

Kerbal for teachers

Gianluigi Filippelli, Agatino Rifatto

Maker Faire, Roma, 18/10/2019



Marco Brusa, Eleonora Monge (Infini.to, Torino)

Sandro Bardelli (INAF-OAS, Bologna)

Agatino Rifatto (INAF-Capodimonte, Napoli)

Gianluigi Filippelli, Stefano Sandrelli

(INAF-Brera, Milano)



MINISTERO DELL'ISTRUZIONE, DELL'UNIVERSITÀ E DELLA RICERCA

Dalla Russia con amore

PHYSICAL REVIEW PHYSICS EDUCATION RESEARCH 14, 010140 (2018)

II. CONCEPTUAL FRAMEWORK

Because play has been a topic of interest to educational researchers and cognitive psychologists since at least 1933,¹ the positive aspects of games on learning are well established in the literature. Researchers have more ~~recently identified how video games can influence positively~~.

¹ 1933 is the original publication year of Vygotsky's *Play and Its Role in the Mental Development of the Child* in Russian. It was translated into English in 1967.

setting through nonplayer characters and built-in minigames. Based on prior research on the potential benefits of video games for use in education, we expect that topics covered in the minigames, the most gamified aspects of the course, should be particularly effective. Using data collected through pre- and post-testing of two sections of ASTRO 001V (the designation given in Penn State's course catalog) with the Test Of Astronomy Standards, we focused our analysis on six questions that pertain directly to minigame topics. We found that two of these questions showed encouraging gains, while the other four demonstrated that students continued to hold on to common alternate conceptions within those topic areas. This finding suggests that more work is required to understand how to improve the games in ways that will further support student astronomy learning.

Videogiochi nella didattica della fisica

- 1975: *lunar landing* di **Steve Derenzo e Noah Sherman**

Videogiochi nella didattica della fisica

- 1975: *lunar landing* di **Steve Derenzo e Noah Sherman**
 - moto uniformemente accelerato

Videogiochi nella didattica della fisica

- Digitale

Videogiochi nella didattica della fisica

- Digitale
- Simulazione

Videogiochi nella didattica della fisica

- Digitale
- Simulazione
- Interattivo

Videogiochi nella didattica della fisica

- Digitale
- Simulazione
- Interattivo
- *Feedback* immediato

Approccio al gioco didattico

● *Gamification*

Approccio al gioco didattico

- *Gamification*
 - *gamified quiz*

Approccio al gioco didattico

- *Gamification*
 - *gamified quiz*
- Giochi didattici

Approccio al gioco didattico

- *Gamification*
 - *gamified quiz*
- Giochi didattici
- Giochi commerciali

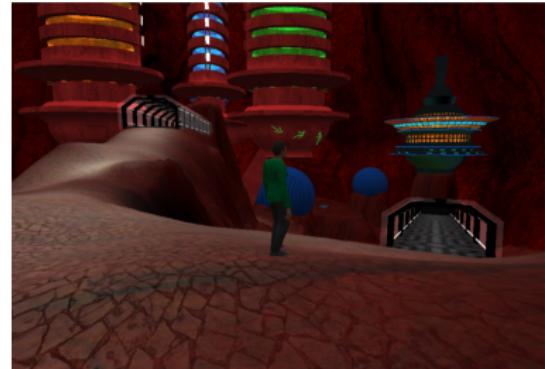
Giochi didattici

Giochi realizzati con uno scopo didattico

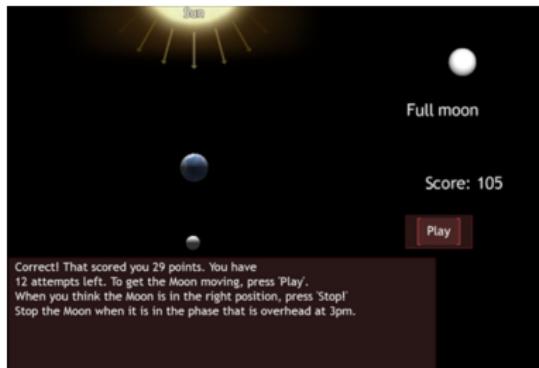
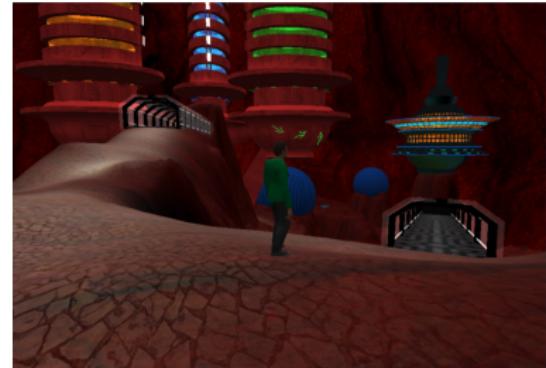
Giochi didattici



