Worksheets unit 2

FORCES IN ACTION

MACHINES MOVE THE WORLD

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February – April 2011
Word search about FORCES

Find these words in the grid on the right.

CONTACT FORCES
NON-CONTACT FORCES
PUSH
PULL
MAGNETISM
WEIGHT
FRICTION
GRAVITY

Use the name of the forces to complete the words. Copy the letters in the numbered cells to other cells with the same number.

Definition of FORCE

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PROBLEM:
How do different surfaces affect the movement of the objects?

MATERIALS:
Pencil, toy car, metric tape, 4 clothes pegs, tape, scissors, aluminium foil, wax paper, recycled paper, sand paper, a calculator and plastic cable covers.

STEPS:
1. Predict the distance of the toy car will travel on each surface.
2. Create a ramp using clothes pegs and plastic cable covers.
3. Place the toy car on the ramp and measure the distance.
4. Do 3 different trials for each surface and calculate the distance.

### SURFACE
<table>
<thead>
<tr>
<th>PREDICTION cm</th>
<th>TRIAL 1 cm</th>
<th>TRIAL 2 cm</th>
<th>TRIAL 3 cm</th>
<th>DISTANCE $\frac{T1+T2+T3}{3}$ cm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminium foil</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wax paper</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recycled paper</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sand paper</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

I/we think that the distance will be the same different on all the surfaces.

CONCLUSIONS
Remember: What kind of motion is it? ___________________________________________
Why?  ___________________________________________________________________________
On which surface is the distance shortest? _________________________________________
On which surface is the distance farthest? ________________________________________
Why does the same object travel a different distance? ________________________________
________________________________________________________________________________
Why does the car go down the ramp? ________________________________________________

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Calculate your WEIGHT in the Solar System

On Earth our mass is equal to our weight.

WEIGHT = MASS \times GRAVITY

\[
\text{WEIGHT} = 1\text{kg} \times 1
\]

\[
\text{MASS} = 1\text{kg} \quad \text{WEIGHT}= 1\text{kg}
\]

Look at the gravity of the planets, the sun and the moon and calculate your weight in respect to those.

<table>
<thead>
<tr>
<th>Planets, Star and satellite</th>
<th>GRAVITY</th>
<th>your MASS</th>
<th>your WEIGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sun</td>
<td>27,90</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mercury</td>
<td>0,37</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Venus</td>
<td>0,88</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Earth</td>
<td>1,00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mars</td>
<td>0,38</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jupiter</td>
<td>2,64</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Saturn</td>
<td>1,15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Uranus</td>
<td>0,16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neptune</td>
<td>1,22</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moon</td>
<td>0,16</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Look at your results and underline the correct part of the sentence.
Is it your weight different or is it equal?
My weight never changes. changes.

Is it your mass different or is it equal?
My mass never changes. changes.

Calculate your weight in newtons

<table>
<thead>
<tr>
<th>On Earth</th>
<th>On the moon</th>
</tr>
</thead>
<tbody>
<tr>
<td>WEIGHT = \ldots \times 9,8</td>
<td>WEIGHT = \ldots \times 1,5</td>
</tr>
<tr>
<td>WEIGHT = \ldots\text{newtons}</td>
<td>WEIGHT = \ldots\text{newtons}</td>
</tr>
</tbody>
</table>

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Classify the images below depending on if the force applied is a PUSH or a PULL.

Why do you think it is a push/pull?

<table>
<thead>
<tr>
<th>...</th>
<th>is a push pull</th>
<th>because it is a force that can move something away from towards from somebody/something.</th>
</tr>
</thead>
</table>

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HANDS ON! Newtons

PROBLEM:
How do you use a dynamometer?
What is the relation between mass and force?

F = m x a

MATERIALS:
- Pencil
- Tape measure
- Weighing scale
- Dynamometer
- 3 objects.

STEPS:
1. Predict the power of the force needed to move the objects. Write a number from 1 to 3 (from the bigger force to the smaller force).
2. Measure the objects with a weighing scale and record it in your data table.
3. Put a tape measure on the floor and measure 100 cm in straight line.
4. Attach the object to the dynamometer and pull it along a distance of 100 cm and record the result in your data table.
5. Write your conclusion about the experiment.
6. Share and check the results with all the class.

<table>
<thead>
<tr>
<th>Objects</th>
<th>PREDICTION</th>
<th>MASS</th>
<th>FORCE NEWTONS</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

I think that object 1 will need more force than object to be moved.
The mass of object 2 needs more force than object 3.
I don’t think so.
We/I agree with……

Write your CONCLUSIONS

If the mass of an object is bigger/smaller, the force needed to move it is bigger/smaller.

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Find the answers to these questions.

Why is this apple falling?
- A. It’s changing shape.
- B. Because of a push.
- C. Because of gravity.

Why does the scooter stop?
- D. Because of magnetism.
- E. Because of weight.
- F. Because of friction.

What is happening with this can?

Why is this ball flying?

Why is iron attracted to this material?

Why is the blue ball down on the see saw?

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Put the labels in the correct place.
Running dictation. Find the missing words and match the name with its definition.

<table>
<thead>
<tr>
<th>Force</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gravity</td>
<td>Force of _______ or _______ acting between ferromagnetic materials like iron.</td>
</tr>
<tr>
<td>Push</td>
<td>It is a force that pulls all objects towards the center of _________</td>
</tr>
<tr>
<td>Friction</td>
<td>The _________ of one object against another produces in moving objects go slowly.</td>
</tr>
<tr>
<td>Force</td>
<td>It is any influence that causes a free body to undergo a change in ______, a change in ________, or a change in ________</td>
</tr>
<tr>
<td>Contact Forces</td>
<td>It is a force that can move something______ _____somebody/something.</td>
</tr>
<tr>
<td>Magnetism</td>
<td>It is a force that can move something_________ somebody/something.</td>
</tr>
<tr>
<td>Non-Contact Forces</td>
<td>It is a force applied to an object by another body that is ____________ with it.</td>
</tr>
<tr>
<td>Pull</td>
<td>It is a force that acts at the__________ between two objects.</td>
</tr>
</tbody>
</table>