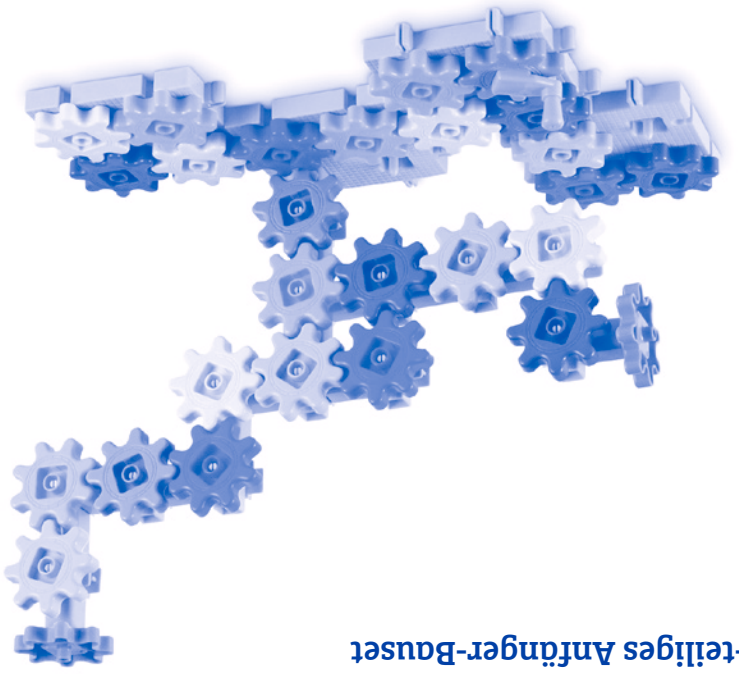
Set de construcción para principiantes de 60 piezas
Jeu de construction de 60 pièces pour débutants
60-teiliges Anfänger-Bauset



Activity Guide
Guía de Actividades • Guide d'activités • Spielvorschläge

⚠ WARNING:
CHOKING HAZARD - Small parts.
Not for children under 3 years.

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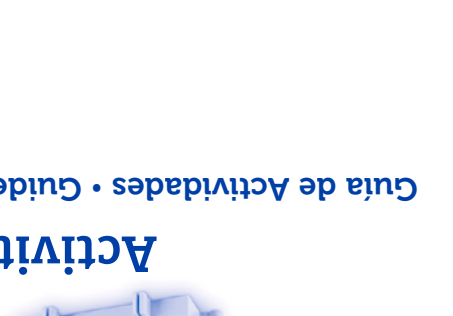
60-Piece Building Set



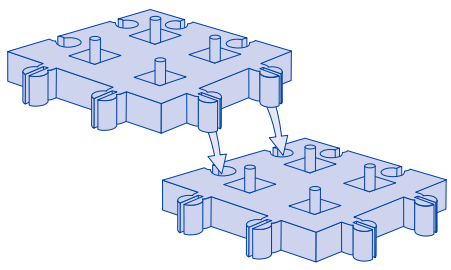
Create Worlds of Spinning Fun!

Introduce children to construction and movement with this colorful set of spinning gears and mix-and-match building pieces. Get started with the **Building Basics**, or jump right in and construct your own design—the choice is yours! When you build with gears, there are no limits, only the possibilities powered by imagination. Where will yours take you?

BUILDING BASICS

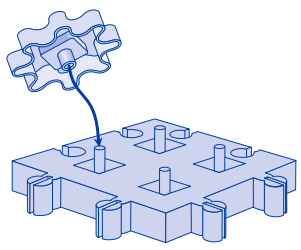
Build a Base

Attach bases together by sliding the side pegs into the slots. There are many different ways to arrange the bases: rows, pyramids, zigzags, and more!



Add Gears

Line up the center hole of a gear with the top peg of a base, and pop it on! When placed correctly, gears should easily spin both ways with a tiny push. Attach more gears, making sure the "teeth" of all the gears mesh.