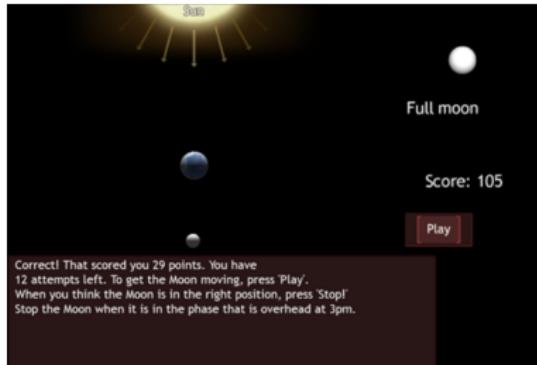
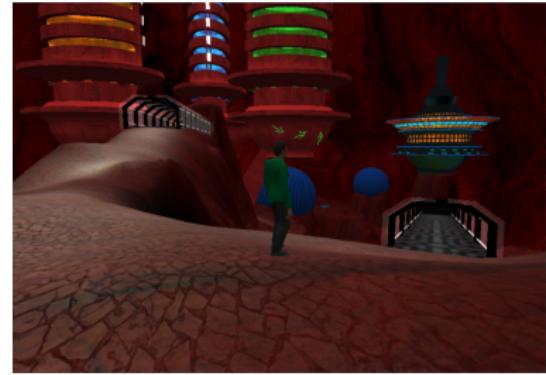
Giochi didattici



