



WOJEWÓDZTWO
KUJAWSKO-POMORSKIE

Kujawsko-Pomorskie
Centrum Edukacji
Nauczycieli
w Toruniu



Mobilne pracownie dydaktyczne

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e-Usługi - e-Organizacja

pakiet rozwiązań informatycznych dla jednostek organizacyjnych
województwa kujawsko-pomorskiego

e-Kultura e-Zdrowie e-Edukacja

Czym jest projekt

Mobilne pracownie dydaktyczne?

- Urząd Marszałkowski zakupił 15 mobilnych i 3 stacjonarne pracownie (zestawy czujników Pasco) do nauczania przedmiotów przyrodniczych, przekazał je oddziałom KPCEN
- Pracownie stacjonarne: do szkoleń n-li w zakresie użytkowania sprzętu oraz organizowania pokazów dla uczniów w ramach lekcji



NARODOWA
STRATEGIA SPÓJNOŚCI
dla rozwoju Polski



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Mój region w Europie

Pracownie mobilne

- Udostępnione szkołom - nowoczesna edukacja podczas lekcji chemii, biologii, fizyki, geografii, przyrody
- Doświadczenia m.in. w zakresie pomiaru natężenia prądu, siły, ciśnienia gazu, poziomu pH i zasolenia cieczy, zmian temperatury w pomieszczeniu i w terenie



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dla rozwoju Polski



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KUJAWSKO-POMORSKIE

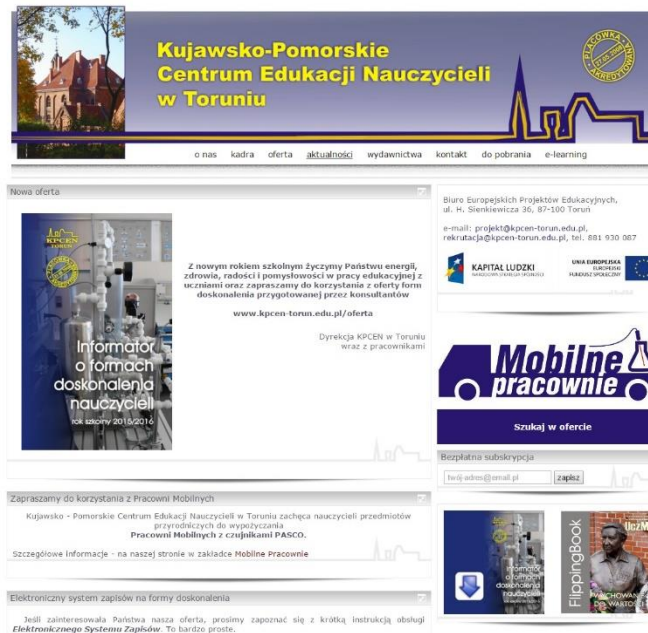
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Pierwsze źródło informacji

- Strona internetowa KPCEN Toruń – zakładka [Mobilne pracownie](#)



The screenshot displays the website of the Kujawsko-Pomorskie Centre for Teacher Education in Toruń. The header features the organization's name and a logo. A navigation menu includes links for 'o nas', 'kadra', 'oferta', 'aktualności', 'wydawnictwa', 'kontakt', 'do pobrania', and 'e-learning'. The main content area is titled 'Nowa oferta' and features a large graphic for 'Informator o formach doskonalenia nauczycieli' (Information on teacher development forms) for the 2015-2016 school year. Text on the page mentions a new school year offering energy, health, and joy in educational work, along with a free subscription to 'Mobilne Pracownie' (Mobile Workshops). A search bar and a 'zapisać' (save) button are also visible.

Główne elementy i zasady pracy

- Komputer (lub laptop; ewent. tablet, smartfon) wyposażony w program (aplikację) SPARKvue do zbierania i analizy danych
- Interfejs do podłączenia wybranych czujników (jest też mobilne „centrum naukowe” SLS)
- Czujnik/-i do odpowiednich pomiarów



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SPARKvue – program obsługujący

