S.T.E.M.

BMX AFTER SCHOOL CURRICULUM

THE AMERICAN BICYCLE ASSOCIATION

usa BMX

usabmx.com

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DISCLAIMER

This curriculum, the bike, including any/all portions of this kit are intended for educational purposes only.

The sport of bicycling involves risk of injury, loss and damage. By choosing to ride a bicycle and partake in this program, the rider assumes full responsibility for such risks. Proper use, assembly and maintenance of the bicycle reduces risk of injury.

This curriculum makes no representation or warranty, expressed or implied, concerning the bicycle, including but not limited to any warranty of merchantability or fitness for a particular purpose. There are risks associated with the use of any bicycle, and the rider of the bicycle is responsible for any potential risks associated with the use of the bicycle.

The rider acknowledges that a helmet is included in this kit. It is strongly recommended that the bike is used at all times with the helmet. It is the responsibility of the rider and the program he/she is associated with to adjust the fit of the helmet before attempting to ride the bike.

A.B.A. Foundation (dba USA BMX Foundation) shall not incur any liability for any damages, including but not limited to, direct, indirect, special or consequential damages arising out of, resulting from, or in any way connected to the use of the bicycle or this curriculum, whether or not based upon warranty, contract, or otherwise, whether or not injury was sustained by persons or property, and whether or not loss was sustained from, or rose out of, the bicycle or this curriculum.

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Lesson I

TOOLS

WHAT YOU SHOULD KNOW ABOUT THE TOOLS

INQUIRY QUESTION (S)

Why are wrenches different lengths? Where should you hold a wrench?

SCIENCE SUMMARY

Wrenches and tool handles are levers - a simple machine. Levers magnify your effort force, creating leverage. The longer the tool handle, the larger the magnification. You should always hold a tool handle as far away, as possible, from the end doing work. This gives you maximum leverage to turn the tool handle.

BMX APPLICATION

Always choose tools with longer handles and hold the tool as far from the end turning a nut as possible. Sometimes a "stuck" nut or screw can be loosened by using a longer wrench or screwdriver.

HANDS-ON ACTIVITIES SUMMARY

Simple Lever Activity: Students will try to open a paint can lid with a quarter compared to a spoon (hold spoon at end farthest from can).

Assembling a BMX Bike: Students will use wrenches, ratchets with sockets, screwdrivers, and pliers to assemble each BMX bike.

Simple Lever Activity

SIMPLE LEVER ACTIVITY

Activity Learning Objective(s): Students Will Be Able To Observe And Explain . . .

- The length of a tool (lever) does magnify the effort force and make it easier to apply a force to open a paint can lid.

Materials

1 paint can with lid per class

1 quarter per class

1 metal spoon

Procedure

1. Make sure the paint can is empty and clean.
2. Tap the lid closed.
3. Insert a quarter under the lip of the paint can lid. Apply an effort force to the quarter to try to open the paint can lid.
4. Insert the tip of the bowl of a metal spoon under the lip of the paint can. Apply force to the end of the spoon to try to open the paint can lid.
5. Compare and contrast the length of the tool (quarter vs. spoon) and the effort force required to open the lid.
6. The longer spoon should have required much less effort force than the quarter to open the paint can lid.

ASSEMBLING A BMX BIKE ACTIVITY

* Bike shown subject to change.

ACTIVITY LEARNING OBJECTIVE(S)

Students Will Be Able To Observe And Explain . . .

- BMX bikes are assembled from individual parts that are held together with screws, bolts, and nuts.
- Tools are required to assemble these parts into a working bike.
- There is a "right tool" for every job. This tool is the correct size and length for the parts being assembled.

Materials

Bike and tools provided with each kit

Procedure

1. Attach front wheel to the forks. Make sure the nuts and washers are tight.
2. Attach handlebars to the stem. Make sure the handlebars are positioned correctly, centered and balanced.
3. Time to attach the brake cable. **TIP:** It is easier if you release the tension in the line by detaching the pinch bolt from the rear brakes. Attach at the nipple into the brake lever and cover. Reattach the rear hardware.
4. Attach pedals. Notice they thread differently.
5. Drop in the bike seat. Find a position that is comfortable, adjust and tighten.

Lesson 8

BIKE CIRCLES

WHAT YOU SHOULD KNOW???

INQUIRY QUESTION(S)

Can we use a rotating bike wheel to calculate the length of a Figure-8? How many feet does a BMX bike cover when the wheels spin around once?