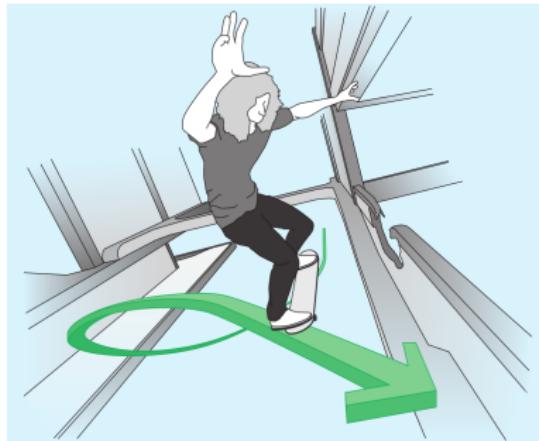
Giochi didattici



Giochi didattici

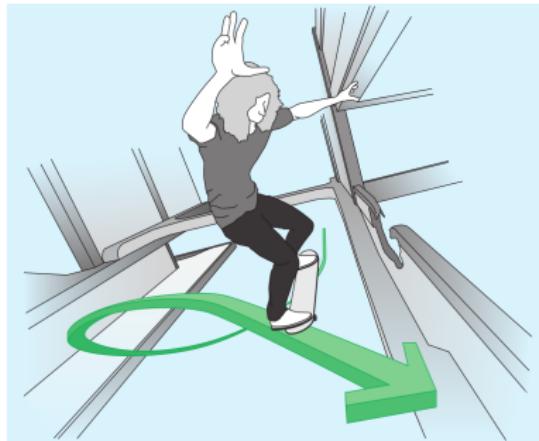


Giochi commerciali



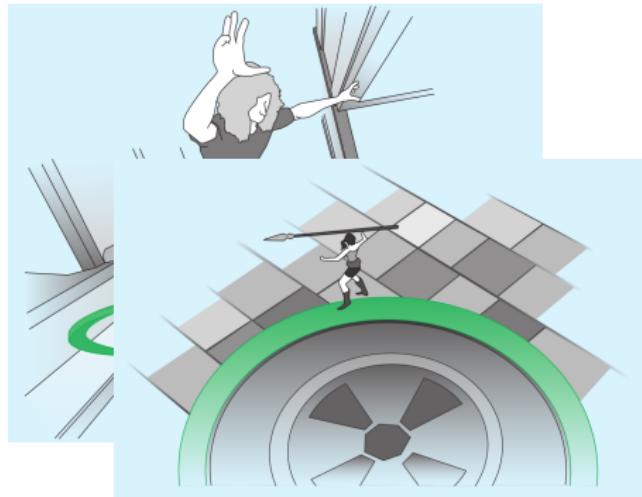
Shaun White Skateboarding

Giochi commerciali



Shaun White Skateboarding
sistemi di coordinate

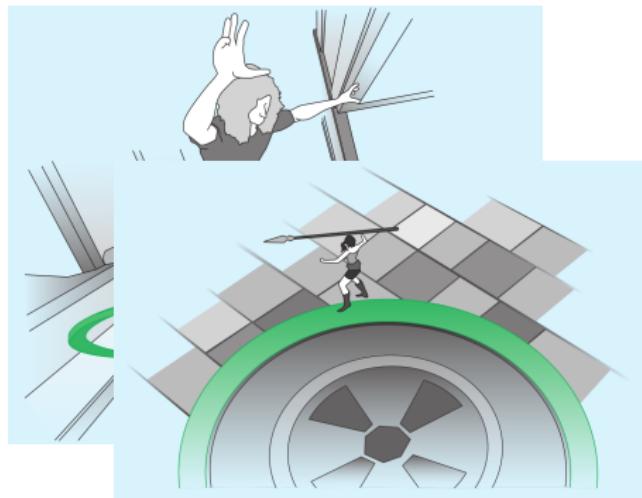
Giochi commerciali



Shaun White Skateboarding sistemi di coordinate

Guardian of Light

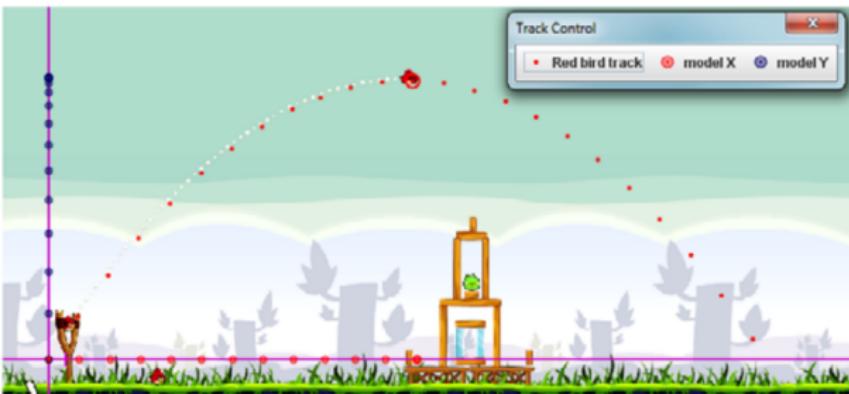
Giochi commerciali



Shaun White Skateboarding sistemi di coordinate

Guardian of Light

Giochi commerciali: Angry Birds



Giochi commerciali: Angry Birds



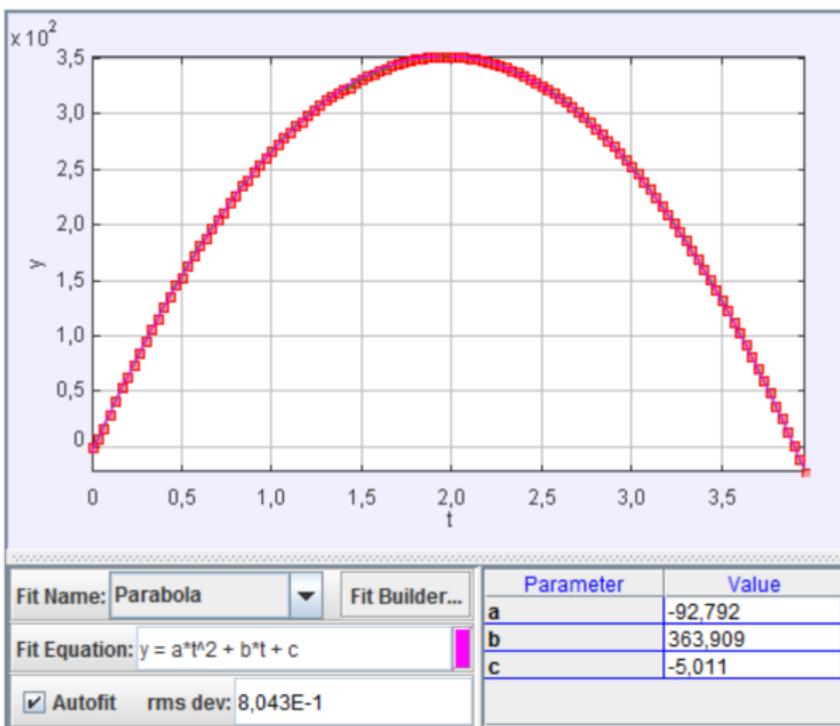
- *Software* di cattura video

Giochi commerciali: Angry Birds



- *Software* di cattura video
- *Tracker*

Giochi commerciali: Angry Birds



Le domande della D&D

- Come: supporto, *format*, organizzazione

Le domande della D&D

- Come: supporto, *format*, organizzazione
- Dove: *location* (scuola, extrascolastico), mezzo