Najważniejsze przyciski

Przycisk	Nazwa	Funkcja
	Ekran główny	Wróć do Ekranu głównego
	Narzędzia urządzenia	Otwórz ekran narzędzi urządzenia
	Współdzielenie	Otwórz ekran współdzielenia
	Pomoc	Otwórz Przewodnik użytkownika
	Zrzut ekranu	Zapisz stronę SPARKlabu jako obraz
	Dziennik	Otwórz dziennik
	Nawigacja stron	Przeglądaj strony SPARKlabu
	Nowa strona	Stwórz nową stronę SPARKlabu
	Usuń stronę	Usuń stronę SPARKlabu
	Start	Rozpocznij zbieranie danych
	Stop	Zakończ zbieranie danych
	Zachowaj	Zapisz pojedynczą wartość każdego pomiaru
	Stop	Zakończ ręczne próbkowanie danych
	Narzędzia doświadczenia	Otwórz ekran narzędzi doświadczenia
	Opcje próbkowania	Zmień opcje próbkowania



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**WOJEWÓDZTWO
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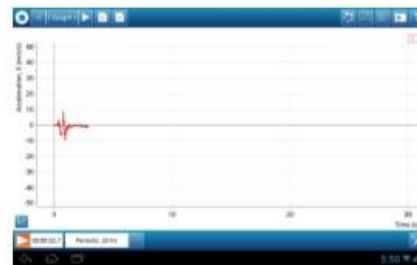
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SPARKvue – zbieranie danych


Kliknij  by wyświetlić dane w innym formacie.



Zbieranie danych

Naciśnięcie  rozpoczyna zbieranie danych.

Naciśnięcie  kończy zbieranie danych.

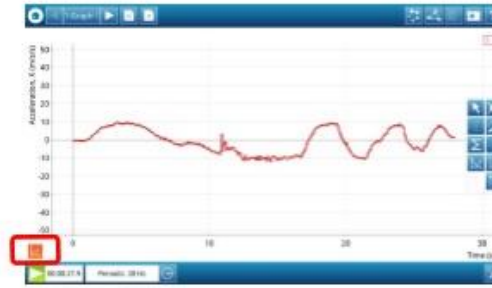
Naciśnięcie  wyświetli więcej opcji zbierania danych.



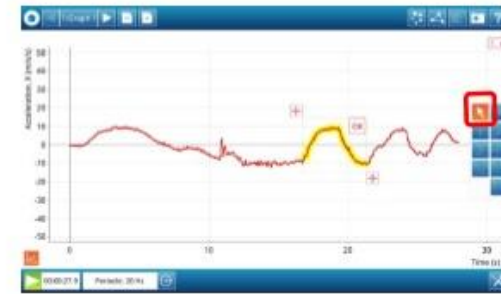
Analiza danych



Otwiera paletę Narzędzia wykresu.



Służy do zaznaczania części danych.



Naciśnięcie



dopasowuje wybraną część próby do

krzywej.



Zapisywanie i współdzielenie danych

Naciśnij




, aby zapisać lub udostępnić SPARKlab.

Wybierz Zapisz plik, aby zapisać otwarty SPARKlab w wybranej lokalizacji.

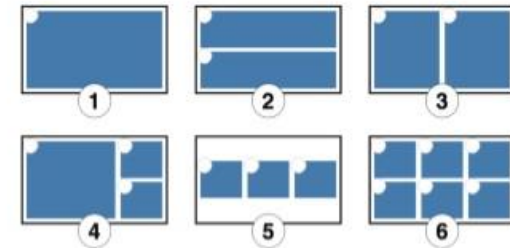


Tworzenie nowego SPARKlabu


Kliknij  na Ekranie głównym, aby stworzyć nową stronę SPARKlabu.



Podczas dodawania elementów do strony SPARKlabu, możesz wybrać jej układ.



Otwieranie utworzonego SPARKlabu


Naciśnij , aby otworzyć doświadczenie lub wcześniej zapisany plik.



OK



Narzędzia urzędzenia

Naciśnij , aby otworzyć stronę Narzędzia urzędzenia.



Czym jest SPARKlab?



- A modern approach to science activities
- Integrate content and data analysis
- Or use our tools to easily create your own!

What is a SPARKlab? It is a discovery-based, interactive lab activity that combines content with data collection and analysis. Students remain engaged because everything takes place in one cohesive learning environment.

A SPARKlab can be as simple as a page or two of teacher created images, text and custom displays for the data or as robust as fully formed offerings from PASCO and partners such as Sally Ride Science and Horizon.

Every SPARKvue license and each SPARK Science Learning System ships with an initial library of over 60 SPARKlabs in the areas of Biology, Chemistry, Earth Science and Physics as well as SPARKlabs designed specifically for Middle and Elementary school students.

To access the SPARKlab Online Library, click on the **subject areas below**.

