July 8, Week 6

Today: Chapter 10, Gravitational Potential Energy

Homework #6 due Friday at 1:00PM. Now available on webpage.

Gravitational Potential Energy

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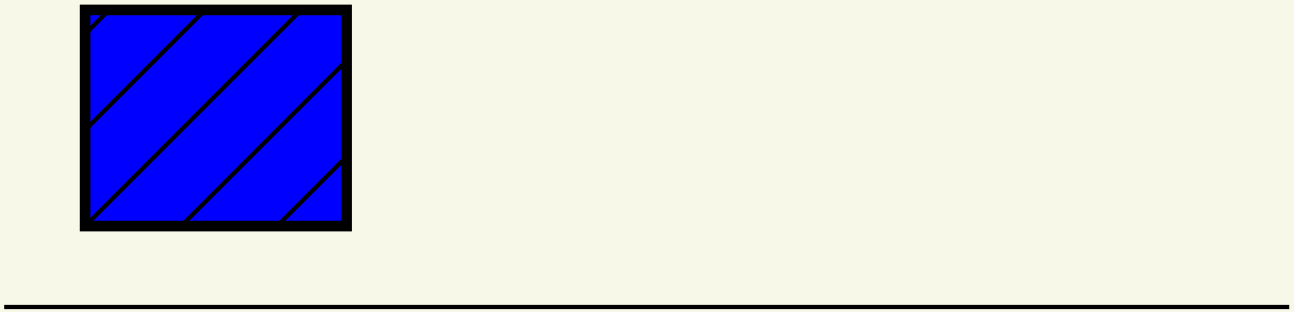

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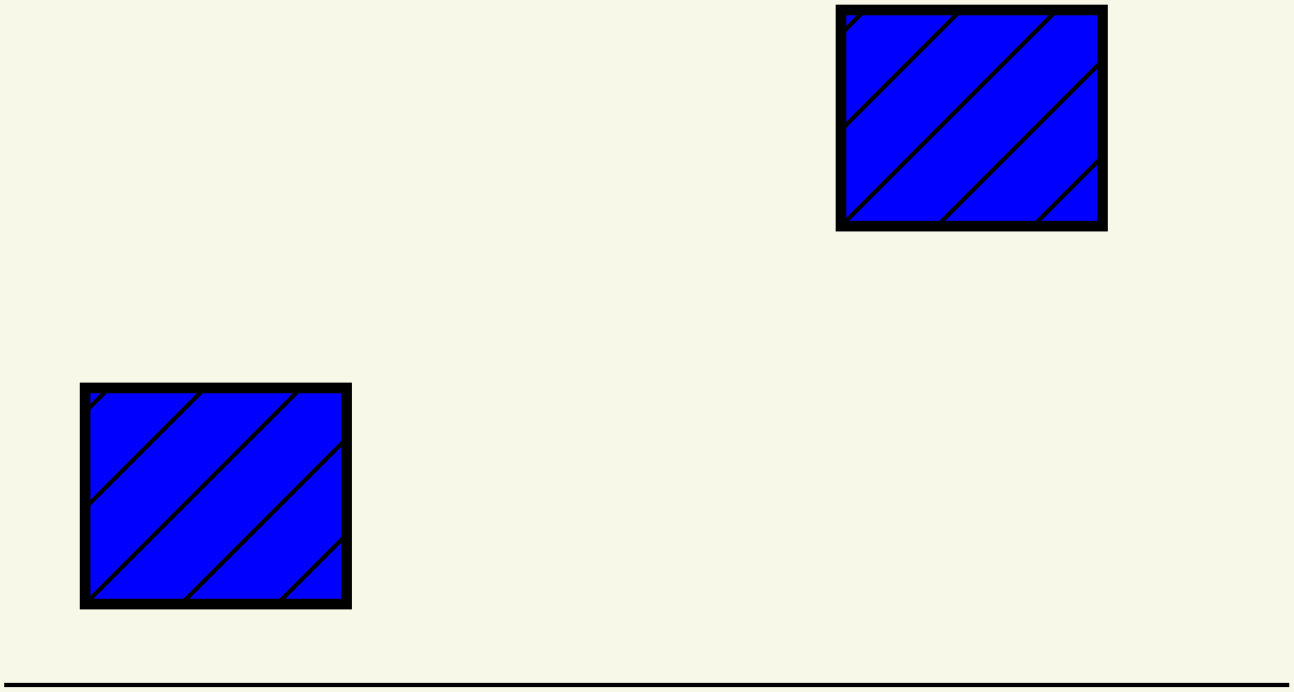

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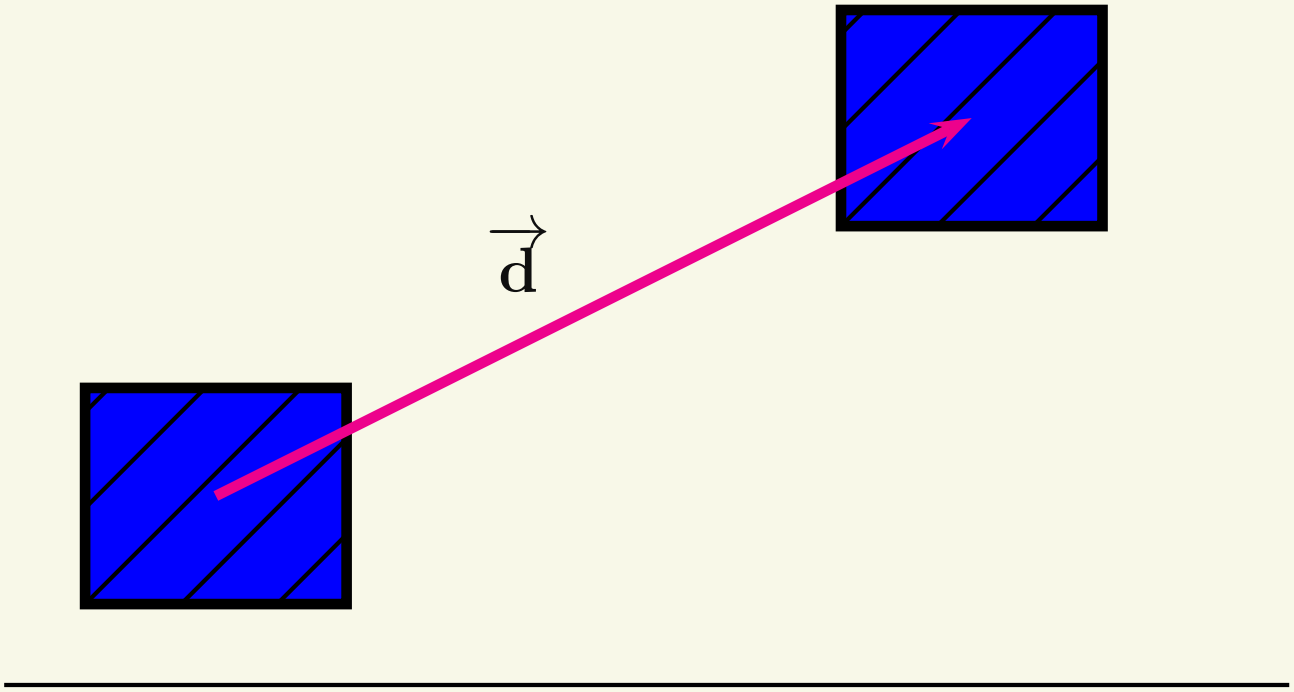

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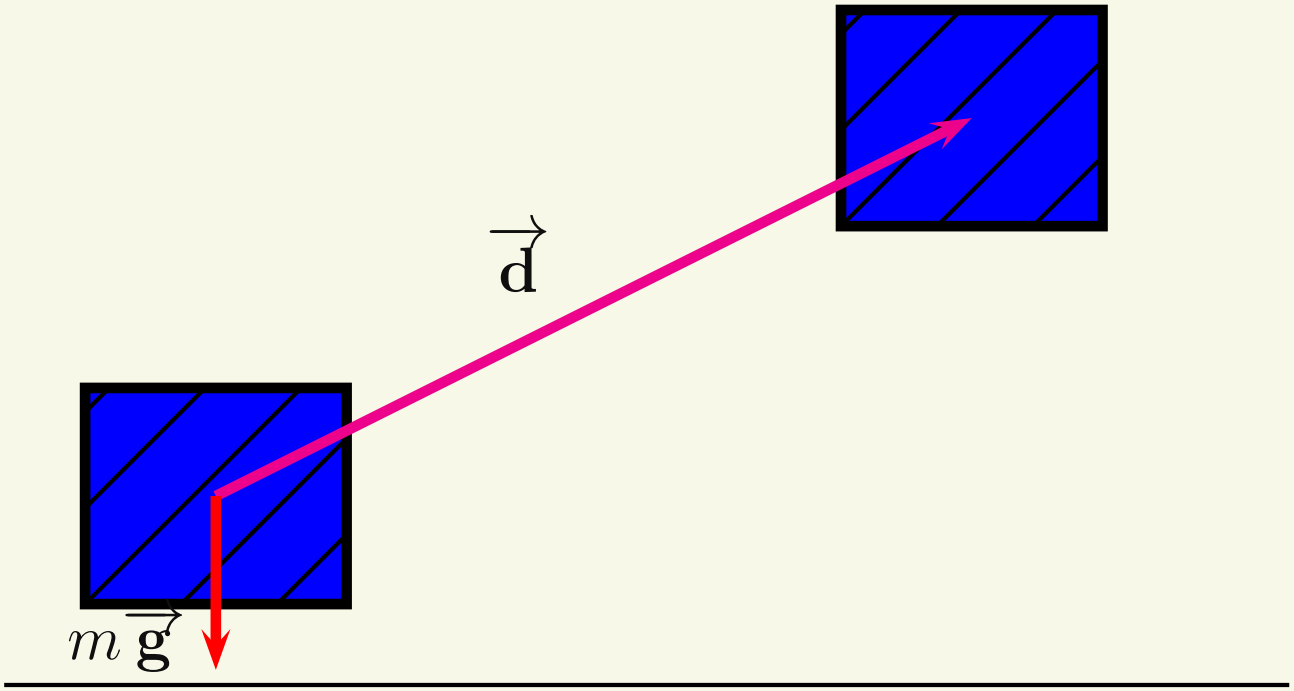

