Inclined plane wedge screw worksheet

Tilt Planes, Wedges, and Screws In Inclines Planes, Wedges, and Comprehensable Reading Fasteners with fifth grade tilt printing aircraft, wedges, and reading comprehensor fasteners with sixth grade tilt-printed aircraft, wedges, and edHelper reading level reading level screws suggest reading levels: grade 5-7 Flesch-Kincaid grade : 6.52 challenging words: theory, based, simple, sketch, airplane, electric, spiral, for example, science, so, pyramid, connection, middle, force, flow content from: Ancient Egyptians Other French language: Les plan tilt, les coins et les vis Spanish: Planos, cuñas , y tornillos Italy: Piani inclinati, cunei e viti Germany: Schiefe Ebenen, Keile und Schrauben Inclines Planes, Wedges, and Screws By Sharon Fabian 1 Simple Machine is even simpler to remember if you group those accompanying examples, plane tilts, wedges, and screws all have something in common. Let me explain. 2 An inclined plane is just a steep surface, such as a sliding board. Usually the tilted plane remains in one place and something moves up or downhill. You slide down the sliding board. Like all simple machines, an inclined plane makes the job easier. A wheelchair connector is another example. Some people find it easier to travel up the seam than to take the stairs. Ramps also make it easier to load and unload a truck. The ancient Egyptians may have used ramps to build giant pyramids. One theory is that they gradually built a ramp in the sand, spiraling around the outside of the pyramid as it became higher. The giant building blocks were then pushed up the seam. 3 A wedge that looks like two tilt planes stuck together. The edges of a wedge are often called blades. The big difference between a wedge and an inclined plane is that, while the plane tilts still, a moving wedge to do its job. To chop down a tree, someone has to swing the axe. To cut out a paper heart, you need to move the blade up and down. Paragraphs 4 through 8: For stories complete with questions: click here to print weekly reading books Create weekly Reading Books Prepare for the whole week at the same time! Feedback on Inclines Planes, Wedges and Screws Simple Machines Simple Machines Simple Machines Science Science Copyright © edHelper Simple machines are devices with few or no moving parts that make work easier. Students were introduced to six simple machines - wedges, wheels and shafts, levers, tilt planes, screws, and pulleys - in the context of building a pyramid, gaining a high-level view of the tools that have been in use since ancient times and are still in use today. In two practical activities, students begin designing their own pyramids by performing material calculations, and evaluating and selecting a construction site. Six simple machines are tested more intensively in the next lessons in this unit. Program teaching this technique in accordance with next-generation Science Standards Why are engineers interested in simple machines? How do such devices help engineers improve society? Simple machinery is important and popular in our world today in the form of everyday equipment (crowbars, wheelbars, highway ramps, etc.) that individuals, and especially engineers, use on a daily basis. The same physical principles and mechanical advantages of simple machinery were used by ancient engineers to build the pyramid used by today's engineers to build modern structures such as houses, bridges and skyscrapers. Simple machines give engineers more tools to solve everyday challenges. After this lesson, students will be able to: Understand what a simple machine is and how it will help an engineer build something. Identify six simple machine types. Understand how the same physical principles used by today's engineers to build skyscrapers were used in ancient times by engineers to build pyramids. Create and compare multiple possible solutions to create a simple leverage machine based on how responsive the challenges are. NGSS 3-PS2-2 performance expectations. Make observations and/or measure the movement of an object to provide evidence that a pattern can be used to predict future motion. (3rd grade) Do you agree with this link? Thank you for your feedback! Click here to see other curriculums that match this performance expectation This lesson focuses on the following three-dimensional learning aspects of NGSS: Science & Technical Practice The core idea of crosscutting the Concept of Making observations and/or measurements to produce data as the basis for evidence for an explanation of a phenomenon or testing a design solution. Affiliate Agreement: Thank you for your feedback! Scientific findings are based on the recognition of patterns. Affiliate Agreement: Thank you for your feedback! Patterns of movement of an object in different situations can be observed and measured; when motion in the past expressed a regular pattern, future movement could be predicted from it. (Boundaries: Technical terms, such as intensity, velocity, velocity, dynamics, and vector quantity, are not introduced at this level, but the concept that a quantity needs both the described size and direction is developed.) Affiliate Agreement: Thank you for your feedback! The change model can be used to make predictions. Affiliate Agreement: Thank you for your feedback! Tools, materials and skills are used to do everything