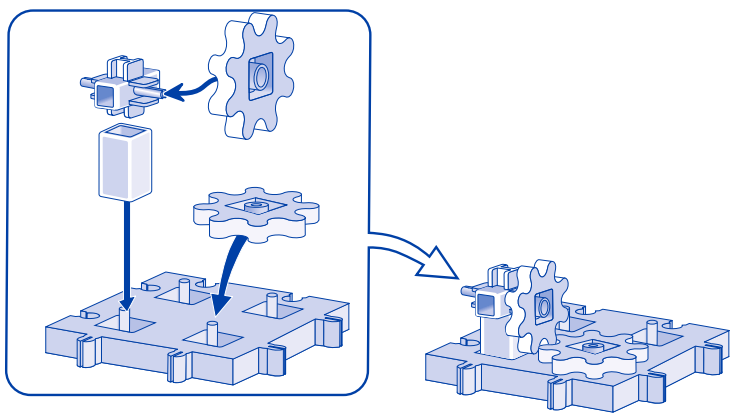


Get Things Moving

Turn the crank to start everything moving. The crank works best if placed flat on a gear that is attached to a base, and not a vertical structure.

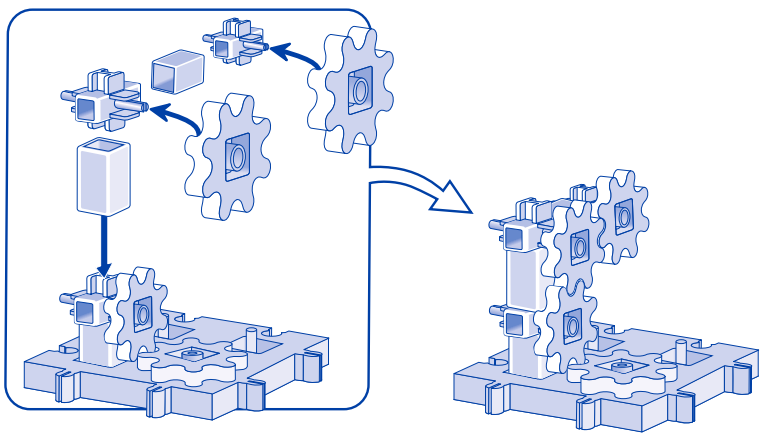
Going Up

Begin vertical structures by placing a pillar into the square hole on a base. Then, add a six-way axle and attach gears to the axle, making sure the "teeth" mesh at a right angle with the gear on the base. The gear on the axle should spin when you turn the gear on the base.



Up and Over

Continue to build up by adding a pillar to the top of the six-way axle and attaching another six-way axle. Add a pillar to the side of a six-way axle to build horizontally.



EX-GEAR-IMENTS!

The following EX-GEAR-IMENTS encourage children to notice interesting movements and connections, and to explore the fascinating action that can be created with gears.

How Does It Spin?

Place two gears next to each other on a base. Spin the gears and watch them move. Are the gears spinning in the same direction?

End to End

Connect the bases so that they are in a straight line. Make a long row of connecting gears going from one end of the bases to the other. Spin the first gear at one end very slowly. Does the last gear start spinning right away?

ES

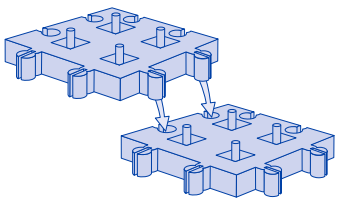
Crea mundos de diversión dando vueltas!

Introduce a los niños en la construcción y el movimiento con este colorido set de engranajes que no dejan de girar y piezas de construcción de mezclar y emparejar. Empieza con los Elementos básicos de construcción o ponte directamente manos a la obra y construye tu propio diseño: ¡tú eliges! Cuando construyes con engranajes, no hay límites: ¡dale rienda suelta a tu imaginación! ¿Dónde te llevará?

ELEMENTOS BÁSICOS DE CONSTRUCCIÓN

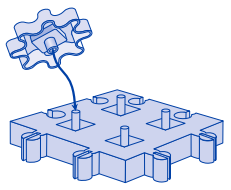
Construye una base

Acopla las bases encajando los salientes en las ranuras. Hay muchas maneras distintas de disponer las bases: ¡en filas, pirámides, zigzag y muchas más!



Agrega engranajes

Alinea el agujero central de un engranaje con el saliente superior de una base ¡y mételo! Cuando esté colocado correctamente, los engranajes deberán girar fácilmente en ambas direcciones con un ligero impulso. Acopla más engranajes, asegurándote de que se engranan los “dientes” de todos los engranajes.

