

## TIP UPS



## TIP UPS



### Curriculum Connections

Science (5) A1.2 use a scientific experimentation process and associated skills to conduct investigations

Science (5) A1.3 use an engineering design process and associated skills to design, build, and test devices, models, structures, and/or systems

Science (5) A1.5 communicate their findings, using science and technology vocabulary and formats that are appropriate for specific audiences and purposes

Arts (5) D1.4 use a variety of materials, tools, and techniques to determine solutions to design challenges



### Learning Goals

Problem-based Design Project and Skill Challenges

Use engineering design processes to design innovative solutions to an ice fishing challenge



### Materials

Construction materials (illustrative)

Cardboard

String/fishing line

Craft sticks

Straws

Wood (e.g. popsicle sticks)

Scissors

Assorted recyclable items (plastics and non-sharp metal are ideal for this exercise)

Fasteners (illustrative)

Hot glue gun, glue, Tape, and Paper clips

Blank paper



## Assessment / Evaluation

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Design Process Activity page  
Design process rubric



## Accommodations / Modifications

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Provide visual supports: Incorporate visual aids, such as diagrams, charts, or models, to enhance comprehension and make abstract concepts more tangible.

Provide students with examples of simple machines such as pulley, lever, screw.



## Teaching/Learning Strategies

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### Introduction

(minds on/activate prior knowledge)

Students should familiarize themselves with the Tip-Up through a youtube video (replayed at the start of class) and some basic mechanisms (refer to Attachment #1) for Design Process.

The Indigenous people of the Windigo communities rely on fish year round as an important food source. In the winter this is done by drilling holes through the ice to drop the baited hooks below the frozen ice to catch fish. To ensure a successful harvest, people fishing will use multiple holes to increase the odds of catching a fish.

Monitoring the fishing holes is important to notify the fisherperson once the fish has taken the bait otherwise the fish (and bait!) may be lost.

One popular design called a tip up raises a flag when the fish pulls on the line. Others include audible and even smart phone alerts.





## Teaching/Learning Strategies

### **New Learning** (30 minutes) (give/demonstrate new information)

Introduce the concept of Ice Tips in winter ice fishing

Youtube clip of Ice Tip Up designs

Prompt Ice Safety: “don’t go on the ice unless you know its safe”

Objective is not to discuss ice safety in this lesson, resources are available in Attachment #2

Prompt students to identify the components of the Tip-Ups, e.g.:

The Base: Foundation that lays directly on the ice and supports the mechanism and flag

The Mechanism: Component that translates a pull on a string to some other form of signal

The “Flag”: the signal that alerts an awaiting angler

### **Guided Practice** (40 minutes) (checking for student understanding)

Put the students in groups of 3-4

Ask students to brainstorm a device that will help notify a fisherperson once the fish has taken the bait.

Groups should fill out Student work sheet on design process

Materials (may vary depending on availability)

### **Application** (activity to reinforce/demonstrate learning)

Divide students into groups of 3-5

Prompt student groups to build and test a prototype of the Ice Tip Up

Circulate with students, assist and prompt groups to periodically test how their mechanism works

Invite students to the “official” class testing station up front where groups can demonstrate their prototype