and perform tasks. (Grades 3 - 5) See more details of the appropriate curriculum Do you agree with this link? Thank you for your feedback! Suggest a link not listed above About Simple Machine Presentation (pptx) Simple Machine Reference Sheet (docx) Simple Machines Reference (pdf) Simple Machines Worksheet (docx) Simple Machines Worksheet (pdf) Simple Machines Worksheet Answers (docx) Simple Machines Worksheet Answers (pdf) Simple Machines Worksheet Answers (pdf) Extension Activity: Simple Machines Scavenger Hunt! Bảng tính (docx) Mở rộng hoạt động: Máy đơn giản Scavenger Hunt! Hunt! (pdf) Extended operation: Simple Machine Scavenger Hunt! Worksheet Answer (pdf) Visit [www.teachengineering.org/lessons/view/cub_simple_lesson01] to print or download. How did the Egyptians build the Great Pyramid thousands of years ago (~2500 BC)? Can you build a pyramid using 9,000 kg (~10 tons or 20,000-lb) blocks of stone with your bare hands? It's like trying to move a big elephant with your bare hands! How many people can take to move such a large block? It will still be a challenge to build a pyramid today even with modern tools, such as jackhammers, cranes, trucks and bulldozers. But without these modern tools, how did Egyptian workers cut, shape, transport and lay giant stones? Well, one of the keys to completing this amazing and difficult task is the use of simple machines. The machine simply does not have or very few moving parts that make the job easier. Many of today's complex tools are actually just more complex forms of six simple machines. By using simple machines, ordinary people can divide giant stones, large stone outlines, and move blocks over huge distances. However, it takes more than just simple machinery to build the pyramids. It also takes tremendous plans and a great design. Planning, designing, teamwork and using tools to create something, or to get a job done, is what engineering is all about. Engineers use their knowledge, creativity, and problem-solving skills to perform some great challenges to solve real-world challenges. People urge engineers to use their understanding of how things work to do seemingly impossible jobs and make everyday operations easier. It is surprising how many times engineers turn to simple machines to solve these problems. Once we understand simple machines, you will recognize them in many popular activities and everyday items. (Give a simple machine reference sheet.) These are six simple machines: wedges, wheels and shafts, levers, tilting planes, screws, and pulleys. Now that you see the pictures, do you recognize some of these simple machines? Can you see any of those simple machines around the classroom? How do they work? Yes, an important vocabulary term when learning about machines is simply a mechanical advantage phenomenon. The mechanical advantage of simple machines means that we can use less force to move an object, but we have to move it a longer distance. A good example is pushing a heavy object onto a seam. It may be easier to push objects up a seam instead of just lifting it up to the right height, but it takes a longer distance. A seam is an example of a simple machine called a tilted plane. We'll learn a lot more about each of the six simple machines that are a simple solution to help engineers, and all humans, do the hard work. Sometimes it is difficult to recognize simple machines in our lives because they look different from the examples we see at school. To make our research of simple machines easier, let's imagine that in ancient Egypt and that the leader of the country hired us as engineers to build a pyramid. Students can act as engineers with exciting activities and practice: Stack It Up! and Choose a pyramid site to design and plan the construction of a new pyramid. Today's availability of electrical and technologically advanced machinery makes it difficult for us to see what machines are simply complete. But in the context of ancient Egypt, the simple machines that we will study are much more basic tools at the time. After we develop an understanding of simple machines, we will change our context to build a skyscraper today, so we can compare and contrast how simple machines have been used over the centuries and are still in use today. Use the Attached Introduction to simple machine PowerPoint presentations and simple Machine Reference Tables as useful class tools. (Show PowerPoint presentations or print slides for use with over-the-top projectors. Presentations are animated to promote a style based on information requests; each click shows a new point about each machine; ask students to suggest characteristicss and examples before you reveal them.) Simple machines everywhere; we use them daily to perform simple tasks. Simple machinery has also been used since the early days of human existence. While simple machines come in many shapes, they come in six basic types: Wedge: A device that forces everything apart. Wheels and shafts: Used to reduce friction. Leverage: Move around a pivot point to increase or decrease mechanical advantages. Tilt plane: Lift the object up by moving uphill. Screws: A device that can lift or hold everything together. Pulley: Change the direction of a force. Simple machines We use simple machines because they make the job easier. The scientific definition of work is the number of forces that