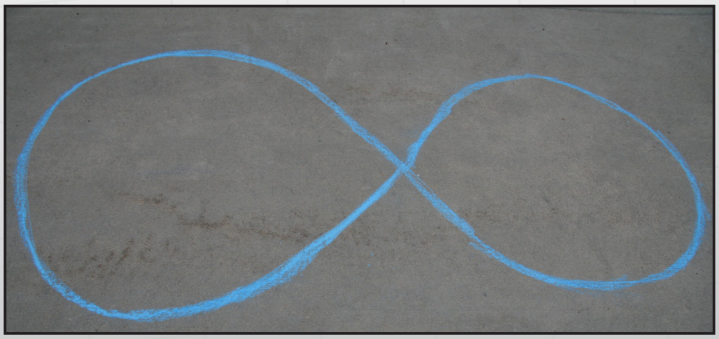
SCIENCE SUMMARY

When a bike wheel completes one spin (or one revolution), the bike has traveled a distance equal to the circumference of the wheel and tire. The circumference is the distance around the tire. We can measure the circumference of any circular object directly. We can also measure the diameter of the circular object and calculate the circumference with the formula: Circumference (C) = Pi (3.14) * diameter (d) OR C=Pi*d. Once we know the circumference of a wheel, we can use this distance and the number of wheel revolutions to calculate the length (perimeter) of a Figure-8 drawn on the ground.

BMX APPLICATION

Circles are everywhere in BMX. Bikes have circular wheels. You can turn the bike handle to make the bike ride in a circle. You ride through circular turns on the BMX track. You pedal in a circular motion. The sprocket and gears are circular. And on, and on. BMX racers count the number of pedal and/or wheel revolutions to know where they are on the track. Some measuring devices are wheels that we know the circumference of. By counting the number of revolutions of the tire, we can calculate the distance traveled by multiplying by the circumference of the wheel.

HANDS-ON ACTIVITIES SUMMARY



Diameter and Circumference of a BMX Bike Wheel and Tire: Students will measure the diameter (distance across the width of the wheel and tire) of the front wheel of their BMX bike. Students will calculate the circumference of the tire by multiplying its diameter times Pi (3.14).

How Big is the Figure-8?: Students will ride a Figure-8, drawn on the pavement, and count the number of revolutions of the front bike wheel. Students will then multiply the number of revolutions of the front wheel by the circumference of the wheel/tire to calculate the length of the Figure-8.

DIAMETER AND CIRCUMFERENCE OF A BMX WHEEL AND TIRE ACTIVITY

Activity Learning Objective(s): Students Will Be Able To Observe And Explain . . .

- Diameter is the distance across the BMX bike wheel/tire.
- We can use the diameter of the wheel to calculate the circumference of the wheel/tire and the distance the wheel covers in one revolution.

Materials

BMX bikes
Tape Measure
Calculator (teacher provided)
1 pencil per 2 students
1 Bicycle Circles Data Sheet per student

Procedure

1. Lay the BMX bike flat on the ground.
2. Use the tape measure to measure the diameter of the front wheel - the distance from one point on edge of the tire to a point on the opposite edge (the width of the tire) in inches.
3. Record this on the Bicycle Circles Data Sheet.
4. Multiply the diameter of the front wheel by Pi (3.14) to calculate the circumference of the wheel/tire.
5. Record this on the Bicycle Circles Data Sheet.

THE FIGURE-8 ACTIVITY

HOW BIG IS THE FIGURE-8? ACTIVITY

Activity Learning Objective(s): Students Will Be Able To Observe And Explain . . .

- We can use the diameter of the wheel to calculate the circumference of the wheel/tire and the distance the wheel covers in one revolution.
- We can calculate the length of any figure drawn on the ground by counting the number of revolutions of a BMX bike wheel needed to cover the distance of the figure, if we know the circumference of the bike wheel.

Materials

BMX bikes
Bike helmets
Calculator (teacher provided)
1 pencil per 2 students
1 Bicycle Circles Data Sheet per student
Bright Colored tape (teacher provided)

Procedure

1. Draw a large Figure-8 on the ground with sidewalk chalk. Make sure the Figure-8 is large enough that students can easily ride the Figure-8 at a slow speed.
2. Repeat, and draw a few more Figure-8's. Intentionally make the Figure-8's different sizes. Number each Figure-8.
3. Place a piece of brightly colored tape around the BMX bike wheel and tire at one point on the front tire on each bike.
4. Place the bike on the Figure-8 and make sure the tape is down, touching the ground.
5. Begin to slowly ride the Figure-8 pattern and have your partner count the number of times the front wheel revolves and the tape touches the ground until you get back to the point on the Figure-8 you started at.
6. Record this on the Bicycle Circles Data Sheet.
7. Multiply the number of revolutions by the circumference of the front tire to calculate the length of the Figure-8.
8. Allow groups that rode the same Figure-8 to compare calculations - they should have the same Figure-8 length, plus or minus a few inches.