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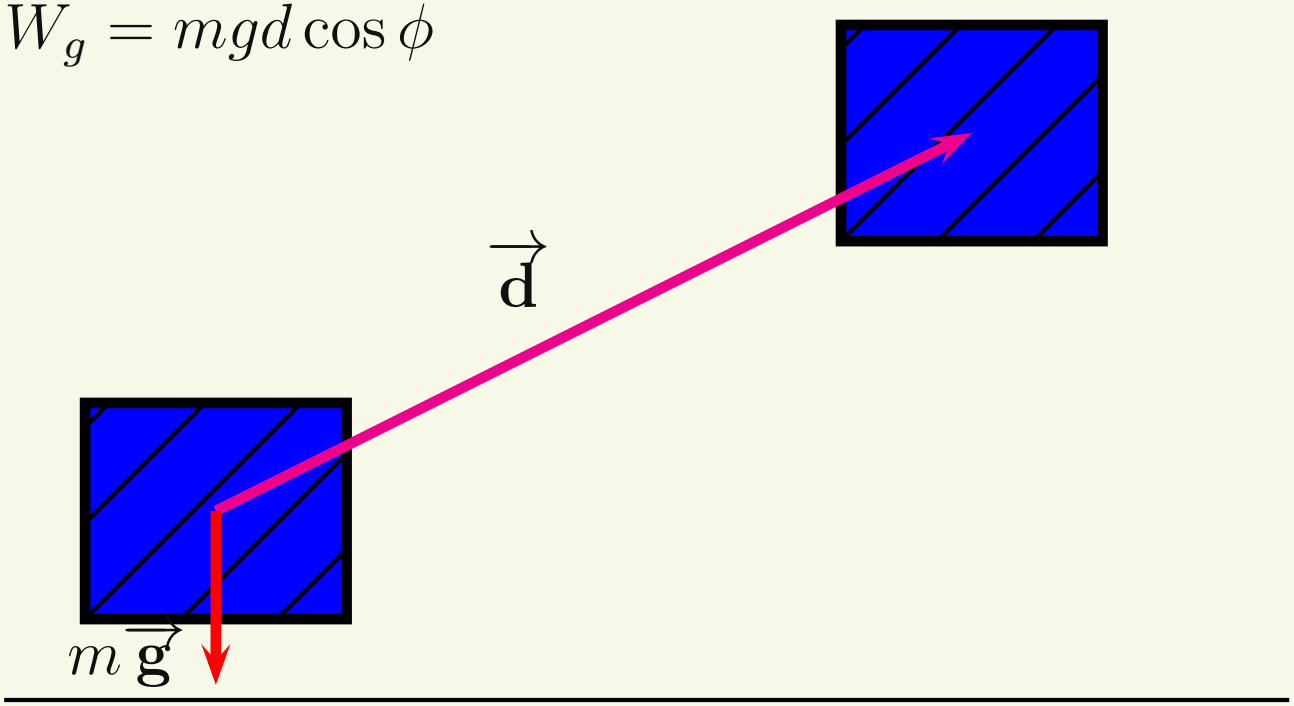

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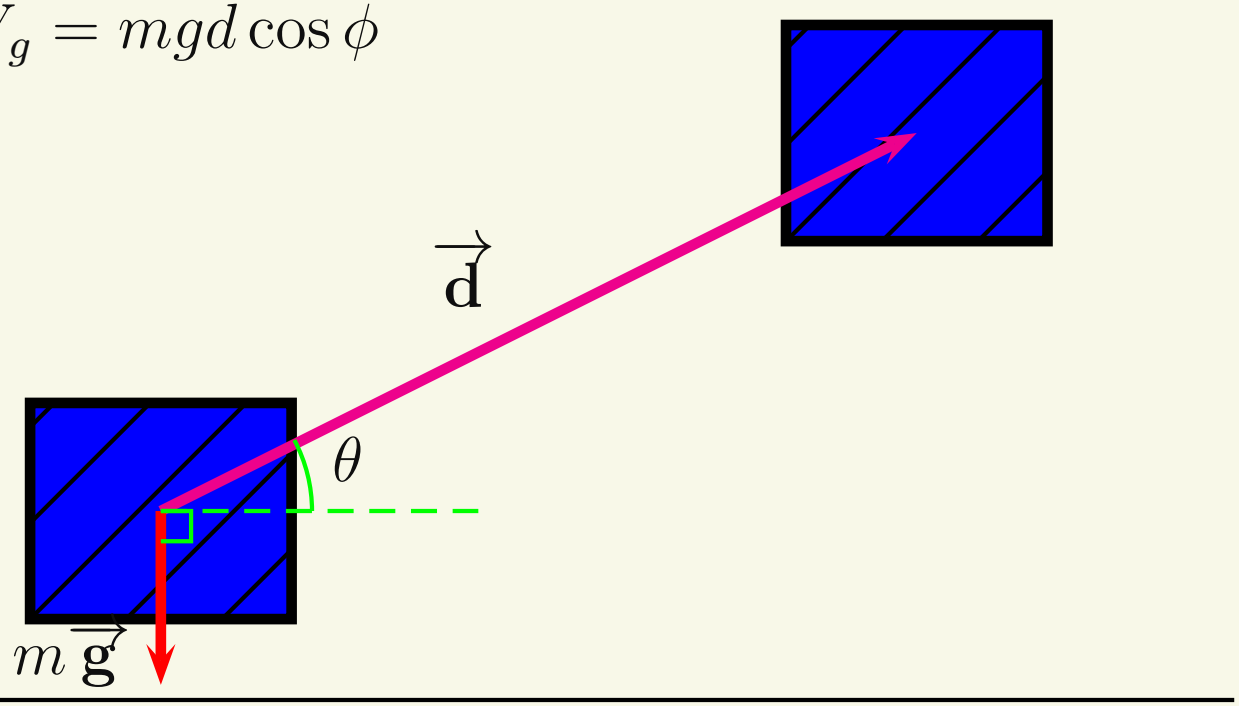

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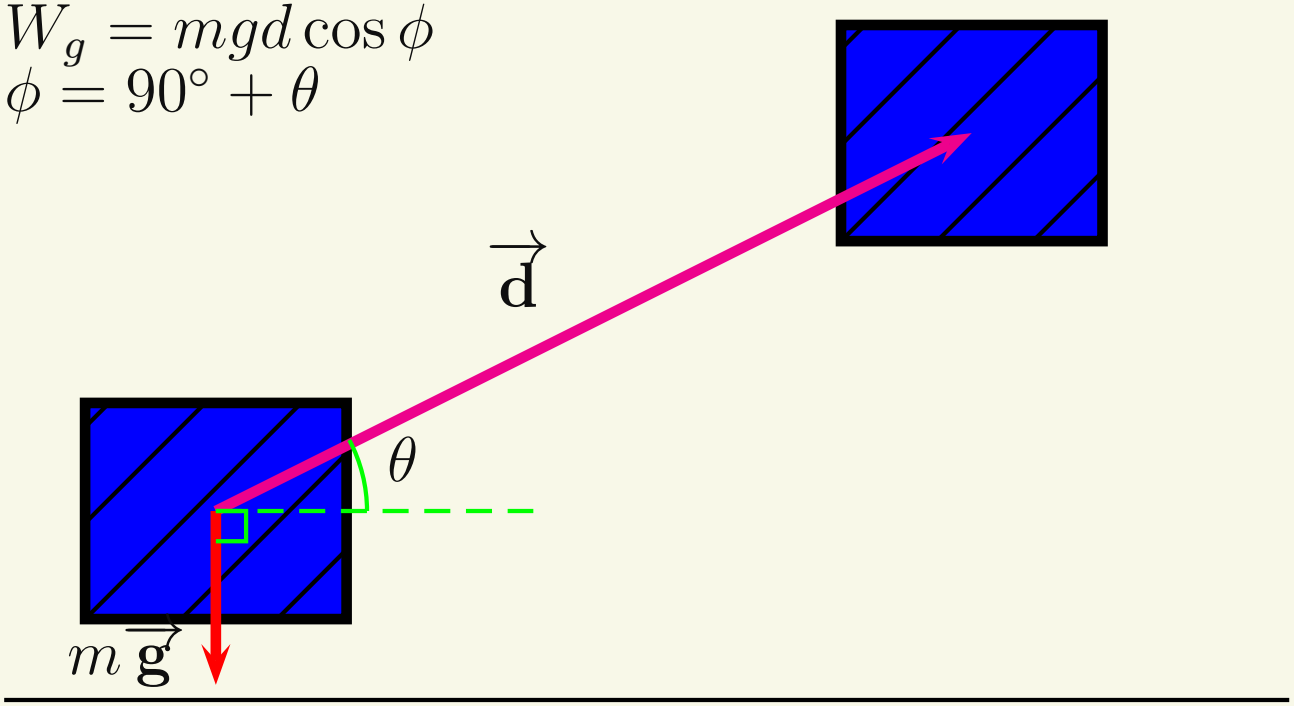