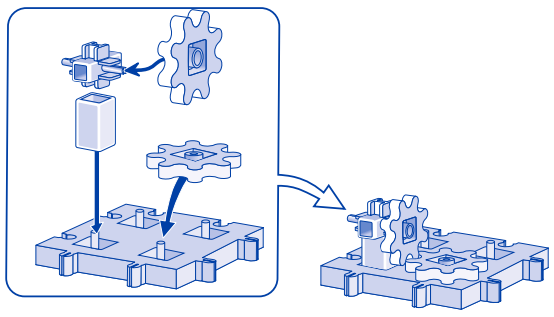


Pon todo en movimiento

Gira la manivela para que todo empiece a moverse. La manivela funciona especialmente bien si se coloca plana sobre un engranaje que está acoplado a una base (y no a una estructura vertical).

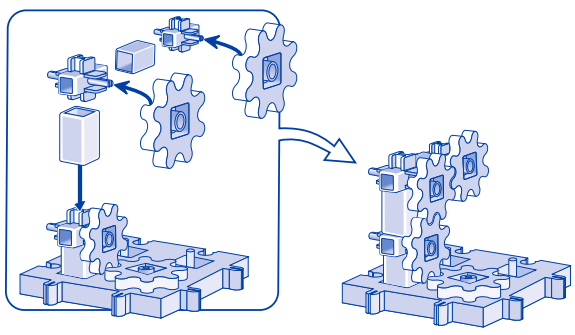
Hacia arriba

Empieza estructuras verticales colocando un pilar en el agujero cuadrado de una base. Luego agrega un eje de seis lados y acopla engranajes al eje asegurándote de que el “diente” se engranaje en el ángulo correcto con el engranaje de la base. El engranaje del eje deberá dar vueltas cuando gires el engranaje de la base.



Pasos a desnivel

Continúa construyendo agregando un pilar a la parte superior del eje de seis lados y luego acoplando otro eje de seis lados. Agrega un pilar al lateral del eje de seis lados para construir en horizontal.



¡EXPERIMENTOS!

Los siguientes experimentos animan a los niños a darse cuenta de movimientos y conexiones interesantes y a explorar la acción fascinante que se puede crear con engranajes.

¿Cómo gira?

Coloca dos engranajes juntos en una base. Gira los engranajes y mira cómo se mueven. ¿Están girando los engranajes en la misma dirección?

De un extremo a otro

Une las bases de tal manera que estén en línea recta. Haz una fila larga de engranajes unidos que vaya de un extremo de las bases al otro. Gira muy despacio el primer engranaje en un extremo. ¿Empieza a girar el último engranaje de inmediato?

FR

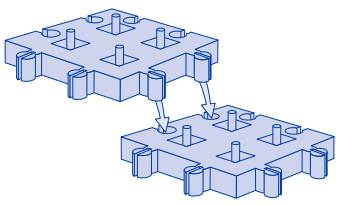
Amusez-vous à faire tourner votre monde !

Familiarisez les enfants avec la construction et le mouvement grâce à ces engrenages et autres pièces de construction colorés. Commencez par leur enseigner les bases de la construction ou lancez-vous directement à construire votre propre modèle. C’est vous qui choisissez ! La construction avec des engrenages offre des possibilités illimitées pour donner libre cours à l’imagination. Où votre imagination va-t-elle vous emmener ?

LES BASES DE LA CONSTRUCTION

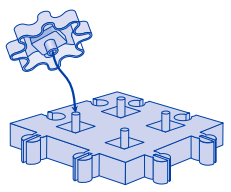
Créez une base.

Connectez les différentes bases en faisant glisser les crans dans les trous. Il y a de nombreuses façons de disposer les bases : en lignes, en pyramide, en zigzag, etc. !



Ajoutez des engrenages.

Alignez le trou au centre d’un engrenage avec le cran supérieur d’une base et appuyez dessus pour le fixer en place ! Une fois correctement placés, les engrenages doivent pouvoir tourner facilement dans les deux sens en poussant très doucement. Accrochez d’autres engrenages en s’assurant que toutes les « dents » s’engrènent.

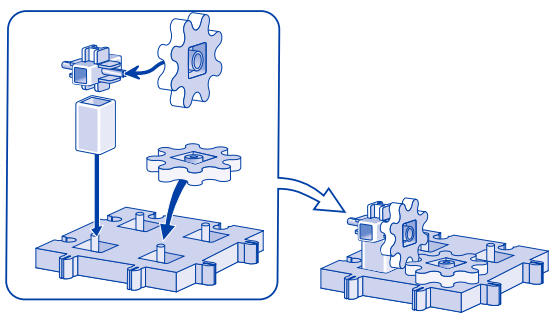


Mettez l’ensemble en mouvement.