Le domande della D&D

- Come: supporto, *format*, organizzazione
- Dove: *location* (scuola, extrascolastico), mezzo
- Quando

Le domande della D&D

- Come: supporto, *format*, organizzazione
- Dove: *location* (scuola, extrascolastico), mezzo
- Quando
- A chi: studenti, insegnanti, pubblico generico

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- Come: supporto, *format*, organizzazione
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- Quale messaggio: divulgazione, motivazione, didattica

Le domande della D&D

- Come: supporto, *format*, organizzazione
- Dove: *location* (scuola, extrascolastico), mezzo
- Quando
- A chi: studenti, insegnanti, pubblico generico
- Quale messaggio: divulgazione, motivazione, didattica
- Coinvolgere

La scelta del gioco: *Galacticraft*



La scelta del gioco: *Universe Sandbox*



La scelta del gioco: i criteri

● Parallasse

La scelta del gioco: i criteri

- Parallasse
- Nessuna violenza

La scelta del gioco: i criteri

- Parallasse
- Nessuna violenza
- Non troppo facile

La scelta del gioco: i criteri

- Parallasse
- Nessuna violenza
- Non troppo facile
- *Educational*

La scelta del gioco: i criteri

- Parallasse
- Nessuna violenza
- Non troppo facile
- *Educational*
- *Open world*

