

# Real life applications of everything that you have learned so far

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# Teaching is a habitual activity

One of the habits of mind that a physics teacher should strive to develop is “noticing physics everywhere”. A habit of practice that follows from noticing physics in an everyday phenomenon is capturing it and incorporating it into student learning. Today we will see an example of such noticing and incorporating.

To learn more about habits, read

Etkina, E., Gregorcic, B., & Vokos, S. (2017) Organizing physics teacher professional education around productive habit development: A way to meet reform challenges. *Physical Review, Physics Education Research*, 13, 010107.

Watch the following video and think of different ways we can use it to apply everything we learned so far in physics. In other words, what physics principles or ideas can be used to explain and analyze what is going on?

[https://www.youtube.com/watch?v=\\_sCp1igJ3j8](https://www.youtube.com/watch?v=_sCp1igJ3j8)

# Links.

The document with the problems that we will be working on today

<https://docs.google.com/document/d/1qjjZC9y9Ts8PE5HHMHCnle4s3cxJ8x7m/edit>

# Team 1 Finn's jump Kinematics

Sketch the graphs on the whiteboard and paste the screenshot here, then proceed answering the rest of the questions

# Team 1 Finn's jump Kinematics

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Running

$$\bar{a}_x = \frac{v_{fx} - v_{ix}}{t}$$
$$= \frac{4 \text{ m/s} - 0 \text{ m/s}}{2 \text{ s}}$$
$$= 2 \text{ m/s}^2$$

Jumping

$$\bar{a}_x = \frac{4 \text{ m/s} - 4 \text{ m/s}}{2.8 \text{ s} - 2.0 \text{ s}} = 0 \text{ m/s}^2$$
$$\bar{a}_y = \frac{-5.5 \text{ m/s} - 0 \text{ m/s}}{2.8 \text{ s} - 2.0 \text{ s}}$$
$$\bar{a}_y = -6.9 \text{ m/s}^2$$

0 m/s - 11.11

Who can see what you share here

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Aaron Ferreira

Kaitlyn Diver (she/her)

Sean Geary

Eugenia Etkina

# Team 1 Finn's jump Dynamics

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Share

a)  $(+)$   
Force\_Ground on Finn  
-  
Force\_Earth on Finn  
 $(-)$

b)  $(+)$   
F\_Ground on Finn  
y  
Force\_Ground on Finn  
x  
F\_Earth on Finn  
-

c)  $(+)$   
-  
Force\_Earth on Finn  
 $(-)$

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Aaron Ferreira

Kaitlyn Oliver (she/her)

Sean O'Leary

Allison Daubert (she/her) B...

# Team 1 Finn's jump Energy

Outline

Headings you add to the document will appear here.

a. Choose your system to be Finn, pier and Earth. Draw a work-energy bar chart using A as the initial and B as the final state and then another bar chart using B as the initial and C as the final state. Make sure that the bar charts are consistent with each other. Repeat for the system of Finn and Earth only. See the template below.

b. Let the system consist of Finn only. Draw x and y component momentum bar charts using A as the initial and B as the final state and then another set of momentum bar charts using B as the initial and C as the final state. Make sure that the bar charts are consistent with each other. The template is below.

$$p_{x,i} + j_{x,i} = p_{x,f}$$

Outline

Headings you add to the document will appear here.

a. Choose your system to be Finn, pier and Earth. Draw a work-energy bar chart using A as the initial and B as the final state and then another bar chart using B as the initial and C as the final state. Make sure that the bar charts are consistent with each other. Repeat for the system of Finn and Earth only. See the template below.

b. Let the system consist of Finn only. Draw x and y component momentum bar charts using B as the initial and C as the final state. Make sure that the bar charts are consistent with each other. The template is below.