SPARKlabs

There are complete SPARKlab series created within our education partnerships, including:

- [Sally Ride Science's Key Concepts in Earth, Life and Physical Science](#)
- [Sally Ride Science's Our Changing Climate](#)
- [Sally Ride Science's Earth's Precious Resources](#)
- [Horizon Renewable Energy](#)

About SPARKlabs

- About SPARKlabs
- Biology
- Chemistry
- Elementary
- Environmental and Earth Science
- Middle School
- Physical Science
- Physics

About SPARKlabs

Background | Accessing Your Subscription | Authoring Resources and Videos | Screenshots

Analysis: Melting Ice

How did your prediction compare to the graph?
What was unusual about the melting curve of the ice water?

My data has a horizontal section. I added energy and the temperature did not change until all the ice was melted.

00:00:00 Periodic

00:00:00 Periodic

Video

[Introduction to SPARKlabs \(10:28\)](#)

SPARKlabs are complete science activities designed for use with the SPARKvue software, whether it is on a PC, Mac, interactive whiteboard, one-to-one computing solution such as Classmate PCs or our standalone device - the SPARK Science Learning System. And with the New SPARKvue App there will even be SPARKlabs available for the iPad, Kindle Fire, and Amazon Fire Phone.

Przykładowy SPARKlab: przyspieszenie

Acceleration

Self-Check

1. When a car's acceleration is negative but its velocity is positive, the car is:
 - a) slowing down
 - b) speeding up
 - c) maintaining constant speed
 - d) undefinable

SNAPSHOT

The best choice is a).

Snap 1 - PAGE 7

February 10, 2000 05:42

Acceleration

Self-Check

2. Does a cart rolling freely up and then back down an inclined track illustrate constant acceleration? Justify your answer.

SNAPSHOT

Yes, because the acceleration is caused by gravity and gravity is constant.

Snap 2 - PAGE 8

February 10, 2000 05:47 PM

Sequencing Challenge

A. Repeat data collection, this time pushing the cart up the inclined track toward the motion sensor.

B. Determine the cart's acceleration from each trial using the slope of the graphed data.

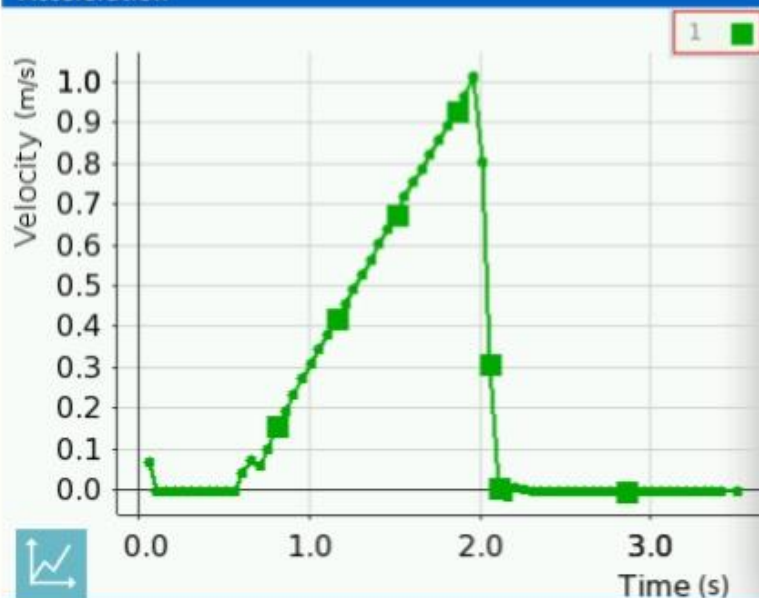
C. Release the cart from the elevated end of the track to produce a velocity versus time graph.

D. Assemble the inclined track with the end stop at one end and the motion sensor at the opposite end.



The steps to the left are part of the procedure for this lab activity. They are not in the right order. Determine the correct sequence of the steps, then take a snapshot of this page.

