browser
- A free account with Tinkercad
(no downloading or installation required)

Skill Development

- CAD design
- Creativity and Innovation, and more!

TUTORIAL



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ACTIVITY: SKIN THERAPY

Description

Your skin's health is just as important as the other organs within your body, and it's important to take care of it every day. Join Skin Therapist Jessica as she walks you through a quick 4-step routine you can do with products you likely already have at home.

Duration

3 to 5 minutes

Materials

- Hair tie (optional)
- Headband (optional)
- Cleanser of your choice
- Toner of your choice
- Serum of your choice
- Moisture of your choice, preferably with SPF.

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ACTIVITY: DESIGN AND BUILD A SPACE LANDER

Description

Design and build a space probe lander model that can land upright after being dropped.

Duration

45 minutes

Materials

- Card stock
- Pencil
- Craft sticks
- Tape, Scissors
- Recycled or craft materials found at home (ex. Cardboard, paper, drinking straws, etc).

Activity Instructions

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ACTIVITY: SUSHI ROLLING

Description

Make dinner fun with this easy to follow sushi rolling activity presented by Skills Canada Alberta.

Duration

45 minutes – 1 hour

Materials

- Sushi Mats
- Sushi Rice
- Nori Sheets
- Sushi Seasoning
- Soy Sauce
- Sushi Giner
- Wasabi
- Chopsticks
- Salmon
- Cucumber, Avocado
- Japanese Mayo (Optional)
- Knife
- Serving Platter.

TUTORIAL



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