are applied to an object by the distance the object is moved. Therefore, the work consists of force and distance. Each job takes a specific amount of work to complete it, and this number does not change. Therefore, the force of the distance is always equal to the same amount of work. This means that if you move something a smaller distance, you need to exert a greater force. On the other hand, if you want to exert less force, you need to move it over a greater distance. This is the force and trade distance out, or mechanical advantage, that is common to all simple machines. With mechanical advantages, the longer the work takes, the less force you need to use during the work. Most of the time, we feel that a task is difficult because it requires us to use a lot of force. Therefore, using the trade- Ways and forces can make our mission much easier to complete. Wedge wedge is a simple machine that forces objects or substances apart by applying force to a large surface area on the wedge, with that force magnized to a smaller area on the wedge to perform the actual work. A nail is a common wedge with a wide nail head area where applied, and a small point area where concentrated forces are promoted. The force is magnied at the point, allowing the nail to pierce the wood. When the nail sinks into the wood, the wedge shape at the point of the nail moves forward, and forces the wood away from each other. Figure 1: The axe is an example of wedges. Daily examples of wedges include an axe (see Figure 1), nails, doorstops, chisels, saws, jackhammers, zippers, bulldozers, snow plows, horse plows, zippers, plane wings, knives, fork and nose of a boat or ship. Wheel and axle Wheels and shafts are a simple machine that reduces friction associated with moving an object, making the object easier to transport. When an object is pushed, friction forces must be overcome to start it moving. When the subject is moving, the friction forces against the force that impacts the object. Wheels and shafts make this easier by reducing the friction involved in moving an object. The wheel spins around a shaft (basically a stick passing through the wheel, allowing the wheel to spin), rolling over the surface and minimizing friction. Imagine trying to push a 9,000-kilogram (~10-ton) block of ice. Wouldn't it be easier to roll it along using logs placed underneath rocks? Daily examples of wheels and shafts include a car, bicycle, office chair, barrow wheel, cart, hand truck and roller skates. Leverage A simple machine lever consists of a load, a fulcfulc and effort (or force). Loads are objects that are moved or raised. The fulcful point is the pivot point, and effort is the force required to lift or move the load. By using one force at one end of the lever (the force is applied), a force at the other end of the leverage is created. The force is applied either up or down, depending on the distance from the fulcful point (the point or support on which a lever rotates) to the load, and from the fulcful point to the attempt. Figure 2: Crowbars are an example of leverage. Daily examples of levers include a teeter-totter or sighting, crane arms, crow bars, hammers (using claw heads), fishing cranes and bottle opening. Think about how you use crowbars (see Figure 2). By pushing down on the long end of the crowbar, a force is created at the top of the load over a smaller distance, again, expressing the balance between force and distance. Tilted aircraft make it easier to lift something. Think of a seam. Engineers use ramps to easily move objects to a larger height. There are two ways to lift an object: by lifting it straight up, or by pushing it diagonally. Lift a straight object up moving it over the shortest distance, but you have to exert a larger force. On the other, using an inclined plane requires a smaller force, but you must exert it over a longer distance. Daily examples of tilted aircraft include highway access ramps, sidewalk ramps, stairs, tilt conveyor lines, and converted roads or trails. Figure 3: A car jack is an example of a simple screw machine that one person to lift up the side of a car. A screw is basically an inclined plane wrapped around a shaft. Screws have two main functions: they hold everything together, or they lift objects up. A screw is good for keeping things together because of the flow around the shaft. The theme grips the surrounding material as teeth, the result is a safe organization; The only way to remove a screw is to relax it. The car jack is an example of a screw being used to lift something (see Figure 3). Daily examples of screws include a screw, bolts, clamps, jar caps, car jacks, spinning stools and spiral staircases. Pulley Figure 4: A pulley on a ship helps people pull in a heavy fishing net. A pulley is a simple machine used to change the direction of a force. Think of raising a flag or lifting a heavy stone. To lift a stone up into its place on a pyramid, one would have to exert a traction on it. By using a pulley made from a grooved wheel and rope, one can pull down on the rope, taking advantage of gravity, to lift the stone up. Even more valuable, a system of several pulleys can be used together to reduce the force needed to lift an object. Daily examples of pulleys used include flagpoles, elevators, sails, fishing nets (see Figure 4), clothing lines, cranes, window shades