Faites tourner la manivelle pour que tout se mette en mouvement. La manivelle fonctionne mieux si elle est placée sur un engrenage accroché à la base (et non sur une structure verticale).

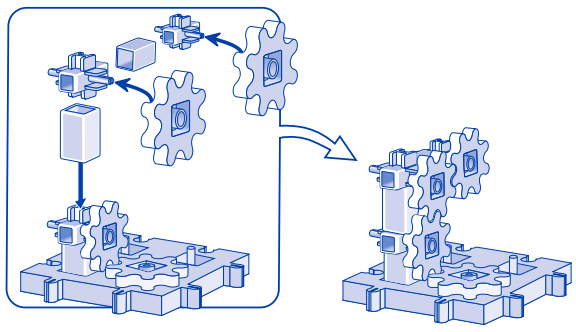
À a verticale

Commencez par placer un pilier dans un trou carré d’une base pour construire une structure verticale. Ajoutez ensuite un essieu avec six attaches et accrochez-y des engrenages en veillant à ce que les « dents » forment un angle droit avec l’engrenage de la base. L’engrenage sur l’essieu doit tourner lorsque vous tournez l’engrenage de la base.



Encore plus loin

Continuez à construire en ajoutant un pilier sur le haut de l’essieu avec six attaches et accrochez un autre essieu. Ajoutez ensuite un pilier sur le côté de l’essieu avec six attaches pour construire à l’horizontale.



EXPÉRIENCES !

Les expériences suivantes encouragent les enfants à faire attention aux mouvements et aux connexions intéressants et à découvrir toutes les choses fascinantes à créer avec des engrenages.

Comment ça tourne ?

Placez deux engrenages l’un à côté de l’autre sur une base. Faites tourner les engrenages et regardez-les bouger. Les engrenages tournent-ils dans la même direction ?

D’un bout à l’autre

Reliez les bases pour faire une ligne droite continue. Faites une longue rangée d’engrenages reliés entre eux allant d’une extrémité à l’autre de la base. Faites tourner le premier engrenage très doucement. Le dernier engrenage se met-il à tourner immédiatement ?

DE

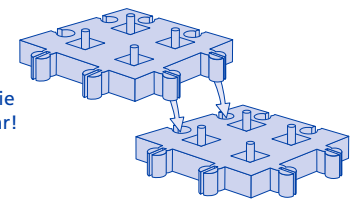
Die Kurbel- und Drehspaß-Welt zum Selberbauen!

Mit diesem farbenfrohen Set aus drehenden Zahnrädern und Bauteilen für viele Spielzwecke erklären Sie Kindern Mechanik und Bewegung. Beginnen Sie mit den Grundlagen zum Bauen, oder tauchen Sie gleich richtig ein, und erstellen Sie sich Ihr eigenes Modell - Sie haben die Qual der Wahl! Dem Bau mit Zahnrädern sind keine Grenzen gesetzt - der einzige Bauplan ist Ihre Vorstellungskraft. Was für eine Konstruktion wird es heute?

GRUNDLAGEN ZUM BAUEN

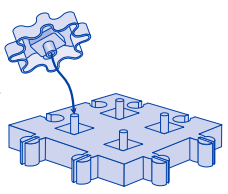
Bauen Sie ein Fundament

Setzen Sie die Bodenstücke zusammen, indem Sie die Dübel in die Steckplätze schieben. Die Bodenstücke lassen sich auf viele verschiedene Weisen zusammensetzen. Konstruieren Sie Reihen, Pyramiden, Zickzack-Konstruktionen und vieles mehr!



Montieren der Zahnräder

Richten Sie das mittlere Loch eines Zahnrads mit dem oberen Dübel eines Bodenstücks aus und stecken Sie es drauf! Wenn Sie die Zahnräder richtig angebracht haben, sollten sie sich mit nur einem kleinen Stupser leicht in beide Richtungen drehen lassen. Montieren Sie mehr Zahnräder und achten Sie darauf, dass die Zähne der verschiedenen Räder ineinander greifen.

