**Stage 1: Identify Desired Results/Outcomes**

**What are the big Ideas?**

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| **Forces can affect movement** |
| **1, 2, 3 class levers, friction,** |
| **Identify advantages of a simple machine for a task** |
| **Experiments are designed to create a fair test. Experiments must be repeatable.** |
| **Simple machines create mechanical advantage - Change distance into force Demonstrate mechanical advantage in: lever, wedge, pulley, screw, wheel, inclined plane, roller** |
| **Simple machines can be combined into Compound machines**  |
| **Identify everyday uses of simple machines** |

**What will students understand as a**

**result of this unit?**

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| **Forces - balanced maintain and unbalanced change motion** |
| **Newton’s 3 laws Inertia: Acceleration, action/reaction, Friction** |
| **Measuring with a spring scale to use the power of math** |
| **Simple machines change distance into force** |
| **Names of simple machines, and everyday uses, 6 simple machines & 3 kinds of levers** |
| **How to create a fair test of effort with simple machines** |
| **How to create a compound machine** |
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**What are the big questions?**

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| **How do simple machines create mechanical advantage?** |
| **What are the characteristics of different simple machines?** |
| **How can simple machines be combined?** |
| **How can we create a fair test of the effort required by a simple machine?** |
| **How are simple machines used in real life situations?** |
| **How does the balance of forces affect motion?** |
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**What are the unit or essential questions that will focus the unit?**

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| **How does each simple machine change the effort needed to move an object?** |
| **How can you measure and predict the change in effort needed to move something with each simple machine?** |
| **How does the balance of forces affect motion?** |
| **What are the key ways to create a fair test of a simple machine?** |
| **How can simple and complex machines be used to complete everyday tasks?** |
| **Should machines which do not covert distance into force be considered simple machines?** |
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**Stage 2: Determine Acceptable Evidence Unit Title \_\_’Simple Machines’\_\_\_**

**What evidence will show that the students understand about \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_?**

**Performance Tasks Prompts**

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| **Identify the simple machine:**  |
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| **Write experiments using structured format- procedures, data collection, graphing, results & errors** |
| **Demonstrate whether the force required is increased or decreased when using a simple machine** |
| **Design a test the effect on an object of a change in the slope of an inclined plane**  |
| **Show an understanding of leverage and using measures (e.g. lever exp).** |
| **Identify the simple machines within a complex machine** |
| **Create an imaginary compound machine to complete a task- build it** |
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| **Create a fair test of bouncing ball on difference surfaces (e.g. tile vs carpet) - watch for repeating exactly/measurement/recording** |
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**Quizzes, Tests, Academic Prompts**

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| **Identify 6 types of simple machines and find them within complex machines** |
| **How do simple machines change the effort needed to move something?** |
| **Identify force x distance in lever for balanced forces.** |
| **Roller doesn’t change distance into speed but reduces friction.**  |
| **Balanced forces maintain Speed & Direction vs. unbalanced force = acceleration** |
| **Identify the sources of error in an experiment** |
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**Other Evidence Incl. Student Self Assessment**

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|  | **My thinking…** |
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**Stage 3- Learning Experiences and Instruction for the Unit**

**Students will need to know**

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| Simple Machines: The 6 types and samples of their use to complete tasks |
| The effect of friction in experiments |
| That simple machines change distance into force |
| To vary only one thing in an experiment |
| To repeat the experiment 12 times |
| That simple machines are often combined |
| **Forces:** |
| That object remain at rest or in motion until moved by an outside force |
| That balanced forces maintain Speed and Direction, unbalanced force change S & D |
| **Enrich:** ID of 1st 2nd 3rd levers., kinetic vs static friction, analyse exp. Design to reduce errors. Use reproducible measurements wherever possible to utilize the power of math for analysis. Measures of the distance of force vs distance of output provide leverage. Calculate leverage for compound machines.  |
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Students will be able to do:

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| **Re Experiments**: |
| Measure distances and record in cm |
| Write procedures in clear point form for activity |
| Make and label a data table and then during the experiment, collect data |
| Make & label a graph |
| Analyze data & graph and draw conclusions |
| Identify errors in an experiment such as more than one variable, not repeating experiment |
| **Re: Simple Machines** - identify simple machines & within complex machines |
| Use simple & complex machines to carry out an everyday task |
| Identify when simple machines change distance into force |
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What teaching and learning experiences will equip students to demonstrate the targeted understandings?

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| Experiments of the effect of friction on force: procedures, data, graphing, and analysis |
| Experiments of the effect of simple machines on the force required to move an object |
| Demonstrations of force on objects |
| Changing one variable in an experiment (e.g. slope or surface or mass). |
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| Balanced forced maintain motion or rest, unbalanced forced change speed or direction |
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Unit Planning Sheet- Part 4 Activity Schedule. Unit Title \_Forces & Simple Machines\_

Term 1/2012

**Teacher \_\_ South Slope \_ Date \_\_\_\_\_\_\_\_**

| No. | Date | Tchr | Teaching/Learning Activities | Target: Skill/Idea |
| --- | --- | --- | --- | --- |
| ~~1~~ | ~~Oct 16~~ | ~~R~~ | ~~Graph the class?~~ | ~~Follow directions, graph, draw conclusions~~ |
| 2&3 | Oct 16 | R | Friction Exp - do static only & Write | Friction, Exp.  |
| 4 | Oct 19 | R | Write UP Enhanced:- **Kinetic** Exp  | Poster write up **Kinetic** Friction for Enrich.  |
| 5 | Oct 19 | R | C&C & **Inclined Plane**  | **Distance into force**, **write up**. |
| 6 | Nov 4 | R | C&C; **Wedge** demo during catch up (measure with Ratio only) & Force? | **Wedge** Effort force & Distance into output force & distance & Intro forces. **Unbalanced forces change motion, balance forces maintain motion** |
| 7 | Nov 4 | L | **Screw** Demo & Force demos - remain at rest or motion; external force?? Wrap paper around pencil. |  |
| 8 | Feb17 | ?? | C&C: **Roller** Optional: If roller in slope how much force vs friction activity  | C&C & **Roller** Correcting for friction |
|  | Feb22 | R& L | C&C Enrich: Changing Inclined Plane: **Force on various slopes** | **One Variable; predict force** **using data** |
| 9 | F29 | L | **Wheel & Axle** Activity -screwdriver | Distance into dist (eval?) |
| 10 | Mar7 | R | C&C **Compound machines** & **design to imaginary task** Find leverage of various simple machines Enrich: leverage in  | Compound machines **Mech Adv**. (Ratio) of kinds of SM & uses & Enrich**: Leverage by division or multiply** & **Design task** |
| 11 | M14 | L | C&C Compare **pulleys** leverage& & design to imaginary task  | 1. **Pulleys** change distance to force & change direction 2.  |
| 12 | M16 | Th  | **Quiz;** pulleys Due & Design | **Preview quiz**.  |
| 13 | Mar28 | R | C&C & **Lever** parts, activity - Enrich- Id 1st, 2nd, 3rd cl. lever | Mech Adv; **L\*W=L\*W**, & Levers change direction  |
|  | A 4 | L | Final **Test** & Lever Due | Evaluation |
| 14 | A 11 | L | C&C Complete Design Due;  | Evaluation |
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**Materials/Notes:**

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| Flip Lessons to do: Wedge, -inclined plane –stationary. wedge- moving; sharper = Screw- pitch |
| Roller, One Variable, predictions using data, Mech Adv ratio, Leverage decimal; Design Task; Quiz; Pulleys, Test |
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