and window blinds, and rock climbing equipment. Compound Machine A compound machine is a device that combines two or more simple machines. For example, a wheelbarrow combines the use of a wheel and shaft with a lever. Using six basic simple machines, all kinds of compound machines can be made. There are many simple and complex machines in your home and class. Some examples of compound machines you can find are a possible opening (wedges and levers), exercise machines/cranes/towing trucks (levers and pulleys), shovels (levers and wedges), car jacks (levers and screws), barrow wheels (wheels and shafts and levers) and bicycles (wheels and shafts and pulleys). Stack it up! - Students analyze and start designing a pyramid. They performed calculations to determine the area of their pyramid base, the volume of stone blocks, the number of blocks needed for their pyramid base, and made a miniature drawing of a pyramid on graph paper. Watch this activity on YouTube Choose a pyramid site - Working in engineering project teams, students choose a website to build a pyramid. They base their decision on the site features provided by the surveyer's report; distance from quarries, rivers and palaces; and other factors they think are important to the project. Today, we discussed six simple machines. Who can name them for me? (Answer: Wedges, wheels and shafts, levers, tilt planes, screws, and pulleys.) How do simple machines make the job easier? (Answer: Mechanical advantages allow we use less force to move an object, but we have to move it a longer distance.) Why do engineers use simple machines? (Possible answer: Engineers use their creative knowledge of science and mathematics to make our lives better, often used Machine. They invented tools that make work easier. They complete huge tasks that can not be done without the mechanical advantage of simple machinery. They design structures and tools to use our environmental resources better and more efficiently.) Tonight, at home, think about daily examples of six simple machines. See how much you can find around your home! Complete the KWL Evaluation Chart (see Assessment section). Assess students' understanding of the lesson by assigning a Simple Computer Spreadsheet to take the take-home test. As an extension, use a simple machine with Scavenger Hunt! Spreadsheets to conduct a simple machine hunt in which students find examples of simple machines used in the classroom and at home. In other lessons of this unit, students study each machine in more detail and see how each can be used as a tool to build a pyramid or a modern building. Design: (from) To plan in systematic form, usually graphics. To create a specific purpose or effect. Design a building. (nod word) A well thought out plan. Engineering: Apply scientific and mathematical principles into practice such as designing, manufacturing and operating efficient and economical structures, machines, processes and systems. Force: A push or pull on an object. Plane Tilt: A simple machine that increases an object to a larger height. Usually a surface tilts straight and there are no moving parts, such as a ramp, ramp or staircase. Leverage: A simple machine that increases or decreases forces to lift something. Usually a swivel bar on a fixed point (fulcfulcful point) with which force is applied to work. Mechanical advantages: An advantage gained by using simple machinery to complete the job with less effort. Makes the task easier (meaning it requires less force), but may require more time or room to work (more distance, rope, etc.). For example, applying a smaller force over a longer distance to achieve the same effect as applying a large force over a small distance. The ratio of the force of the input is impacted by a computer with the input force applied to it. Pulley: A simple machine that changes the direction of a force, usually to lift a load. Usually consists of a grooved wheel in which a zipper or line runs. Pyramids: A giant structure of ancient Egypt and Mesoamerica used for a crypt or tomb. The typical shape is a square or rectangular base on the ground with edges (faces) in the form of four triangles that meet at one point at the top. The Mesoamerican temple has stepped aside and a flat end is crossed by the room. Screws: A simple machine that lifts or holds materials together. Often a cylindrical bar is tilted with a spiral thread. Simple Machine: One Machine little or no moving parts are used to make the job easier (providing a mechanical advantage). For example, a wedge, wheel and shaft, lever, plane tilt, screw, or pulley. Spiral: A curve around a fixed center point (or axis) at a continuous rate of increase or distance from that time. Tools: A device used to work. Wedge: A simple machine that forces the material apart. Used for separation, tightening, protection or utilize. It thickenes at one end and descends to a thin edge at the other end. Wheels and Shafts: A simple machine reduces friction moving by rolling. A wheel is a disc designed to rotate around a shaft that passes through the center of the wheel. Axle is a support cylinder on which a wheel or a set of wheels rotates. Work: Force on an object by the distance it moves. $W = F \times d$ (manpower with distance). Pre-Lesson Assessment Know / Want to Know / Learn (KWL) Chart: Create a class KWL chart to help organizations learn