SNAPSHOT

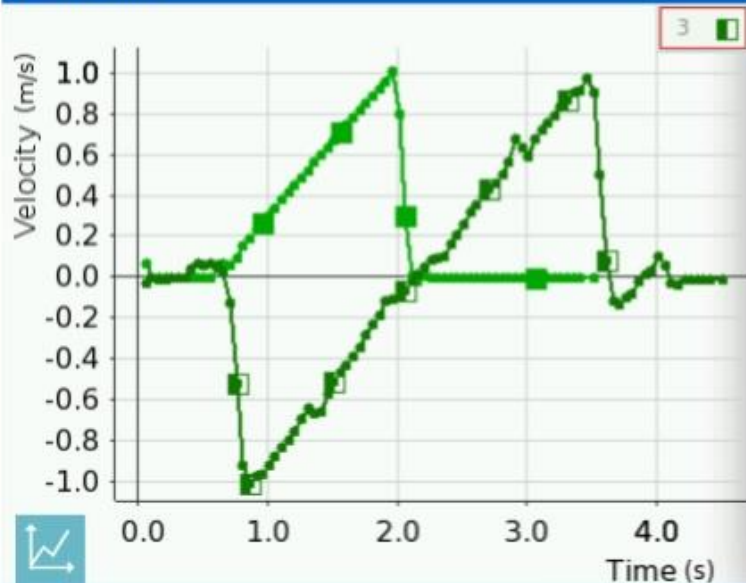
The correct sequence of steps is D, C, A, B.





Collect Data

1. Set the cart at the top of the inclined end of the track holding it ~15 cm from the Motion Sensor.
2. Tap  to begin data collection.
3. Release the cart allowing it to roll down the track.
4. Catch the cart at the bottom of the inclined track just before it hits the end stop.
5. Tap  to stop data collection.

Acceleration



Collect Data

6. Set the cart at the bottom of the inclined track against the end stop.
7. Tap  to begin data collection
8. Using your hand, push the cart up the inclined track (avoid hitting the motion sensor) allowing it to roll back down.
9. Again, catch the cart just before it hits the end stop.
10. Tap  to stop data collection.

Acceleration

Analysis

1. During the period when the cart was in motion, are the velocity versus time graphs straight lines? Refer to the previous page if necessary. How is the acceleration of the cart changing if your velocity versus time graphs are straight lines?

SNAPSHOT

Are the graphs straight lines? Yes, they are straight lines.

The acceleration is constant if the velocity versus time graph is a straight line.

Acceleration

Analysis

2. Although the paths of the cart in both trials were different, the slopes of the velocity versus time graphs for each trial are the same (during the period in which the cart was in motion). Why is this the case? Justify your answer.

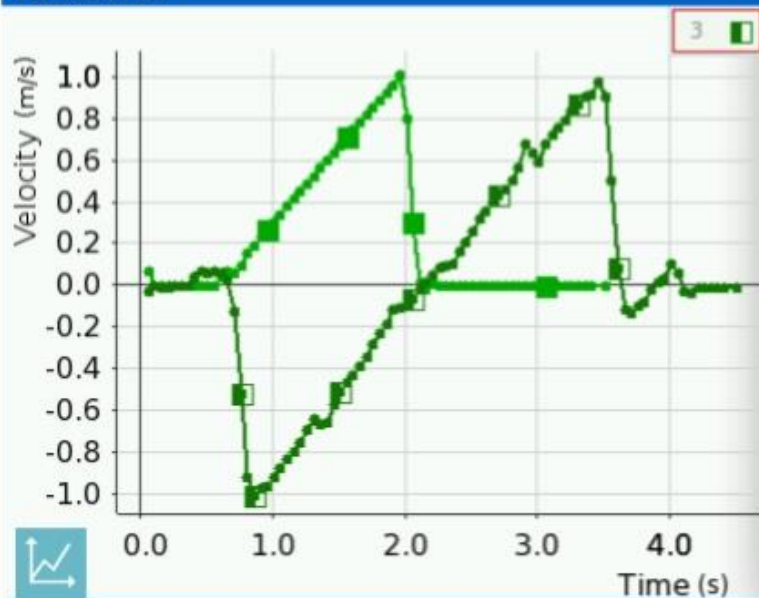
SNAPSHOT

The slopes are the same because the cart is subject to the same acceleration in both trials.

Snap 7 - PAGE 15

February 10, 2000 05:59 PM

Acceleration



Analysis

3. Looking at the velocity versus time graph, what would a negative slope tell you about the cart's acceleration? A positive slope?