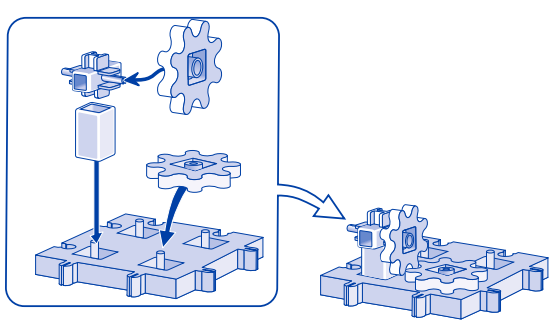


Bringen Sie Ihre Werke in Bewegung

Drehen Sie an der Handkurbel, um Ihr Bauwerk komplett in Bewegung zu bringen. Die Kurbel funktioniert am besten, wenn Sie diese auf ein Zahnrad stecken, das an einem Bodenstück (nicht vertikal) angebracht ist.

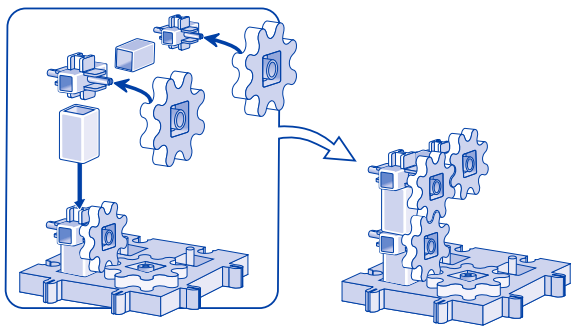
Hoch hinaus

Um vertikale Strukturen zu bauen, stecken Sie eine Säule in das quadratische Loch des Bodenstücks. Bringen Sie dann eine Sechsfach-Achse an, und montieren Sie Zahnräder an der Achse. Stellen Sie dabei sicher, dass die Zähne des Rads mit dem Zahnrad am Bodenstück im richtigen Winkel ineinander greifen. Wenn Sie das Zahnrad am Bodenstück drehen, sollte sich das Zahnrad an der Achse ebenfalls drehen.



Höher und weiter

Bauen Sie Ihre Konstruktion weiter aus, indem Sie eine Säule oben auf der Sechsfach-Achse anbringen und dann an dieser eine weitere Sechsfach-Achse montieren. Bringen Sie noch eine Säule an der Seite einer Sechsfach-Achse an, um Ihre Konstruktion horizontal auszubauen.



EXPERIMENTE!

Die nachfolgend aufgeführten Experimente regen Kinder dazu an, interessante Bewegungen und Verbindungen zu erkennen sowie faszinierende Mechanismen zu erforschen, die sie mit Zahnrädern selbst gestalten können.

Wie dreht sich was?

Bringen Sie zwei Zahnräder nebeneinander auf einem Bodenstück an. Drehen Sie die Zahnräder, und beobachten Sie ihre Bewegungen. Drehen sich die Zahnräder in die gleiche Richtung?

Von einem Ende zum nächsten

Verbinden Sie die Bodenstücke so, dass sie eine gerade Linie bilden. Konstruieren Sie nun von einem Bodenstück-Ende zum nächsten eine lange Reihe verbundener Zahnräder. Drehen Sie nun das erste Zahnrad an einem Ende sehr langsam. Dreht sich das letzte Zahnrad sofort mit?

Lesson One: Rover Gears™

Grade: Kindergarten

Content Objective: Using the Rover Gears™ set from Learning Resources®, students will build a rover to help NASA successfully navigate different terrains.

Language Objective: Students will be able to state and justify opinions on how their rover will work well on the Mars terrain.

STEM Career: Engineer, Programmer, Geologist

Vocabulary:

- Terrain: a stretch of land
- Rover: robot that roars planet surfaces in space and acts as a geologist
- NASA: National Aeronautics and Space Administration

Next Generation State Standard(s):

K-ESS2-1: Use observations to describe patterns in the natural world in order to answer scientific questions.

K-ESS2-2: Construct an argument with evidence to support a claim.

ISTE Standard(s):

1.d. Understand the fundamental concepts of technology operations, demonstrate the ability to choose, use and troubleshoot current technologies and are able to transfer their knowledge to explore emerging technologies.

3.d. Build knowledge by actively exploring real-world issues and problems, developing ideas and theories and pursuing answers and solutions.

4.c. Develop, test and refine prototypes as part of a cyclical design process.

6.d. Explore local and global issues and use collaborative technologies to work with others to investigate solutions.