about a new topic. On a large piece of paper or on a class board, draw a chart with the title Build with Simple Machinery. Drawing three 2016 columns, K, W and L, represents what students know about simple machines, what they want to know about simple machines, and what they've learned about simple machines. Fill in the K and W sections in the lesson introduction when events and questions appear. Fill in the L section at the end of the lesson. Post-introduction review reference sheet: Give a simple machine reference table attached. Review the information and answer any questions. Ask students to keep handy sheets of paper in their desks, folders, or logs. Observations: Show students an example of each simple machine and ask them to observe and discuss any patterns that can be used to predict future movement. Summary Lesson End Discussion: Conduct an official discussion in the classroom, ask students what they have learned from the activities. Ask the students: Who can name different types of simple machines? (Answer: Wedges, wheels and shafts, levers, tilt planes, screws, and pulleys.) How do simple machines make the job easier? (Answer: Mechanical advantage allows us to use less force to move an object, but we have to move it a longer distance.) Why do engineers use simple machines? (Possible answer: Engineers use their creative knowledge of science and mathematics to make our lives better, often using simple machines. They invented tools that make work easier. They complete huge tasks that can not be done without the mechanical advantage of simple machinery. They design structures and tools to use our environmental resources better and more efficiently.) Remind students that engineers consider many factors as they plan, design, and create something. Ask students: What are the considerations an engineer must keep in mind when designing a new structure? (Possible answers: Size and shape (design) of structures, building materials available, calculation of necessary materials, material and cost comparison, drawing, etc.) Considerations an engineer must keep in mind when choosing a website What is building a new structure? (Possible answer: Site physical characteristics [terrain, soil foundation], distance construction resources [wood, stone, water, concrete], in accordance with the purpose of the structure [locate a school or grocery store near where people live].) KWL Chart (Conclusion): As a class, end column L of the KWL Chart as described in the Pre-lesson Assessment section. List all the things they've learned about simple machines. Were all questions W answered? What new things did they learn? Home Test: Assess students' understanding of the lesson by assigning a simple Computer Spreadsheet to take the take-home test. Use a simple machine with Scavenger Hunt! Spreadsheet to conduct a fun scavenger hunt. Ask the students to find examples of all the simple machinery used in their classrooms and homes. Bring daily examples of simple machines and demonstrate how they work. Illustrate the power of simple machines by asking students to do a task without using a simple machine, and then with one. For example, create a lever demonstration by hammering a nail into a piece of wood. Ask students to try to pull the nails out, first using only their hands Wear in a variety of daily examples of simple machinery. Give one to each student and ask them to think about what kind of simple machine. Next, ask students to place items in categories using simple machines and explain why they choose to place their items there. Ask students what life would be like without this section. Emphasize that simple machines make our lives easier. See the Edheads website for a simple machine-based interactive game: . Technical Design Fun with Levers: Give each pair of students a paint stir machine, 3 small plastic cups, a piece of duct tape and a block of wood or tube (or anything similar). Challenge the students to design a simple machine lever that will throw a table ball (or any other type of small ball) as high as possible. During the redesign phase, students are allowed to request documents to add to their designs. There is a small contest to see which team can send table balls flying high. Discuss with the class why that particular design was successful compared to other variations seen in the competition. View a good simple machinery website with extracurricular materials including educational games and activities. Dictionary.com Lexico Publishing Corporation, LLC. Retrieved January 11, 2006. (The origin of some vocabulary definitions, with some adaptability) simple Machines. Ask Almanack, the Franklin Institute Online, Unisys and Drexel eLearning. Retrieved January 11, 2006. Greg Ramsey; Glen Sirakavit; Lawrence E. Carlson; Jacquelyn Sullivan; Malinda Schaefer Zarske; Denise Carlson, with design input from students in spring 2005 K-12 Engineering Outreach Corps integrated teaching and learning programs, College of Engineering, University of Colorado Boulder The The of these digital library programs developed by the Integrated Curriculum and Learning under the GK-12 National Science Foundation Grant No. 0338326. However, these contents do not necessarily represent the policies of the National Science Foundation, and you should not assume the federal government's ate. Last revised: December 2, 2020 2020