La scelta del gioco: *Kerbal Space Program*



Verso Kerbin



Verso Kerbin



Verso Kerbin



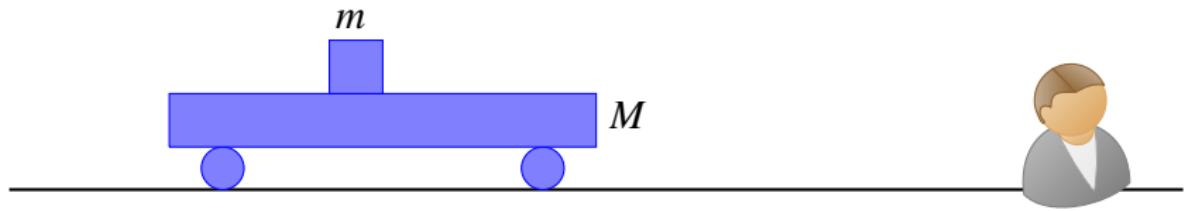
Verso Kerbin



Verso Kerbin

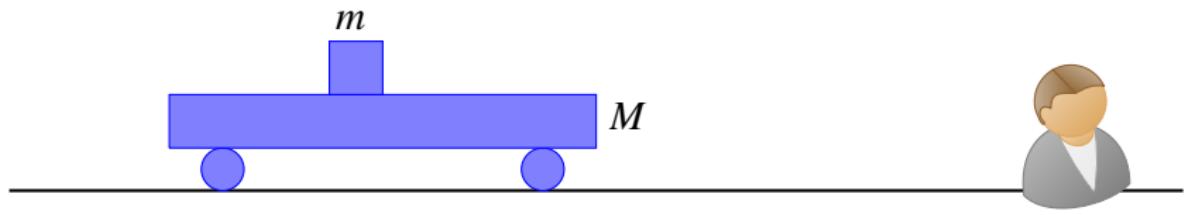


Muovere un carrellino



Bob sul marciapiede

Muovere un carrellino

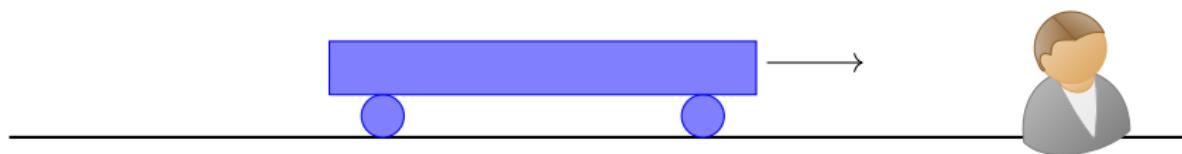


Bob sul marciapiede

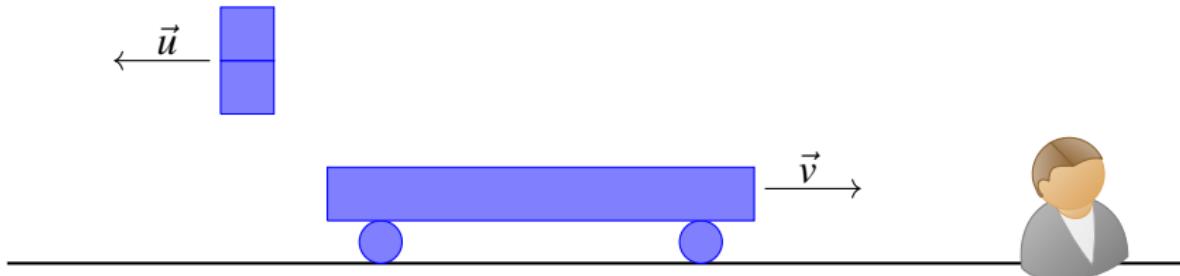
\vec{u} = velocità relativa tra m e M



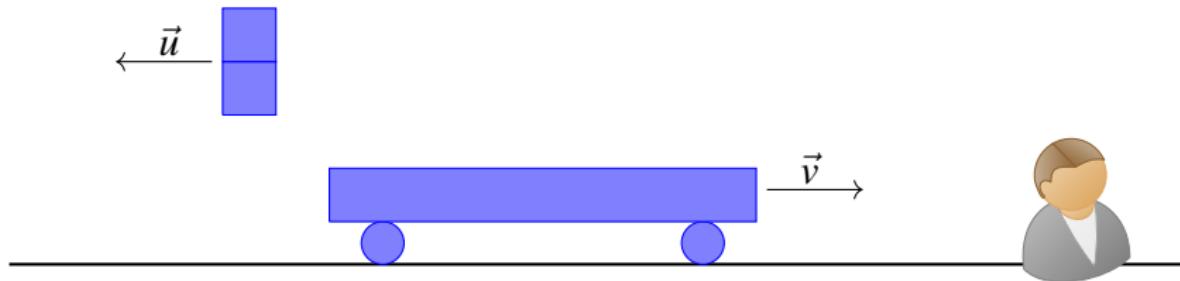
\vec{v} = velocità di M
rispetto a Bob