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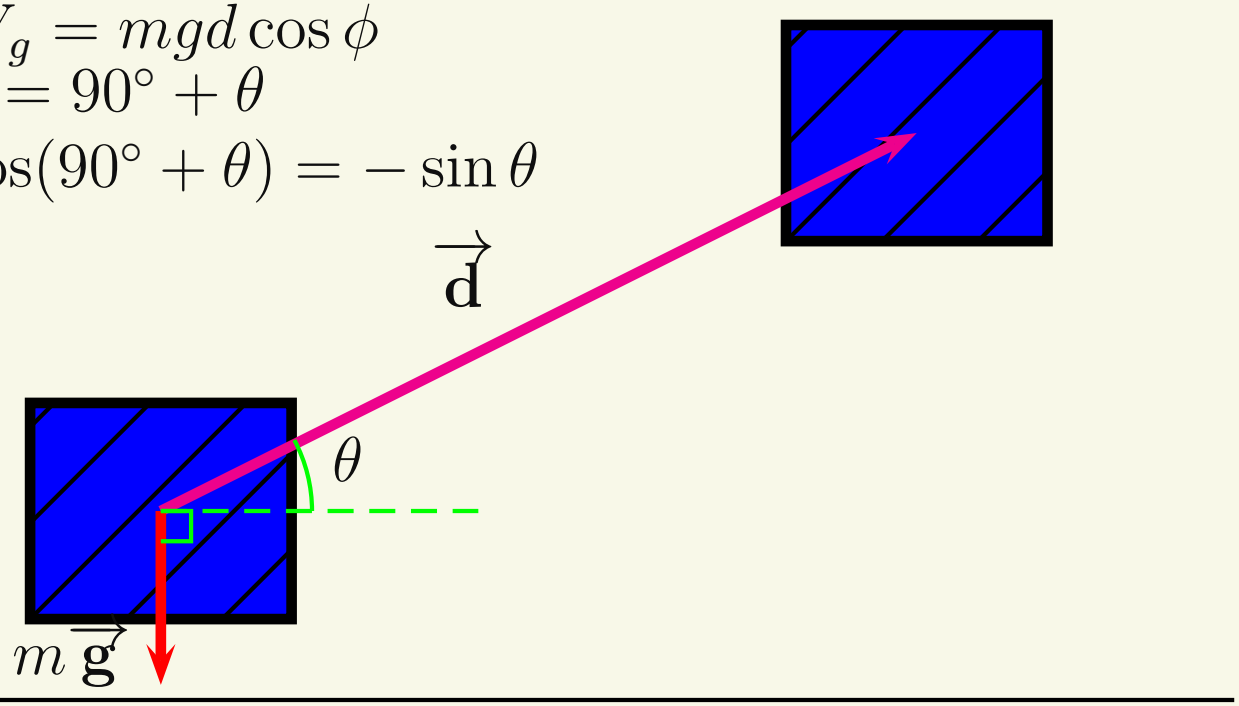

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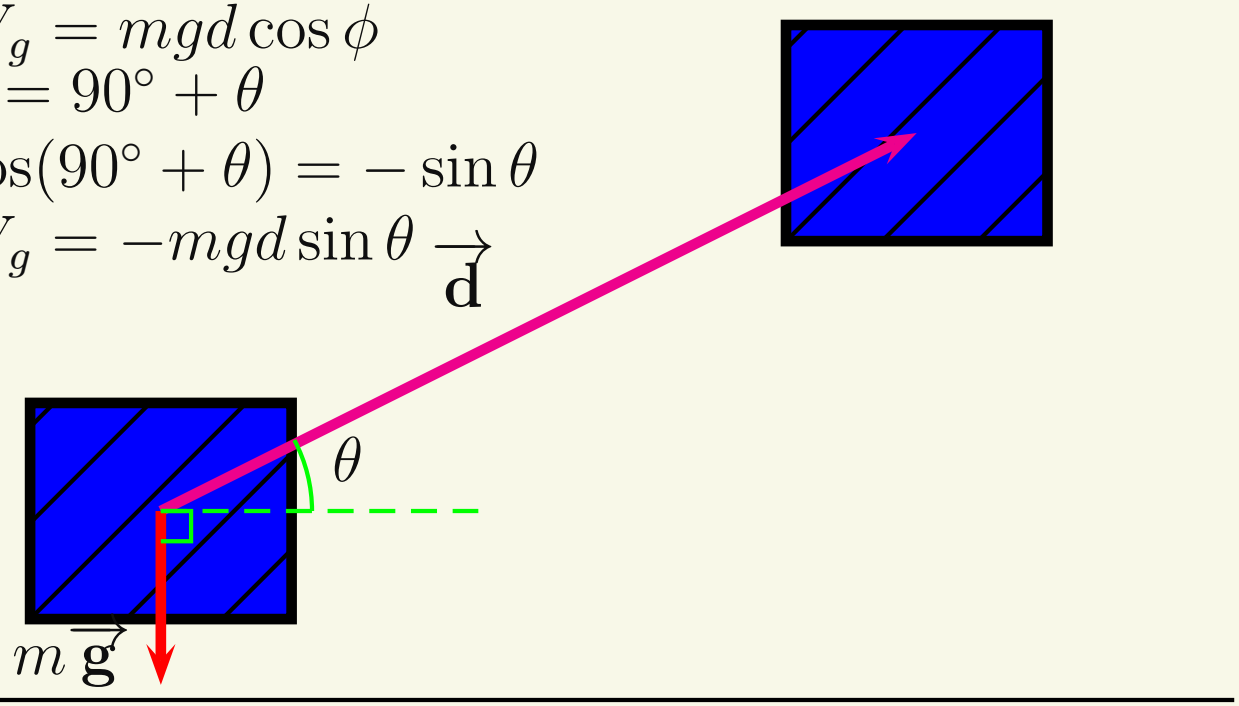

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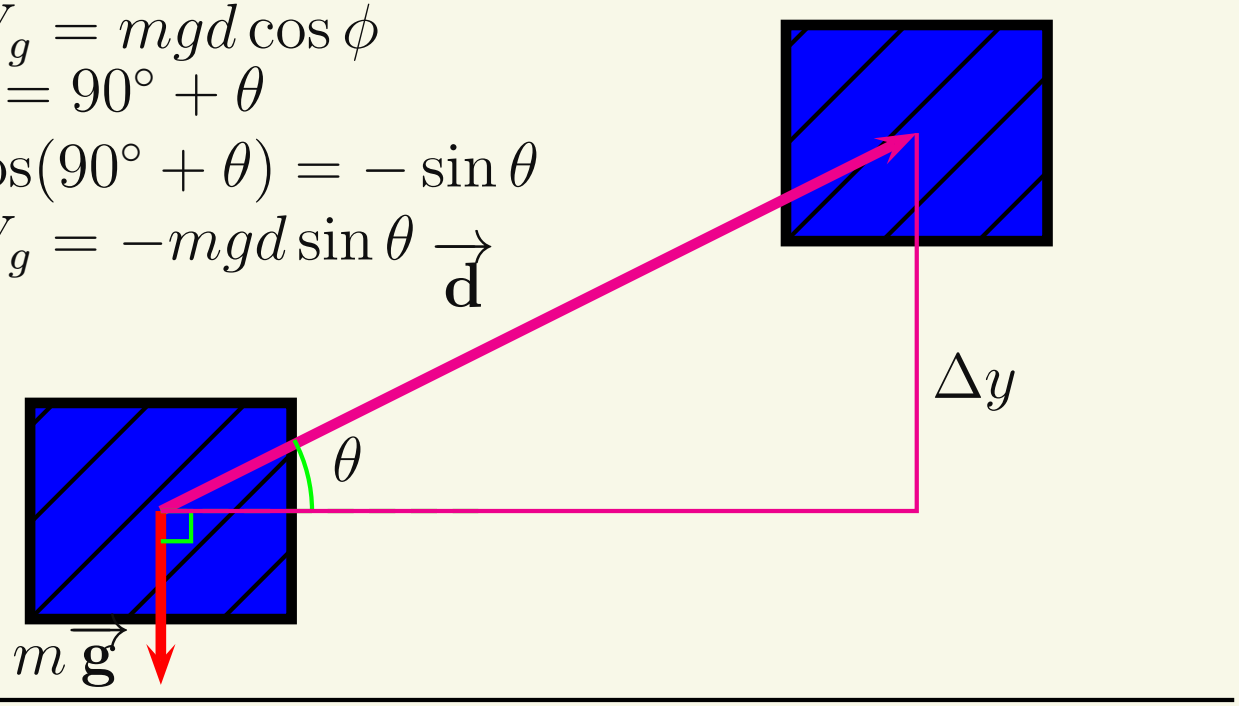