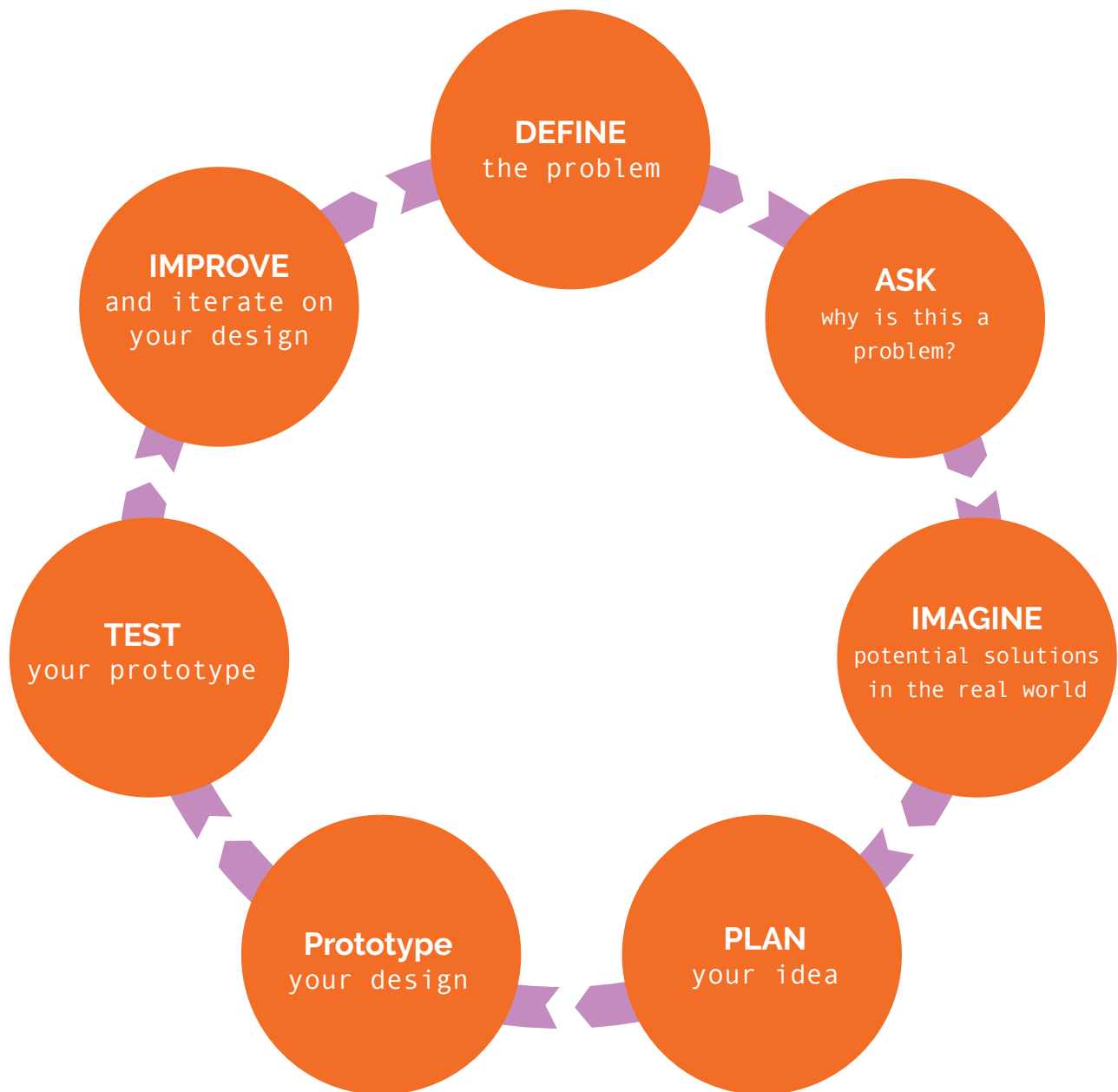
Note: the “official” testing station can just be any desk with the note testing station. The objective have students perform a mock test in a different environment



Name \_\_\_\_\_

Date \_\_\_\_\_

## TIP UP - Engineer Design Process





Name\_\_\_\_\_

Date\_\_\_\_\_

# TIP UP DESIGN Sketch

DESIGN SKETCH PAGE



# TIP UP DESIGN RUBRIC A

TOTAL /12

## COMMUNICATION

4 points:

The student communicates their understanding of the Engineering Design Process in a sophisticated and insightful manner.

3 points:

The student communicates their understanding of the Engineering Design Process clearly and effectively.

2 points:

The student communicates their understanding of the Engineering Design Process adequately.

1 point:

The student communicates their understanding of the Engineering Design Process in a limited way.

## APPLICATION

4 points:

The student is able to apply the process in creative and innovative ways to solve the design challenge.

3 points:

The student may need some minor guidance to complete the design challenge.

2 points:

The student may need some guidance to complete the design challenge.

1 point:

The student may need significant guidance to complete the design challenge.

## KNOWLEDGE AND UNDERSTANDING

4 points:

The student demonstrates a thorough understanding of the Engineering Design Process. The student is able to explain the steps involved in the process in depth and with accuracy.

3 points:

The student demonstrates a good understanding of the Engineering Design Process. The student is able to explain the steps involved in the process independently.

2 points:

The student demonstrates some understanding of the Engineering Design Process. The student is able to explain the steps involved in the process with some support.

1 point:

The student demonstrates a limited understanding of the Engineering Design Process. The student has difficulty explaining the steps involved in the process.

Name \_\_\_\_\_

Date \_\_\_\_\_

# TIP UP DESIGN RUBRIC B

## CONSTRUCTION

### Level 4: Advanced Design and Construction

The student demonstrates an advanced understanding of the design and construction of a DIY fishing tip-up.

The tip-up design is innovative, well-thought-out, and highly functional.

The construction shows exceptional craftsmanship with meticulous attention to detail.

The materials used are carefully chosen and optimized for the purpose, demonstrating creativity and resourcefulness.

### Level 3: Competent Design and Construction

The student demonstrates a good understanding of the design and construction of a DIY fishing tip-up.

The tip-up design is complete and functional.

The construction shows solid craftsmanship with attention to detail.

The materials used are suitable for the purpose and demonstrate thoughtful consideration.

### Level 2: Developing Design and Construction

The student demonstrates some understanding of the design and construction of a DIY fishing tip-up.

The tip-up design is partially complete and somewhat functional.

The construction shows basic craftsmanship but lacks some attention to detail.

The materials used are mostly suitable for the purpose but may have some limitations.

### Level 3: Competent Design and Construction

The student demonstrates a good understanding of the design and construction of a DIY fishing tip-up.

The tip-up design is complete and functional.

The construction shows solid craftsmanship with attention to detail.

The materials used are suitable for the purpose and demonstrate thoughtful consideration.

Comments