Aumentiamo i blocchetti

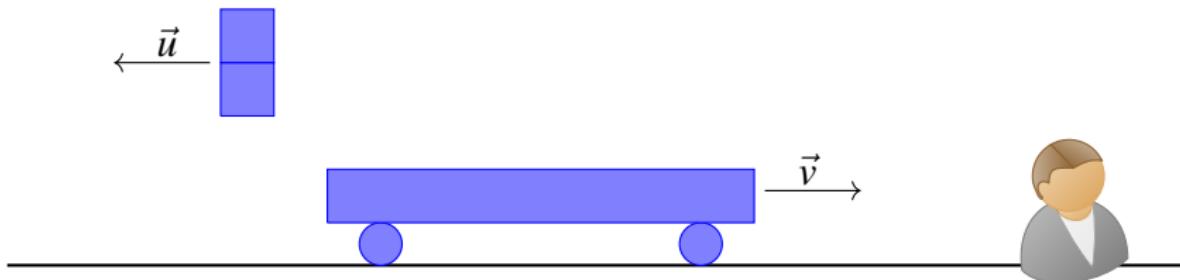


Aumentiamo i blocchetti



$$\vec{v}_{2b} = \frac{2m\vec{u}}{M+2m}$$

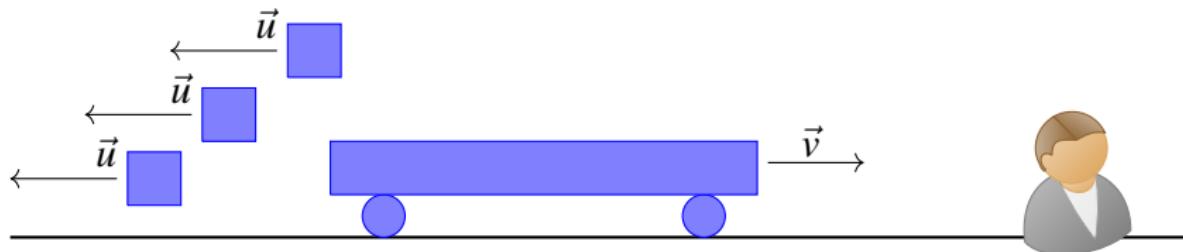
Aumentiamo i blocchetti



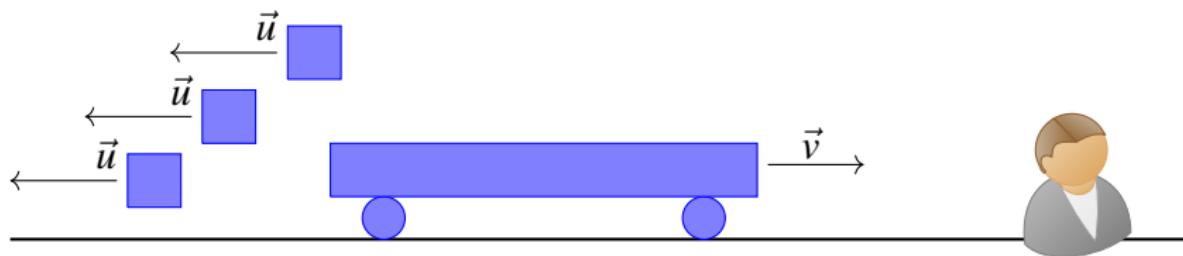
$$\vec{v}_{2b} = \frac{2m\vec{u}}{M+2m}$$

$$\vec{v}_{Nb} = \frac{Nm\vec{u}}{M+Nm}$$

Aumentiamo i blocchetti

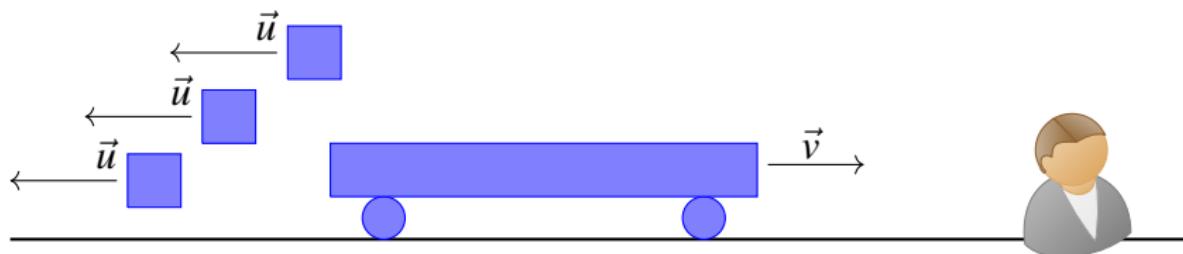


Aumentiamo i blocchetti



$$\vec{v}_3 = \frac{m\vec{u}}{M+3m} + \frac{m\vec{u}}{M+2m} + \frac{m\vec{u}}{M+m}$$