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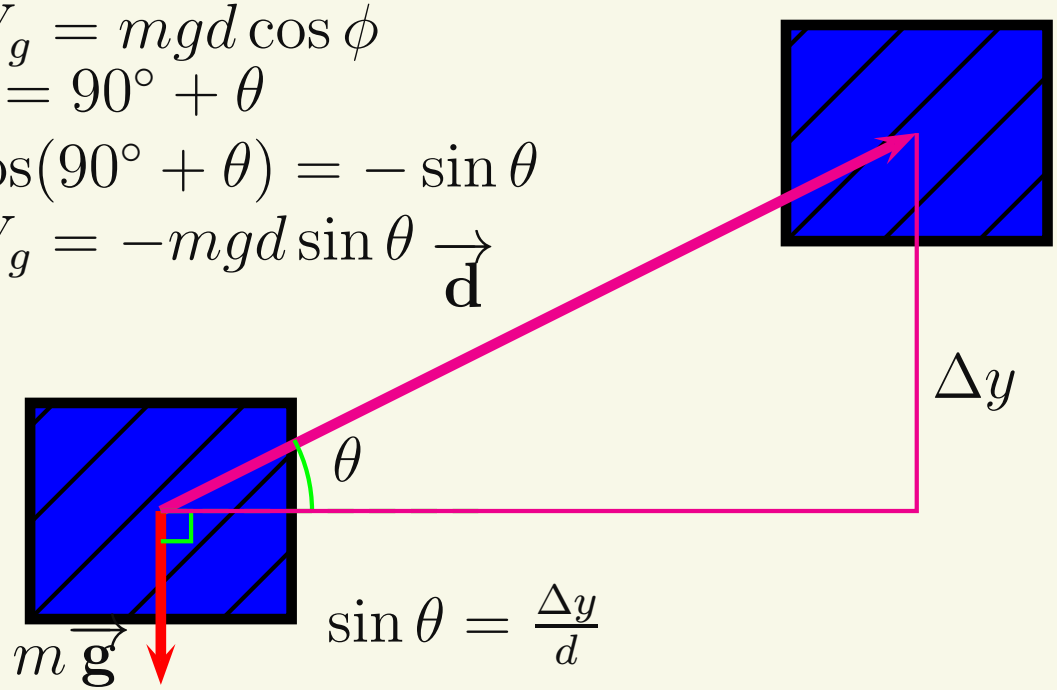

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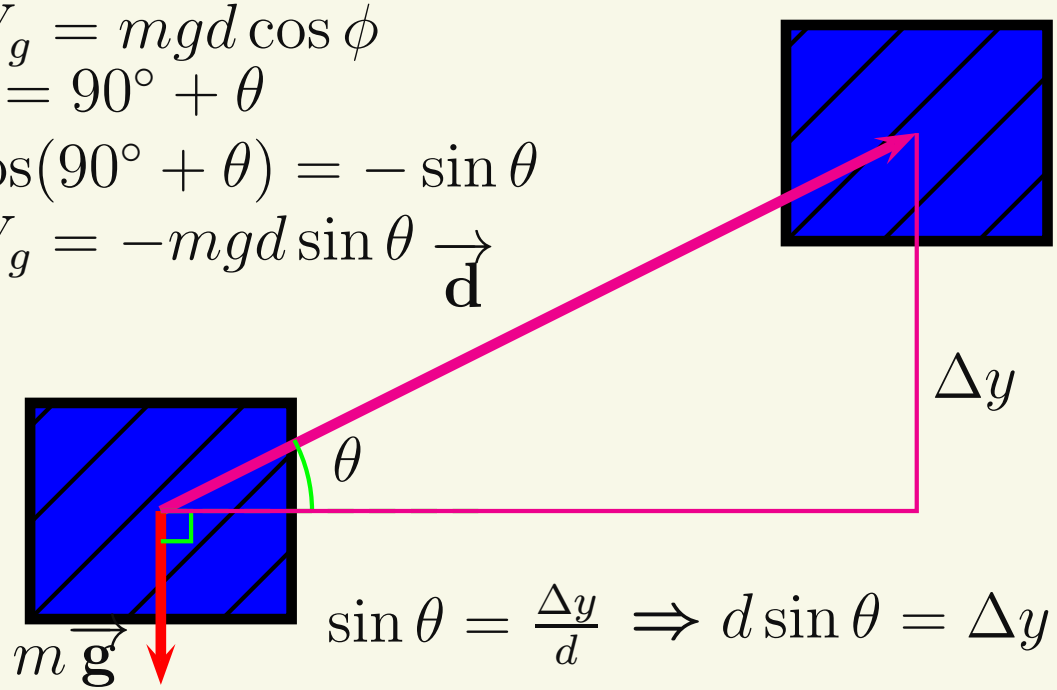

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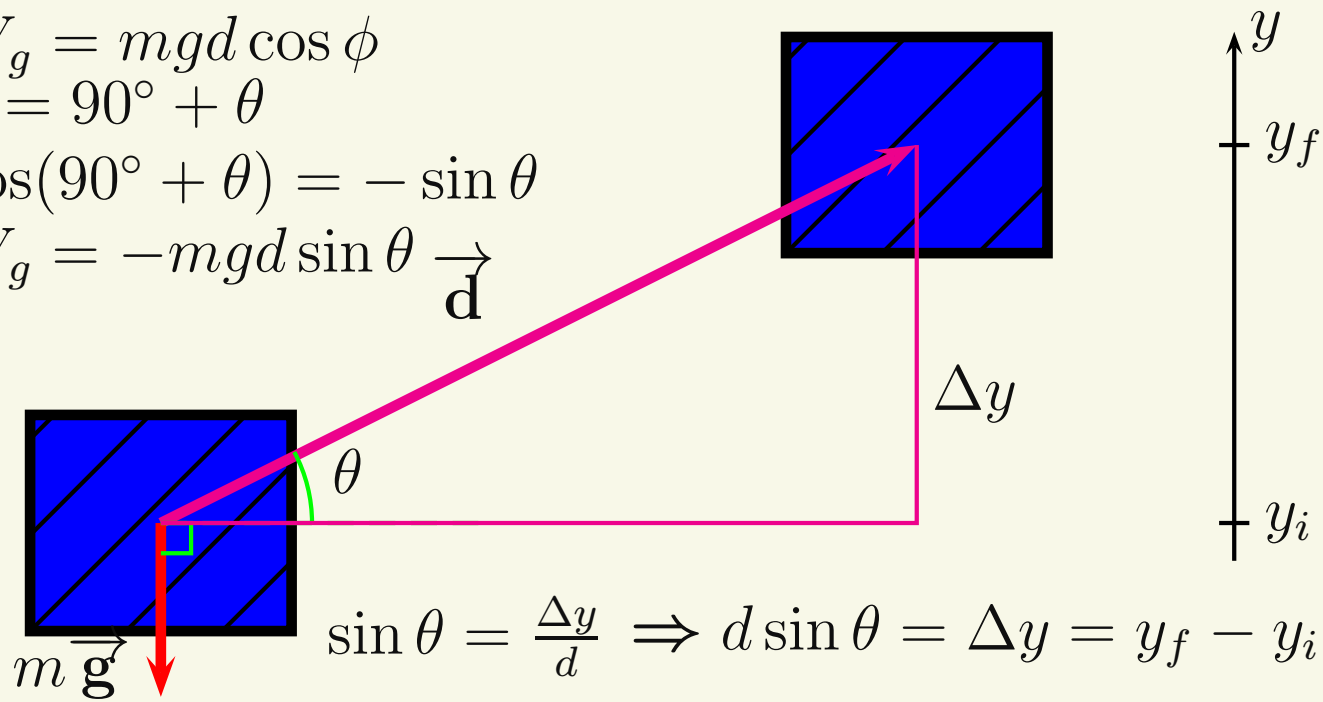

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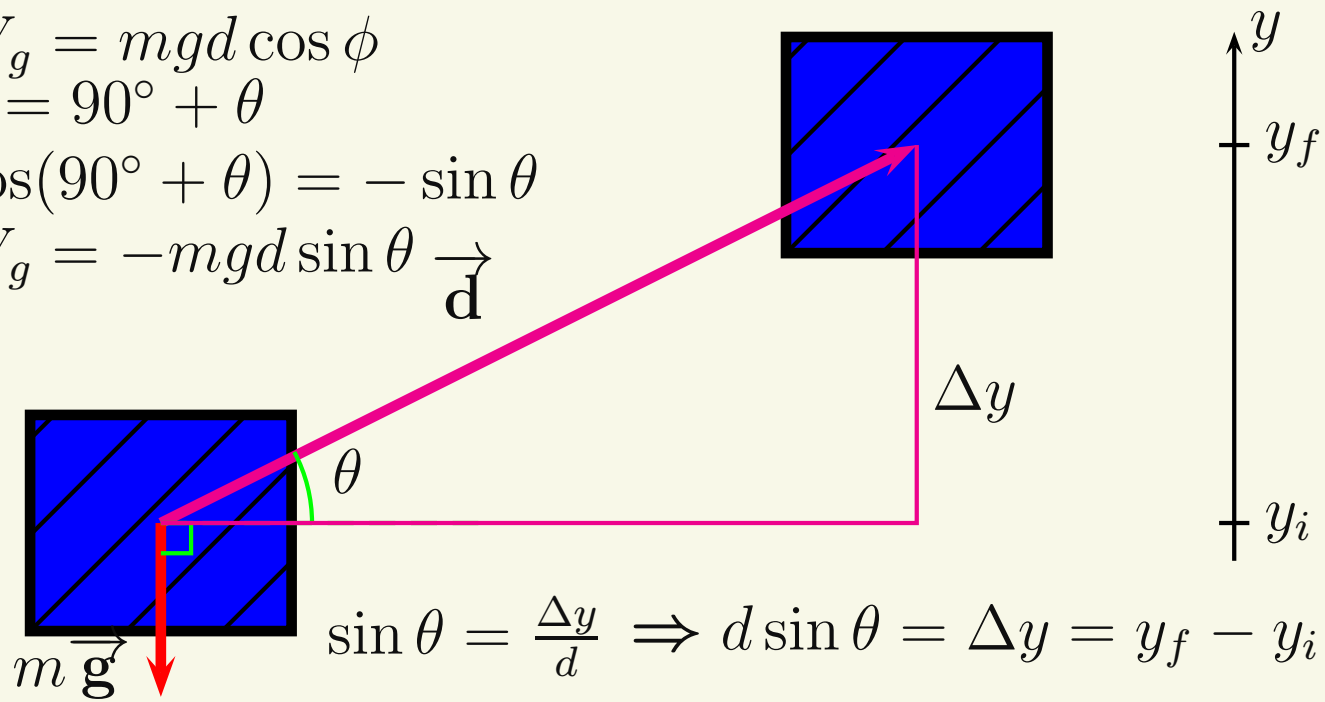