Materials:

- Gears! Gears! Gears!® Rover Gears™ set
- Mars terrain pictures:
    - https://www.universetoday.com/14885/mars-surface/
    - https://mars.jpl.nasa.gov/gallery/martianterrain/PIA00563.html
    - https://www.mnn.com/earth-matters/space/stories/hang-gliders-could-drop-probes-on-mars
- Sand
- Dirt
- Rocks

- Flat object/bin to hold the “Mars” terrain

Preparation:

- Print out the Mars pictures for students or have them uploaded on the computer to show
- Create “Mars” terrain with sand and/or dirt and place rocks on top. This will be used for students to test their rovers on. Place the terrain in a flat bin. Here is a website to help understand the Mars terrain: https://en.wikipedia.org/wiki/Mars

Lesson:

1. Students will need the Gears! Gears! Gears!® Rover Gears™ set
2. Introduce problem to students: NASA needs a rover that will be able to successful navigate the Mars terrain. Students will be in charge of building this rover using the Rover Gears set™.
3. Discuss the vocabulary word terrain. What is terrain? **Terrain**: a stretch of land. What types of terrain do you see around you? **Example:** sand, grass, dirt, rocks.
4. What does the terrain look like on Mars? You can share the pictures below with students. You can also put together Mars-like terrain that students can play with.
    a. https://www.universetoday.com/14885/mars-surface/
    b. https://mars.jpl.nasa.gov/gallery/martianterrain/PIA00563.html
    c. https://www.mnn.com/earth-matters/space/stories/hang-gliders-could-drop-probes-on-mars
5. It may also help to show the video (https://www.youtube.com/watch?v=nQ365jzwk5w&t=21s) to gives students further ideas of what the terrain is like on Mars. The video may be for older students. For younger students, it will help to stop and talk through what they are seeing. Examples: What did the scientists think the Mars terrain was like (**cold and dry**)? What did scientists really learn (**“alive”, dirt, rocks**, **dry desert, once covered in water**)?
6. It may help to show the video (https://www.youtube.com/watch?v=3-MNAX1jgbA). Note, for younger students, it will help to instead ask students questions throughout the showing of the video to help them understand what is a rover and how it works: What is a rover (**a vehicle to help NASA learn more about Mars**)? How does the rover move (**wheels**)? What type of terrain is the rover moving on (**sand and rocks**)? Did the rover have trouble moving on the sand (**it was sliding**)? How did this help scientists get the rover ready for Mars terrain (**the desert terrain was similar to what the Mars terrain will be like. Scientists then know what they need to change on the rover**)?
7. Show the gear set that students will be using. For an add-on, you can bring in other materials to enhance the rovers. Ask the class how they think they will use the pieces to build a rover. You can have students working in pairs.
8. Share as a class the ideas students have.
9. Introduce the “Mars” terrain the students will test their rover on. You could use sand and/or dirt and place rocks on the surface.
10. Pass out the gear pieces and have students begin their creation.
11. Once students feel they’re done, have them visit the terrains to test their rovers.
12. Students test and then modify their rovers based on how they vehicles did.
13. Once everyone has tested their rover, have them share with the class. How did they build their rover? What worked well? What did they have trouble with?

Questions to Guide Students:

- When students are choosing their rover design:
    - Why do you feel this design will work best (evidence)?
- When students are testing their rover:
    - How is your rover moving on the “Mars” terrain?
    - What can you improve upon with your rover?

Check for Understanding:

- Students will be checked for their understanding through the building and testing of their rovers. Once completed, students can discuss or write

Challenge: For older students, you can use the Gears! Gears! Gears!®Motorized On the Move Building Set to have them motorize their vehicle.

Lesson Two: Flight Gears™

Content Objective: Students will use the Gear! Gears! Gears! Flight Gears to create a flying machine

Language Objective: Students will summarize their experience with testing their airplane using discussion and/or writing.

STEM Career: Airplane Captain

Vocabulary:

- Transportation: the action of moving someone or something
- Gears: tooth wheels that work together

Next Generation State Standard(s):

K-ESS2-1: Use observations to describe patterns in the natural world in order to answer scientific questions.

K-ESS2-2: Construct an argument with evidence to support a claim.

ISTE Standard(s):

1.d. Understand the fundamental concepts of technology operations, demonstrate the ability to choose, use and troubleshoot current technologies and are able to transfer their knowledge to explore emerging technologies.

3.d. Build knowledge by actively exploring real-world issues and problems, developing ideas and theories and pursuing answers and solutions.

4.c. Develop, test and refine prototypes as part of a cyclical design process.