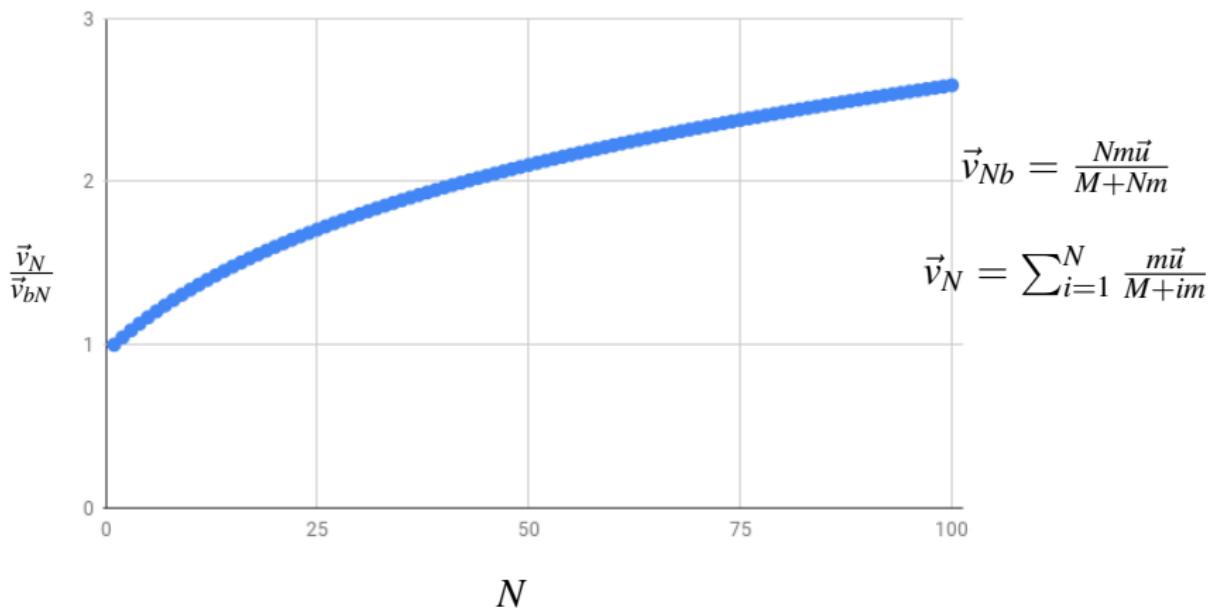
Aumentiamo i blocchetti



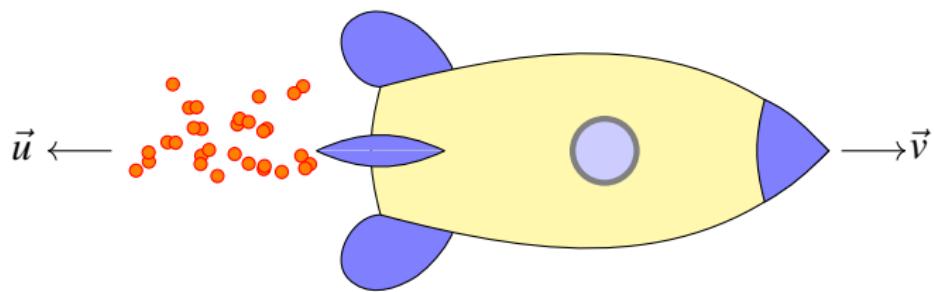
$$\vec{v}_3 = \frac{m\vec{u}}{M+3m} + \frac{m\vec{u}}{M+2m} + \frac{m\vec{u}}{M+m}$$