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$$W_g = -mg(y_f - y_i) \Rightarrow \boxed{W_g = -\left[mgy_f - mgy_i\right]}$$

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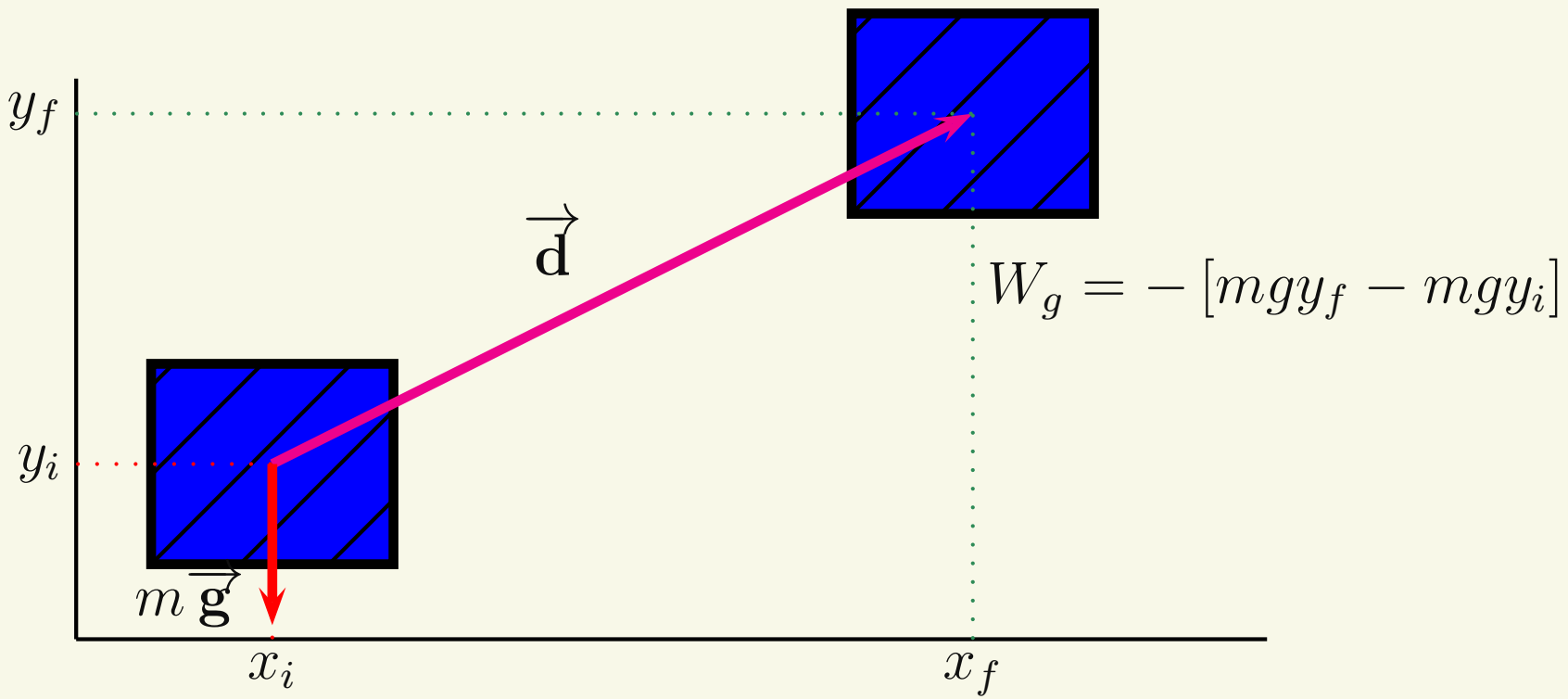

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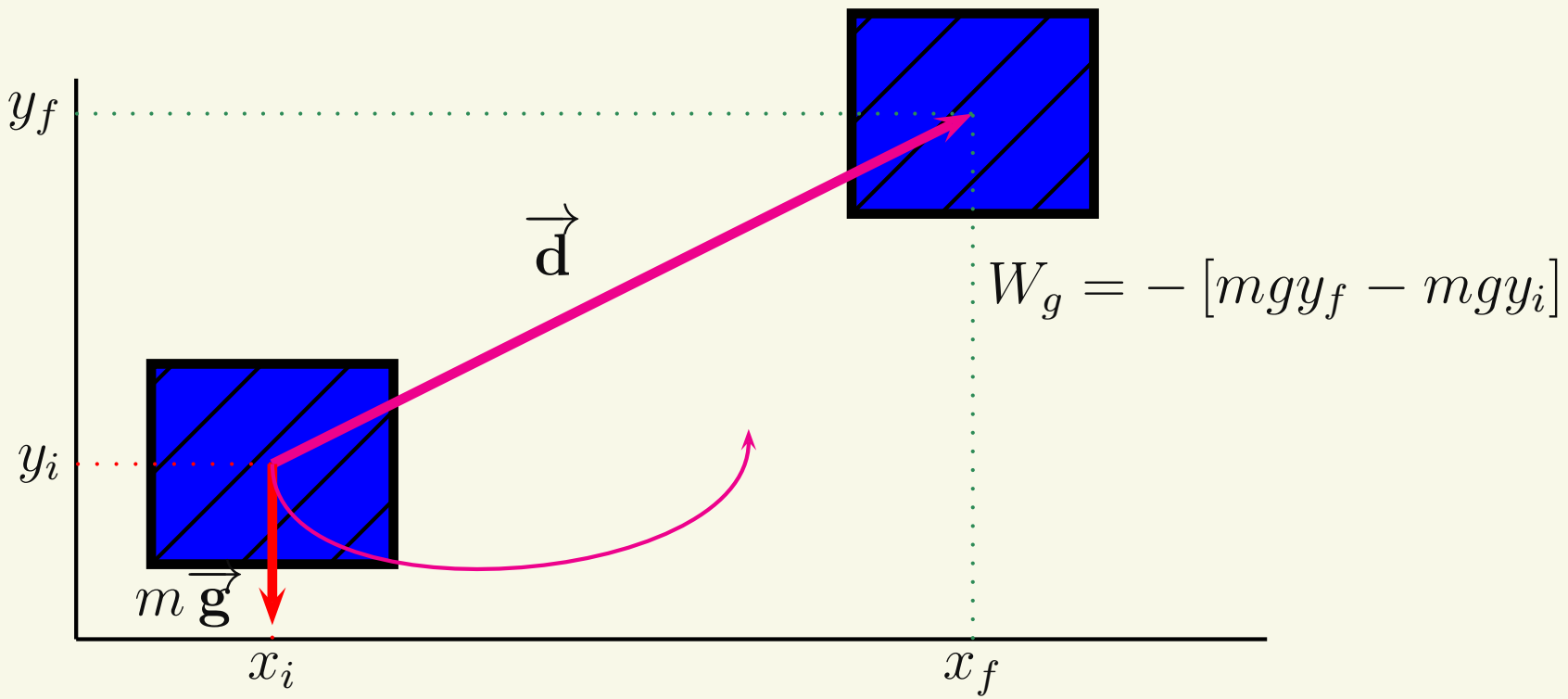

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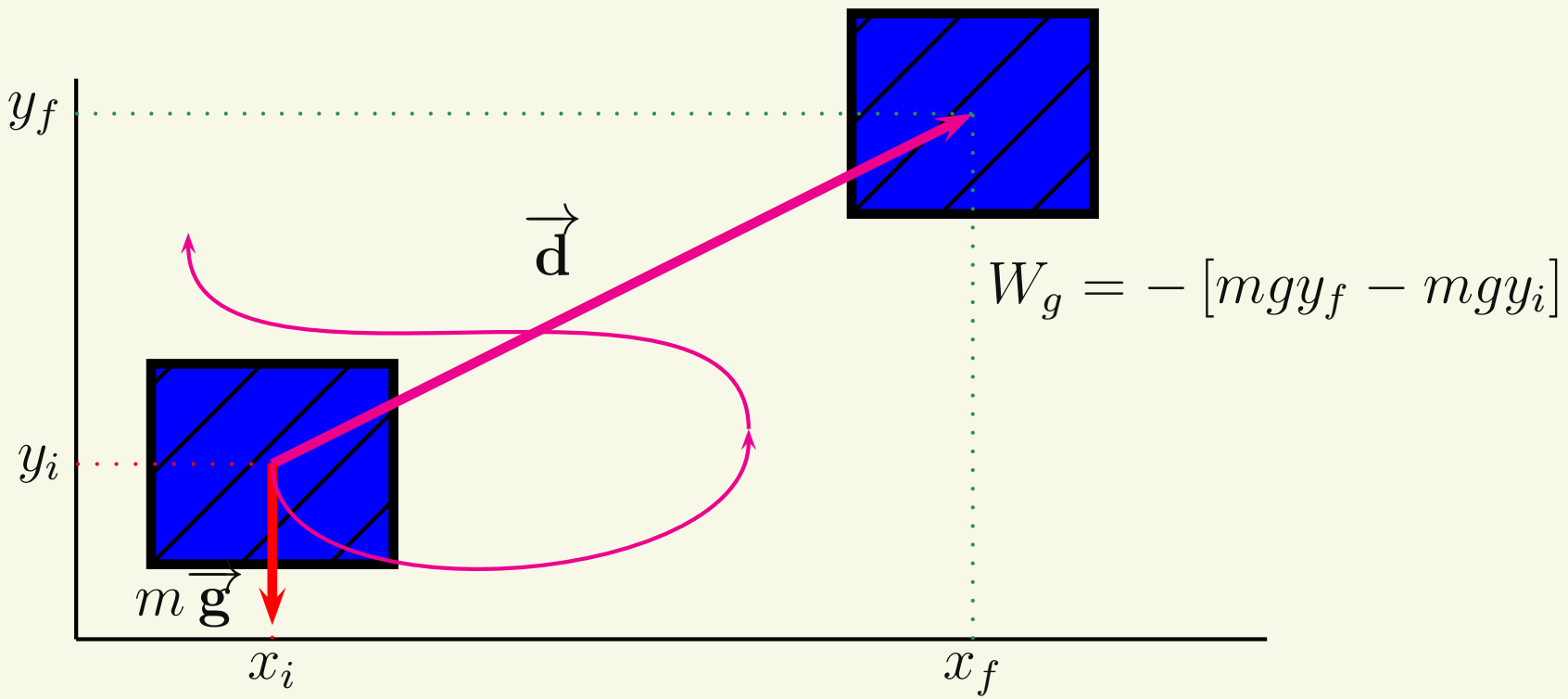