Materials:

- Gears! Gears! Gears!® Flight Gears™ Set

Preparation:

- Have the transportation song ready on the computer

Lesson:

1. Begin discussion by asking students to brainstorm the different types of transportation (focus will be on airplanes).
2. You can share the song/video (https://www.youtube.com/watch?v=cSw50Jw0H34) to reinforce the different modes of transportation.
3. Share with students that they will have an opportunity to build a big airplane like the one shown in the video.
4. Show the Gears! Gears! Gears!® Flight Gears™ set pieces with students. How do students think they will use the gears to piece the airplane together?
5. Allow students time to put together their airplanes.
6. Students can test the movement of their planes on the ground. You can ask students what happens when they push their airplane? How far does it go? Could they make it go further?
7. Students then share their creations with the rest of the class.

Questions to Guide Students:

- What happens when you push your airplane with different strengths?
- How will you use the gear pieces to piece the airplane together?

Check for Understanding:

- Check student learning through the airplane they build and questioning students as they test their airplane. Student learning can also be checked through class discussion when the project is complete.

Challenge: For older students, you can use the Gears! Gears! Gears!® Motorized On the Move Building Set to have them motorize their airplane.

Lesson Three: Fun with Space

Grade Level: First grade

Content Objective: Students will engage with the Gears! Gears! Gears!® Space Explorers Building Set to discover planets and create observations of the sun.

Language Objective: Students will be able to summarize the patterns seen of the sun.

STEM Career: Astronomer

Vocabulary:

- Observation: the act of viewing someone or something to gain information
- Solar System: the collection of eight planets and their moons
- Sun: the star that Earth orbits

Next Generation State Standard(s):

- 1-ESS1-1: Use observations of the sun, moon, and stars to describe patterns that can be predicted.
- Patterns in the natural world can be observed, used to describe phenomena, and used as evidence.

ISTE Standards(s):

7.c. Contribute constructively to project teams, assuming various roles and responsibilities to work effectively toward a common goal.

Materials:

- Gears! Gears! Gears!® Space Explorers Building Set

Preparation:

- Upload videos onto computer

Lesson:

1. You can introduce our solar system by sharing the video Outer Space: "We are the Planets," The Solar System Song by StoryBots
2. Introduce the Gears! Gears! Gears!® Space Explorers Building Set in which students will be building our solar system.
    a. If it helps, you can have students play with the set first and they can create their own planetary system.
    b. You can also share a picture of the solar system
3. Ask students what planets they recognized in the set.
4. Share how we will focus on the Sun. What piece in their gear set is the sun? Why did students choose that piece? Ask the questions below to trigger student thinking.
    a. What star can we see from Earth (**the sun**)?

b. What does the sun do for our planet (**helps to grow food, keeps the earth warm, provides oxygen**)?
c. Why do we not see the sun at night (**the earth rotates around the sun, so the sun looks like it moves across our sky and then sets in the west. Half of the Earth will get sunlight (day) and the other half will not (night) as it rotates**)?

5. You can have students watch the video, Here Comes the Sun: Crash Course Kids #5.1to reinforce the concepts learned of the sun. There are questions below you can ask students after the video.
    a. What would happen to Earth if there was no sun (**dark, frozen world**)?
    b. What is the sun made up of (**gas**)?
    c. What type of energy do we get from the sun (**heat and light**)?
    d. How long does it take for light, from the sun, to travel to the Earth (**8 minutes; you can have students sit or do something specific for 8 minutes to help them understand this length of time**).
    e. There is a fun song that also explains what the sun does and its features: Outer Space: "I'm So Hot," The Sun Song by StoryBots

Extension: Your class can complete an art project that reinforces the sun. Use tissue paper and paper plates to create a handmade sun. Students can glue on pieces of the red, yellow, and orange tissue paper on the round paper plate.

Check for Understanding:

- Use the questions provided above to help you determine the understanding of the students. What concept could students learn further? Do students understand the material well and you can cut the lesson short?

Lesson Four: Testing Ramps

Content Objective: Students will be able to build ramps with different heights and test their built gear set on their ramps.

Language Objective: Students will be able to explain their process of building the ramps with different heights and how well their gear set tested on the ramps.

STEM Career: Engineer

Vocabulary:

- Ramps: a sloped plane
- Energy: a process of transfer from one thing to another (i.e Kinetic, Potential energy)
- Engineering Design Process: the process of creating a solution to a given problem

Next Generation State Standard(s):

K-PS2-1: Plan and conduct an investigation to compare the effects of different strengths or directions of pushes and pulls on the motion of an object.