$$\vec{v}_N = \sum_{i=1}^N \frac{m\vec{u}}{M+im}$$

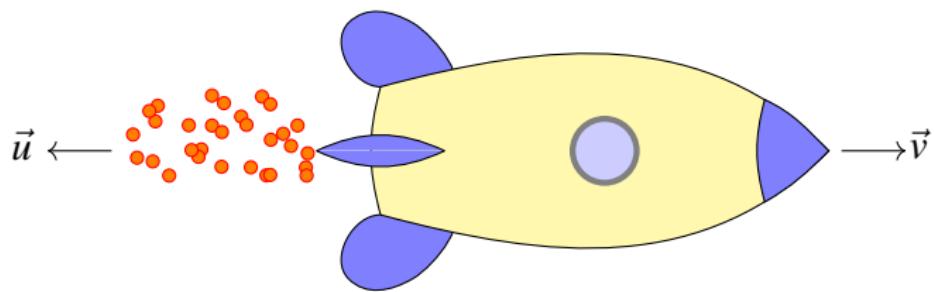
Confrontiamo i due metodi



L'equazione del razzo

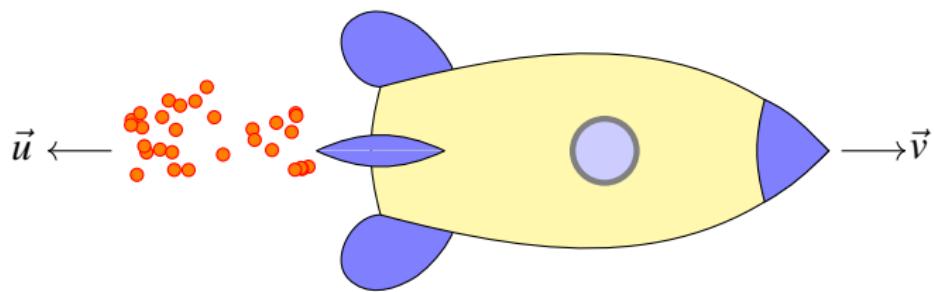


L'equazione del razzo



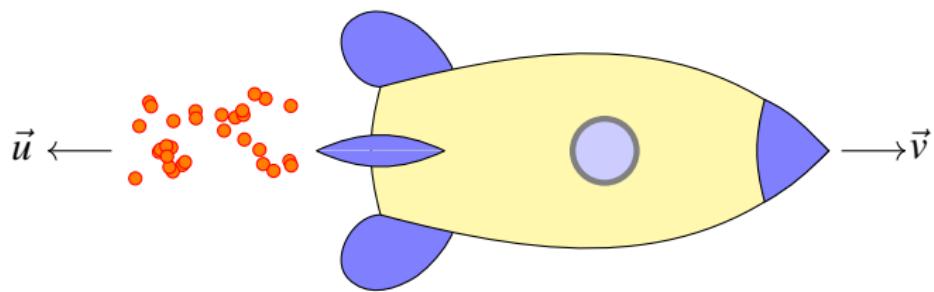
$$F = \frac{\Delta(mv)}{\Delta t}$$

L'equazione del razzo



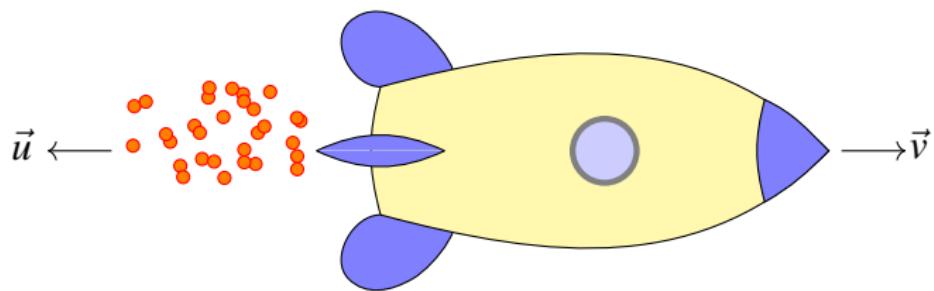
$$m \frac{\Delta \vec{v}}{\Delta t}$$

L'equazione del razzo



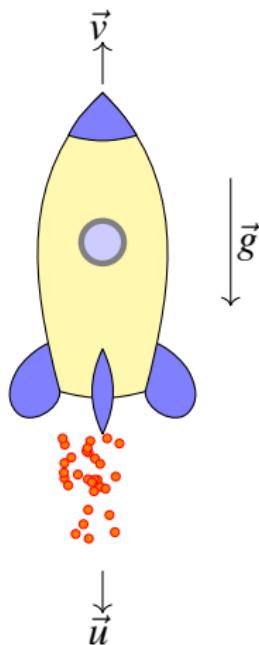
$$m \frac{\Delta \vec{v}}{\Delta t} = \vec{F}_{\text{ext}}$$

L'equazione del razzo



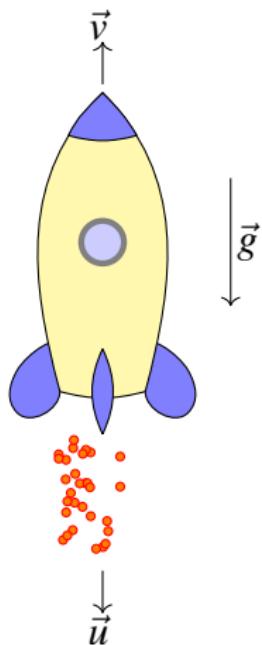
$$m \frac{\Delta \vec{v}}{\Delta t} = \vec{F}_{\text{ext}} + \vec{u} \frac{\Delta m}{\Delta t}$$

L'equazione del razzo



$$m \frac{\Delta v}{\Delta t} = -mg - u \frac{\Delta m}{\Delta t}$$

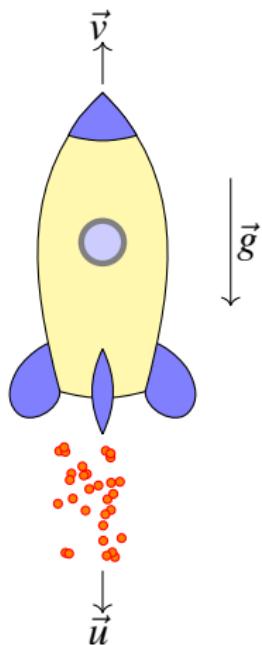
L'equazione del razzo



$$m \frac{\Delta v}{\Delta t} = -mg - u \frac{\Delta m}{\Delta t}$$

$$v = -u \ln \frac{m_i}{m_f} - gt$$

L'equazione del razzo

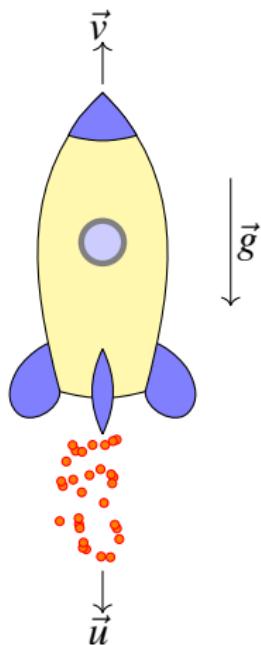


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Konstantin Ciolkovskij

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Konstantin Ciolkovskij

Per il principio di conservazione
della quantità di moto,

è possibile accelerare un corpo in una data direzione,
espellendo massa nella direzione opposta.