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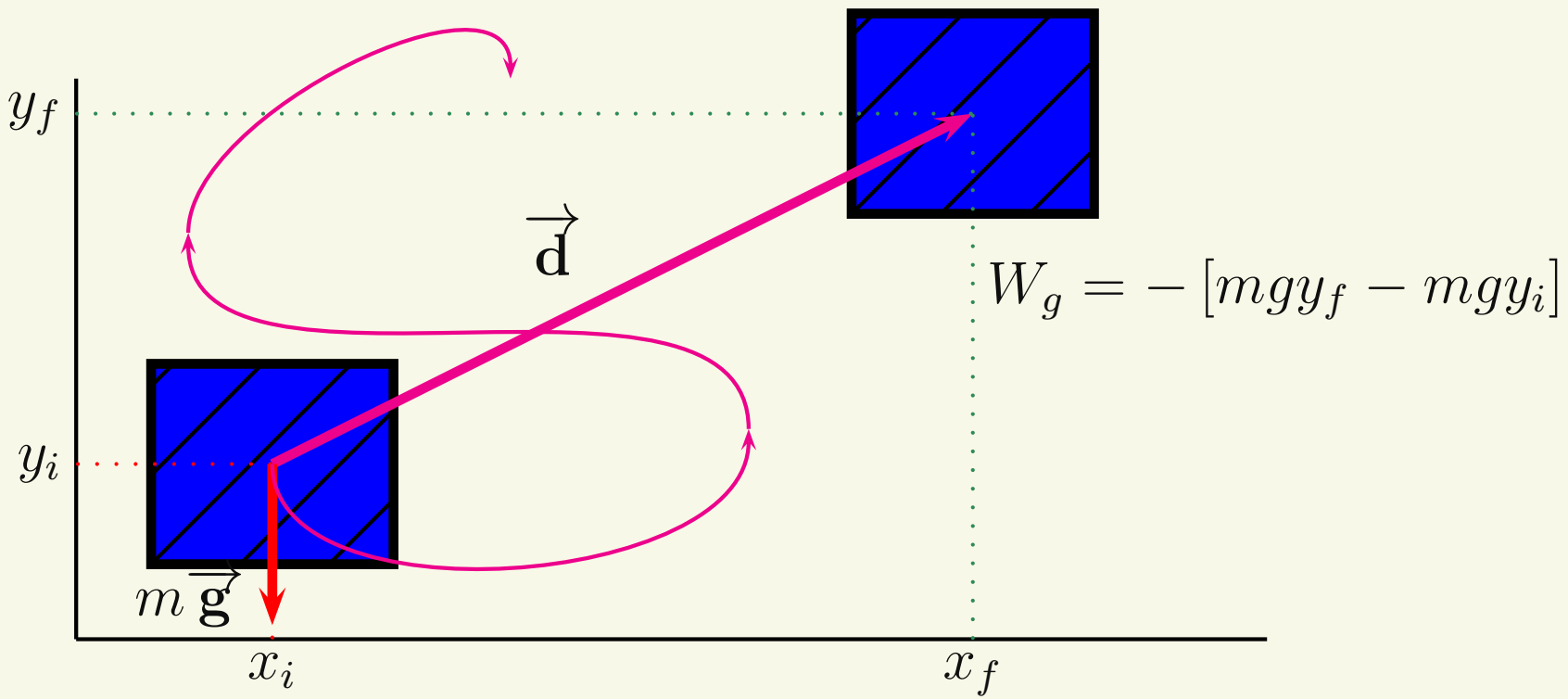

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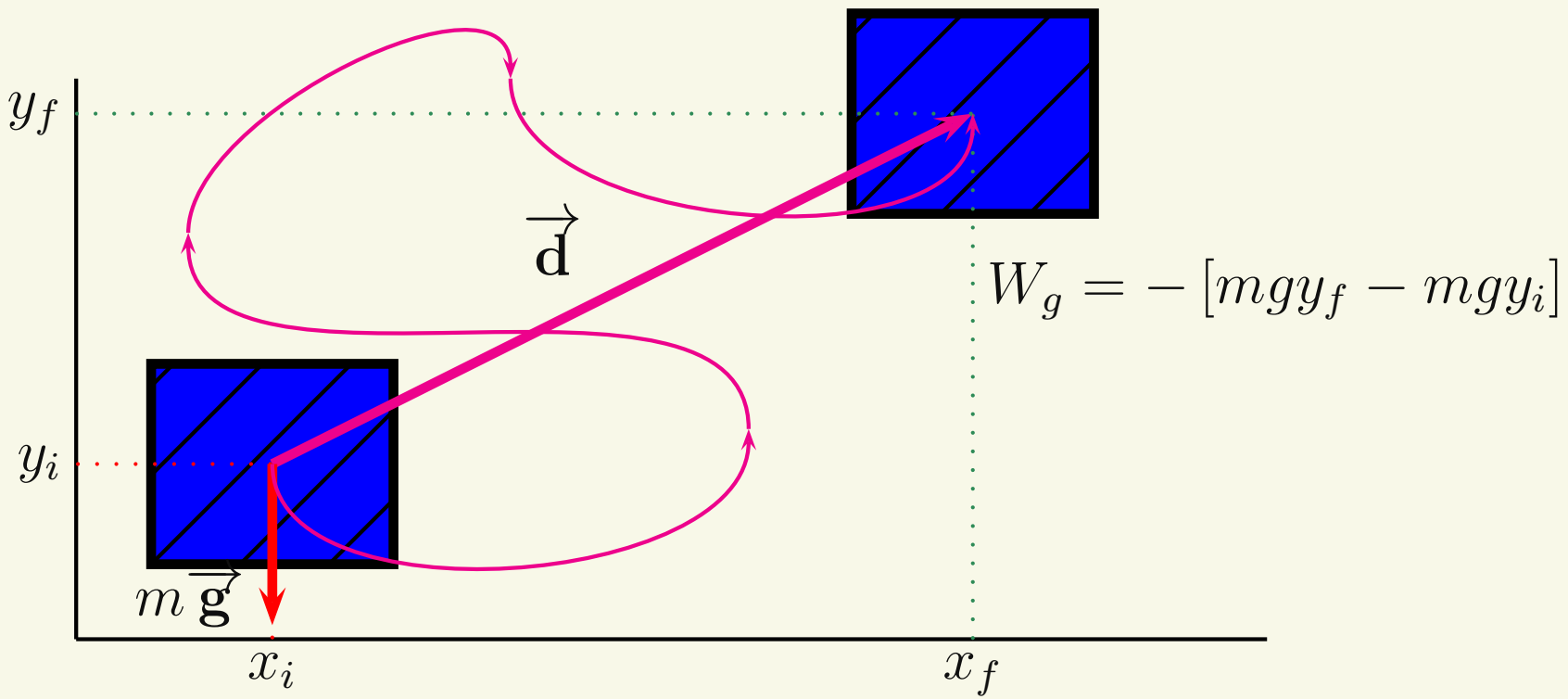