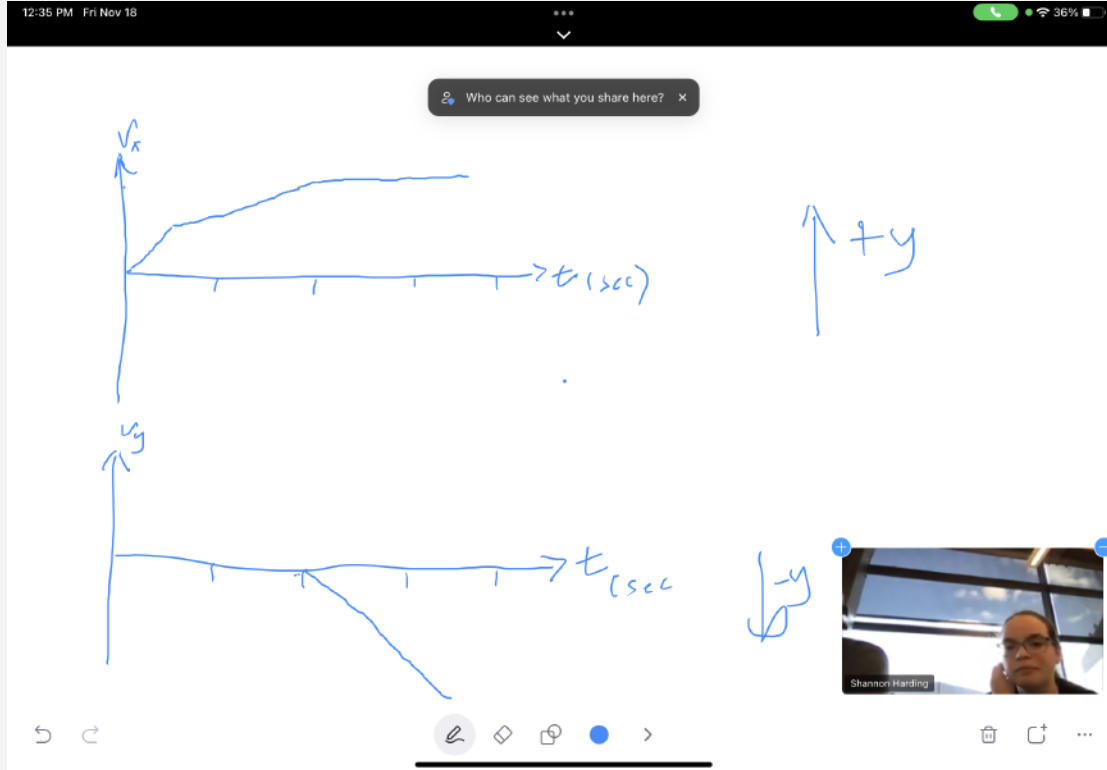
$$p_{x,i} + j_{x,i} = p_{x,f}$$



# Team 2 Finn's jump Kinematics

Sketch the graphs on the whiteboard and paste the screenshot here, then proceed answering the rest of the questions

# Team 2 Finn's jump Kinematics



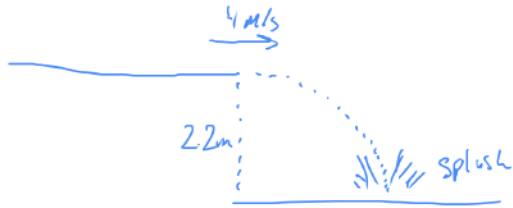
# Team 2 Finn's jump Kinematics

Docs 12:45 PM Fri Nov 18

...

34%

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$$V_{ix} = 4 \text{ m/s}$$

$$V_{iy} = 0$$

$$t = .8 \text{ sec}$$

$$V \cdot t = 3.2 \text{ m}$$

looks similarly to the  
video

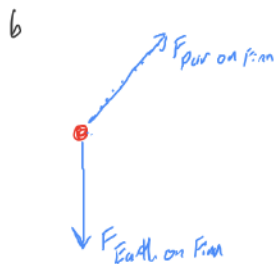
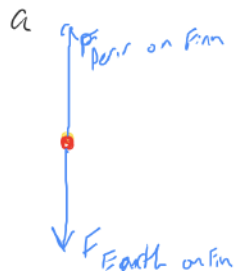
3.2 meters  
traveled after jumping off pier



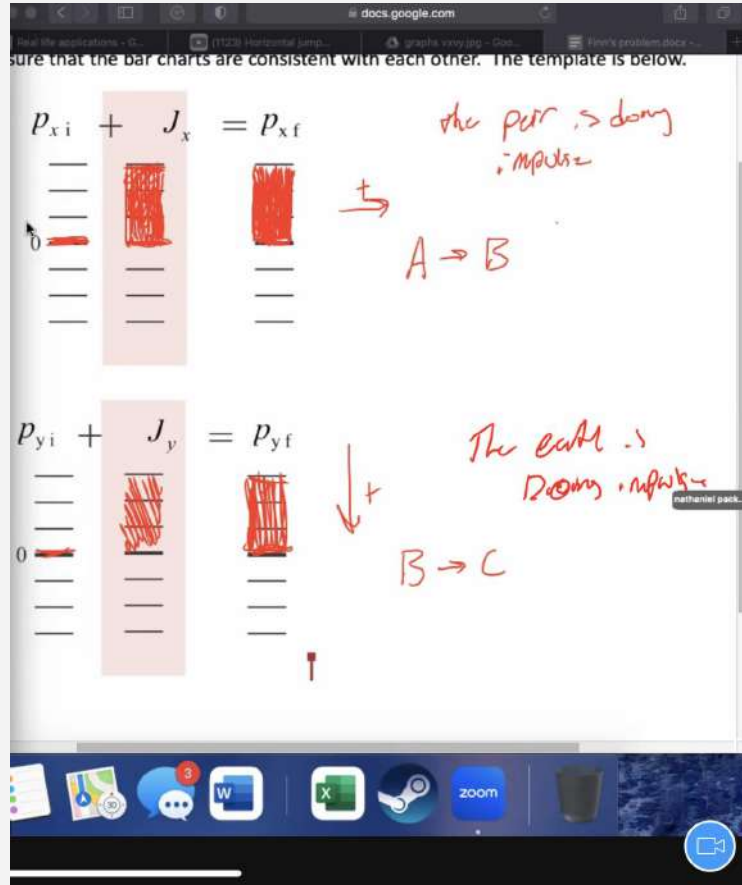
# Team 2 Finn's jump Dynamics

Eugenia Etkina left

Who can see what you share here? x



# Team 2 Finn's jump Momentum



What did you learn today? In what ways did today's lesson help you develop the habit of mind of seeing physics everywhere and a habit of practice of capturing this everyday physics and incorporating it into your students' learning?

Link to solutions

[https://docs.google.com/document/d/1mholURQIezZHB2qhStyOm9eBUpxgrK9C/  
edit](https://docs.google.com/document/d/1mholURQIezZHB2qhStyOm9eBUpxgrK9C/edit)