Sequence 11: Mechanical energy

** Fiche de synthèse mobilisée** (collection en français) :

* Fiche n°11 : énergie mécanique

** Sommaire des activités ETLV** :

* ACTIVITY 1: Energy in a fun ride
* ACTIVITY 2: Using energy to solve a problem

ACTIVITY 1: Energy in a fun ride

**Objective**: to learn about mechanical, kinetic, and potential energy.

nding how DNA strands stick together

car

**DOCUMENT 1: The roller coaster**

In this document we have simplified the trajectory of a car on a roller coaster. Its mass is tons. Let’s suppose its movement starts on point A where it slides down a slope until point B. Then, the car enters a loop where it can turn upside down a series of time.

 Une image contenant ciel, extérieur, herbe, montagnes russes

Description générée automatiquement

**Source: Wikimedia commons, rollercoaster dragon khan universal Port Aventura Spain**

**DOCUMENT 2: Gravity constant**

We will be able to use the gravity constant

t in s

t in s

t in s

Diagram N°4

t in s

Diagram N°3

Diagram N°2

Diagram N°1

**DOCUMENT 3: Energy and force diagrams**





A computational simulation of the trajectory of a car is carried out. In these diagrams, the kinetic energy , the potential energy , the mechanical energy of the car, as well as the normal force of the rails are represented.

**DOCUMENT 4: The normal force**

In mechanics, the normal force is the component of a contact force that is perpendicular to the surface that an object contacts. In this instance normal is used in the geometric sense and means perpendicular, as opposed to the common language use of normal meaning "ordinary" or "expected". A person standing still on a platform is acted upon by gravity, which would pull them down towards the Earth's core unless there were a countervailing force from the resistance of the platform's molecules, a force which is named the "normal force".

Une image contenant texte, écran

Description générée automatiquement **Source: Wikipedia and Wikimedia commons**

### Understanding:

Identify each diagram in document 3 and explain your reasoning.

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Is friction considered in the simulation? Explain.

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### Understanding:

Give a list of the words and expressions in the previous documents that you are not familiar with:

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Fill in the table below:

|  |  |
| --- | --- |
| **English** | **French** |
|  | énergie mécanique |
|  | énergie potentielle |
|  | énergie cinétique |
|  | réaction normale au support |
|  | les frottements |
|  | la hauteur |
|  | la vitesse |
|  | le chariot |
|  | le chariot |

ACTIVITY 2: Using energy to solve a problem

**Objective**: to use the different forms of energy to solve a problem

nding how DNA strands stick together

### Analyzing:

Using document 3, compute the initial height of the car.

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Compute the initial velocity of the car.

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Again, using document 3, compute the maximum velocity reached by the car in this simulation.

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### Problem:

What would be the maximum velocity reached by the car if friction was neglected?

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Activity summary

What you must remember:

**- mechanical, potential, kinetic energies**

**- velocity**

**- height**

**- friction**

Skills linked to the curriculum**:**

|  |  |  |
| --- | --- | --- |
| **Compétences** | **Capacités à maîtriser** | **Où dans cette séquence ?** |
| **APP** | * Utiliser du vocabulaire spécifique | Activité 1 |
| * Lire et comprendre des documents scientifiques | Activité 1 |
| **ANA** | * Citer et exploiter la relation définissant l’énergie potentielle de pesanteur. * Citer et exploiter la relation définissant l’énergie mécanique. * Exploiter la conservation de l’énergie mécanique. * Analyser les transferts énergétiques au cours du mouvement d’un point matériel. * Associer une variation d’énergie mécanique au travail des forces de frottement. * Exploiter des documents pour estimer l’énergie stockée dans un réservoir d’énergie mécanique. | Activité 1  Activité 1  Activités 1 et 2  Activité 1  Activités 1 et 2 |