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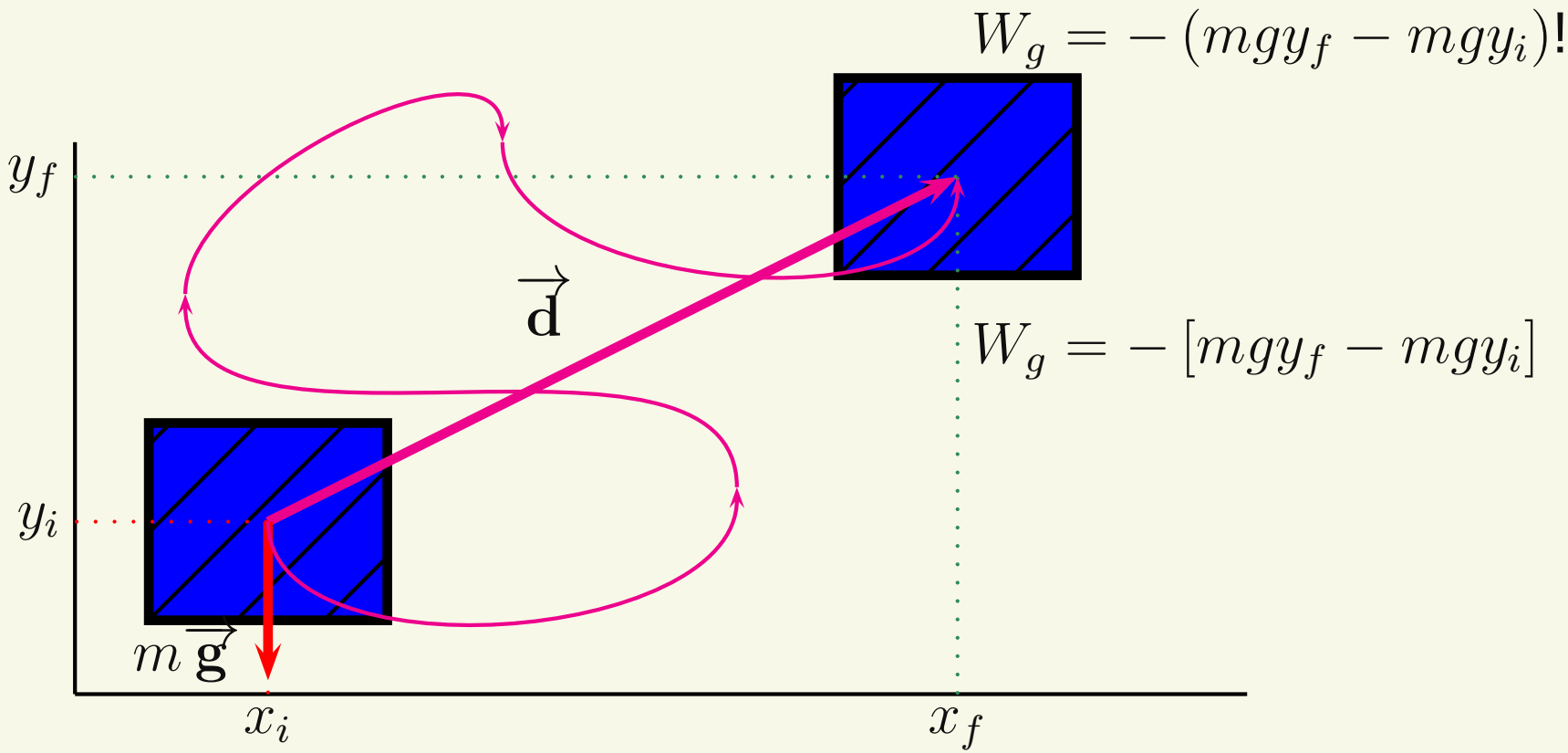

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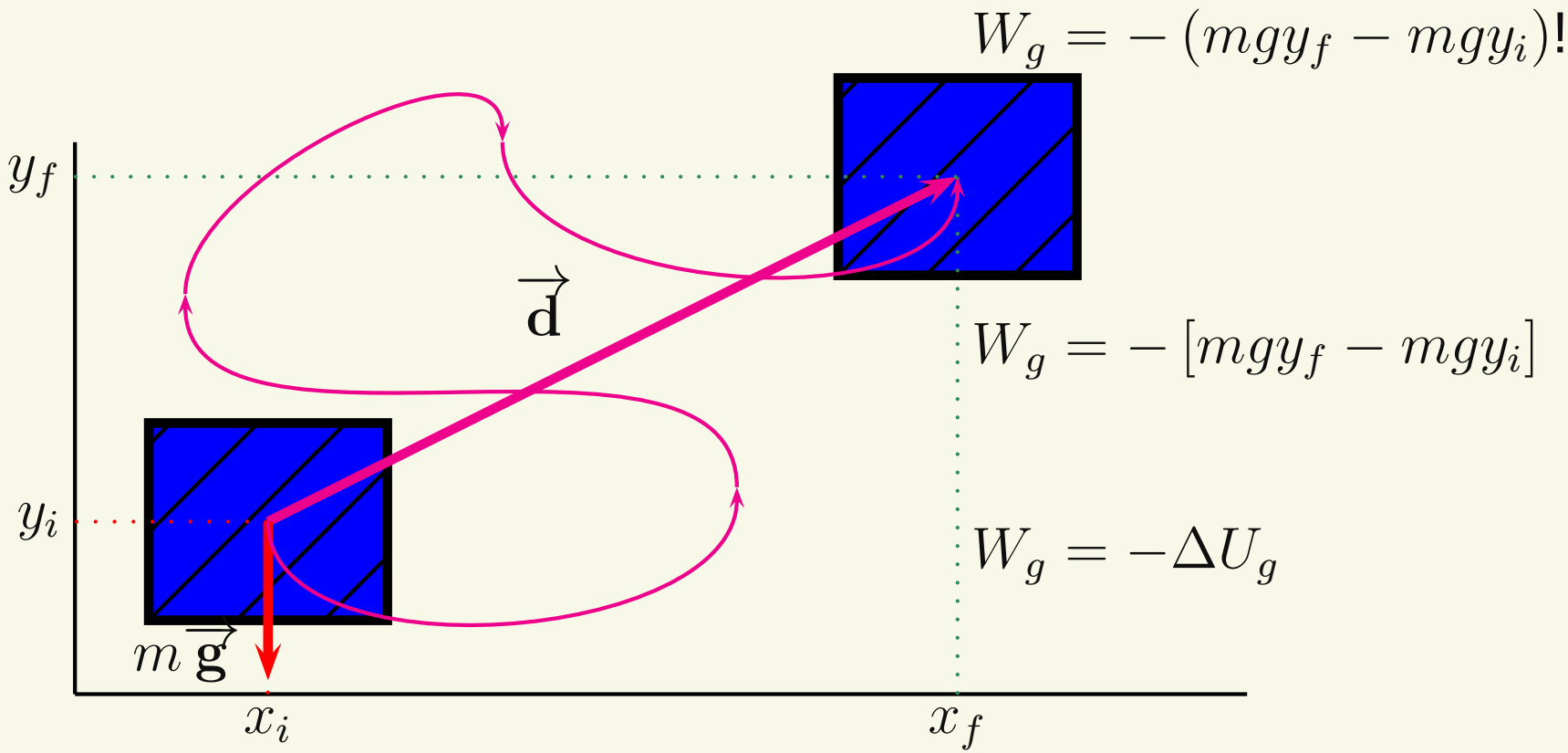

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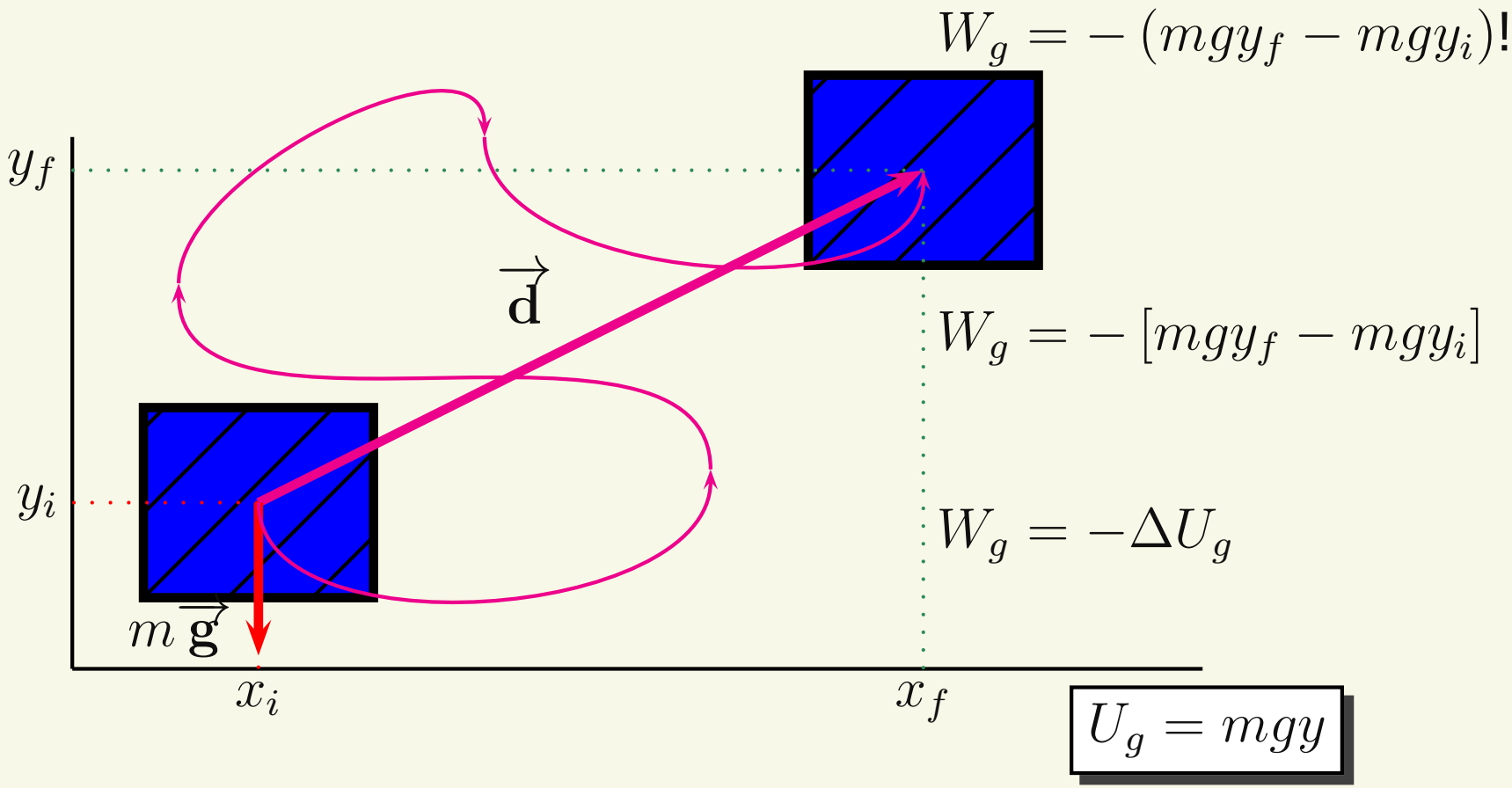