K-PS2-2: Analyze data to determine if a design solution works as intended to change the speed or direction of an object with a push or a pull.

K-PS3-C: Relationship Between Energy and Forces

- A bigger push or pull makes things speed up or slow down more quickly.

K-ETS1.A: Defining Engineering Problems

- A situation that people want to change or create can be approached as a problem to be solved through engineering. Such problems may have many acceptable solutions.

ISTE Standard(s):

3.d. Build knowledge by actively exploring real-world issues and problems, developing ideas and theories and pursuing answers and solutions.

4.c. Develop, test and refine prototypes as part of a cyclical design process.

Materials:

- Wooden blocks (or objects that can create strong ramps and wide enough for the Gears! Gears! Gears! products)
- Gears! Gears! Gears! Flight Gears™
- Gears! Gears! Gears! Rover Gears™
- Gears! Gears! Gears! Cycle Gears™
- Gears! Gears! Gears! Wrecker Gears™
- Coloring paper
- Coloring utensils (markers, crayons)
- Rulers

- Timers

Preparation:

- Have wooden blocks and gear sets ready for use.

Lesson:

1. Introduce the problem to students, “What type of ramp can you build that will have your gear set move the fastest from one end to the other?” (Engineering Design Process: **Define**).
2. You can discuss as a class about the types of ramps they feel can be built (i.e. high, medium, low off the ground). You can give measurements of where the ramp height will need to begin (i.e. High: 24 inches off the ground, Medium: 12 inches off the ground, and Low: 6 inches off the ground).
3. Share that students will need to build three different ramps (high, medium, and low off the ground) and complete tests to compare the speed of their gear set on the ramp.
    a. Have students hypothesize what ramp their gear set will move down the quickest. Why?
4. Show students the type of materials they have available (wooden blocks, Flight Gears™, Rover Gears™, Cycle Gears™, Wrecker Gears™, et. al) (Engineering Design Process: **Identify**).
5. Pass out the coloring paper and coloring utensils. Students will draw out their ramp design ideas that fit the requirement of high, medium, and low (Engineering Design Process: **Brainstorm**).
    a. You can have students draw out designs for high ramps first, then medium ramps, and then low ramps.
    b. Have students think about how many blocks they want to include? What type of support should they have to hold up the blocks?
6. Have students choose their three (high, medium, and low) designs they feel will work best (Engineering Design Process: **Select**).
7. Students will begin by building their high ramp using wooden blocks or other materials you feel work best (Engineering Design Process: **Prototype**).
8. Students build a gear vehicle of their choosing.
9. Once complete, students will set their creation at the top of the ramp and begin testing (Engineering Design Process: **Test**).
    a. Have one student let go of their group’s vehicle and the other student times how long it takes for the object to move from the top, once released from their hand, to the end of the ramp.
    b. Students can do a couple of test runs and use the best time for that ramp. Continue the same process for the other ramps.
    c. As students are testing, walk around and ask groups if they feel they can make improvements on their ramp design. What type of improvements are they? How will it help their gear set to move quick down the ramp? (Engineering Design Process: **Modify**).
10. When the tests are completed, ask students which ramp moved their gear set the quickest from one end to the other (Engineering Design Process: **Communicate**).
    a. What evidence do you have to show the ramp that moved the gear set the quickest (i.e timer)?
    b. What changes did you make to your ramp?

c. Introduce the vocabulary word, energy. Based on the project students have completed, what do they feel the word energy means?
    i. Place a gear set at the top of a created ramp and let go. Share how this is energy. How is the energy being transferred?
    ii. You can then also introduce potential (hold the gear set at the top of the ramp) and then kinetic (let go of the gear set). You can have students do this with you by them using their own ramp.

Questions to Guide Students:

- What ramp will their gear set move down the quickest? Why?
- What evidence do you have to show it moved the quickest (i.e timer)?
- What changes did you make to your ramp? How did these changes help your gear set to move quicker down the ramp?

Check for Understanding:

- Check for student data that was collected during the tests (times took) and how they presented their findings during the discussion.

Challenge:

- Have students implement turns to their ramp and/or have the ramp go up and down. Do these obstacles change the times of their gear set? Why?
- Students push their gear set with different strengths. How do the different strengths change the times of their gear set?