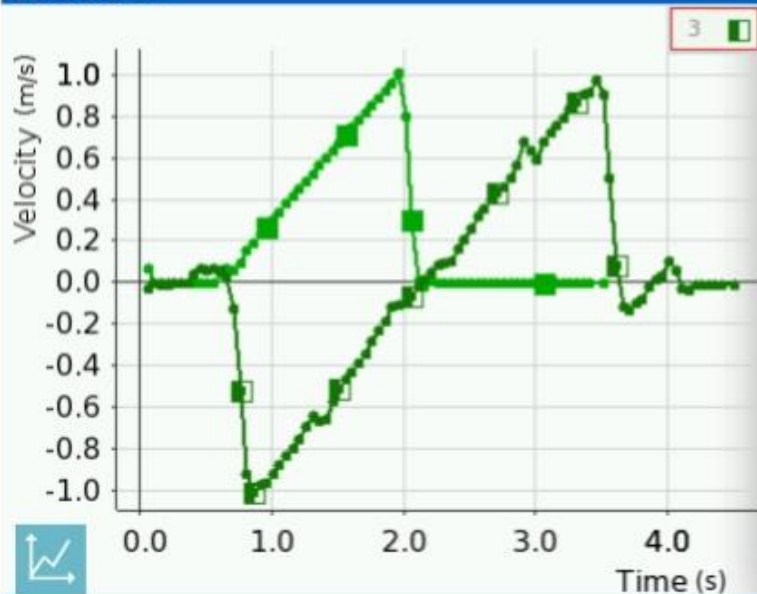
SNAPSHOT

A negative slope tells us that the acceleration is negative.
A positive slope tells us that the acceleration is positive.

Snap 8 - PAGE 16

February 10, 2000 06:00 PM

Acceleration



Analysis

4. What was causing the cart to accelerate after releasing it from rest at the top of the track? Was that acceleration constant?

SNAPSHOT

The acceleration was due to gravity which is constant.

Acceleration

Analysis

5. Describe the motion of an object whose velocity versus time graph is a horizontal straight line (a slope of zero).

SNAPSHOT

The motion is constant. Constant velocity in a constant direction. No acceleration

Acceleration

Synthesis

1. The term "acceleration" is used in our everyday lives and language, but is often used in a non-physical context. Now that you have developed a physical definition of "acceleration" give an example where the physical definition matches the "everyday" definition. Give an example where they are different.

SNAPSHOT

An example where the definitions are similar is how a car accelerates. The car experiences a change in velocity due to acceleration.

An example of where the definitions are different is when a doctor describes an accelerated heart rate of a patient. Although the rate at which the heart is beating has increased the actual position of the heart has not changed, thus no real velocity and no acceleration.

Snap 11 - PAGE 19

August 12, 2009 3:33 PM

Acceleration

Synthesis

2. Modern aircraft carriers use a steam powered catapult system to launch jets from a very short range. These catapults can provide a constant acceleration to bring jets up to speed in only 2 seconds. If each jet requires a minimum take-off speed of 82.3 m/s, how much acceleration must the catapult supply so the jet can take off?



SNAPSHOT

The catapult must supply 41.15 m/s^2 .

Snap 12 - PAGE 20

August 12, 2009 3:34 PM

Acceleration

Synthesis

3. How many different devices in a car help to accelerate the vehicle?
What are they?

SNAPSHOT

3

These devices help to accelerate a vehicle...

Throttle.

Break.

Steering wheel.

Snap 13 - PAGE 21

August 12, 2009 3:34 PM

Acceleration

Multiple Choice Question

1. If the acceleration due to gravity is -9.8 m/s^2 , which of the following choices would best describe the acceleration of a 0.5 kg frictionless block sliding down the track used in our experiment?
- a) -3.5 m/s^2
 - b) 3.5 m/s^2
 - c) 0 m/s^2
 - d) Undefined



SNAPSHOT

The best choice is a)

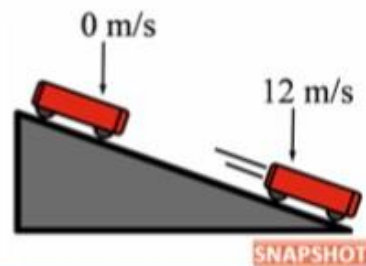
Snap 14 - PAGE 22

August 12, 2009 3:35 PM

Acceleration

Multiple Choice Question

2. A cart with an initial velocity of zero and a final velocity of 12 m/s after 2 s will have an acceleration of
- a) 4 m/s^2
 - b) 6 m/s^2
 - c) 8 m/s^2
 - d) 12 m/s^2



The best choice is b)

Acceleration

Multiple Choice Question

3. A race car starting from rest accelerates uniformly at a rate of 5 m/s^2 . What is the car's speed after it has traveled for 5 s?
- a) 5 m/s
 - b) 10 m/s
 - c) 20 m/s
 - d) 25 m/s



The best choice is d)

Czas na doświadczenia 😊