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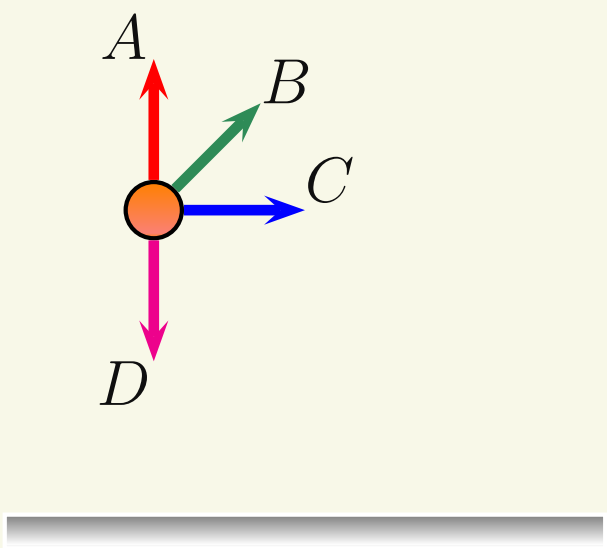
Example: A mass is started from rest at the top of a frictionless slide of height $h = 2\,m$, how fast is it going at the bottom?

Mechanical Energy Exercise

$$\boxed{\frac{1}{2}mv_i^2 + mgy_i = \frac{1}{2}mv_f^2 + mgy_f}$$

Four Balls, A, B, C, and D, are launched from the same height and with the same speed but at the different angles shown. Ignoring air resistance, which of the balls is going fastest when it hits the ground?



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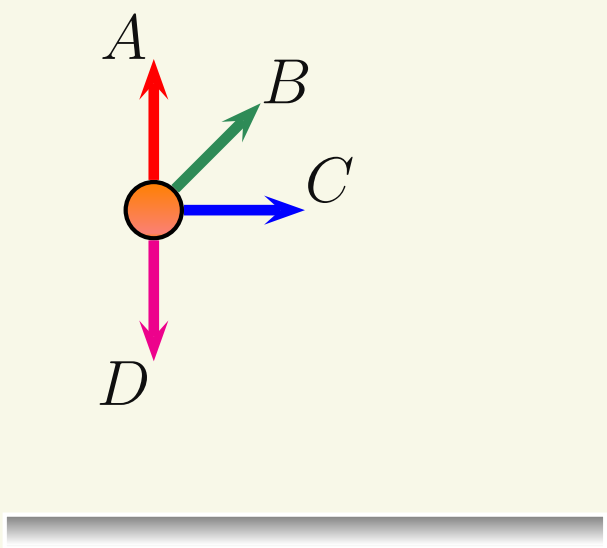

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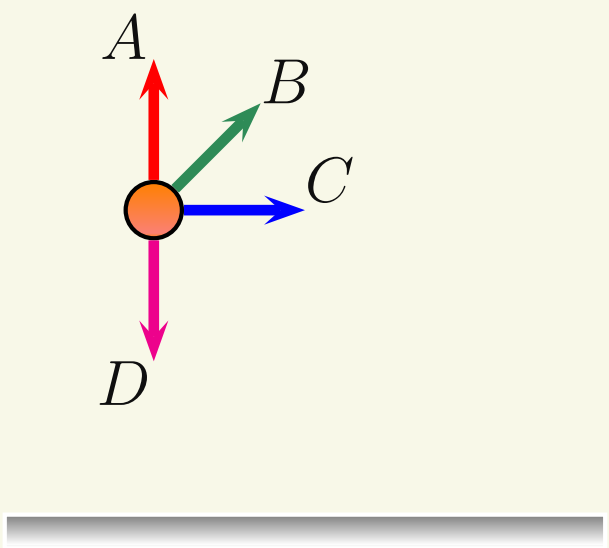

(a) A

(b) B

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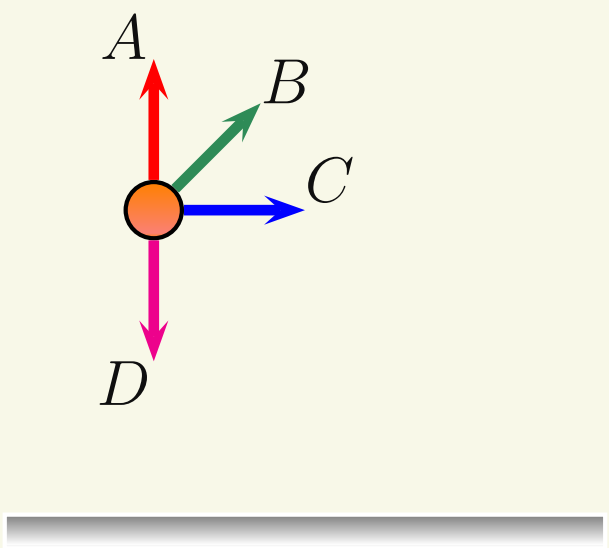

(a) A

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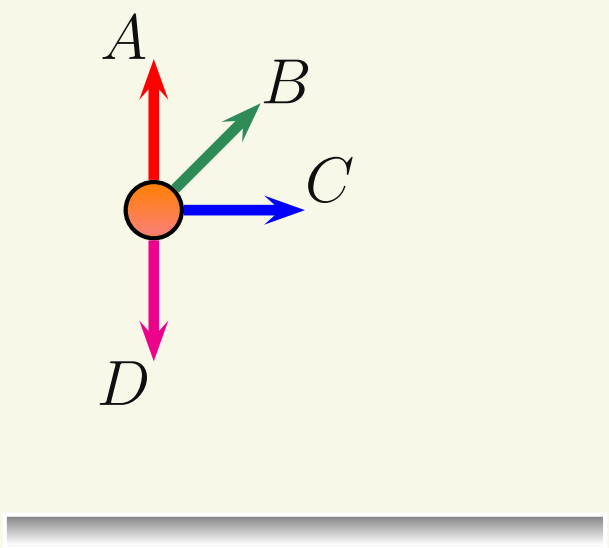

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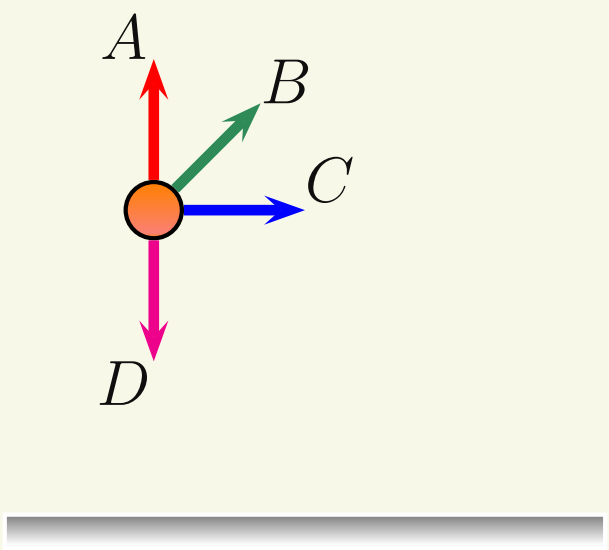

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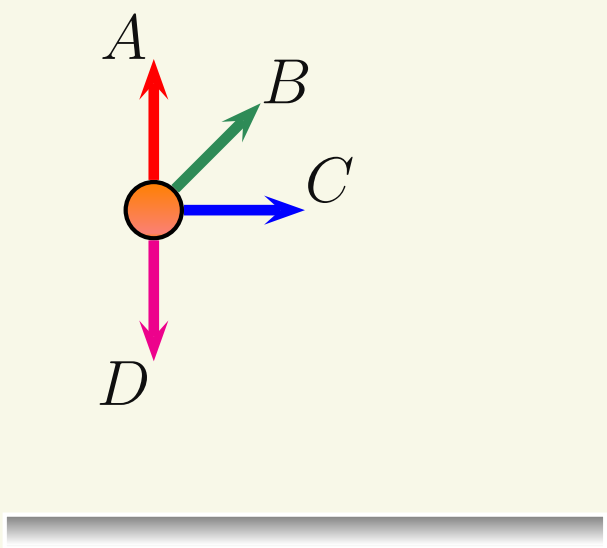

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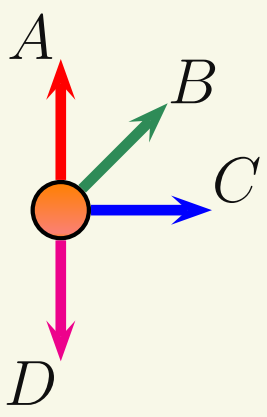

Each of them have the same v_i, y_i, and $y_f \Rightarrow$ same v_f.

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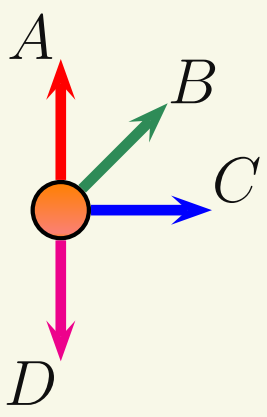

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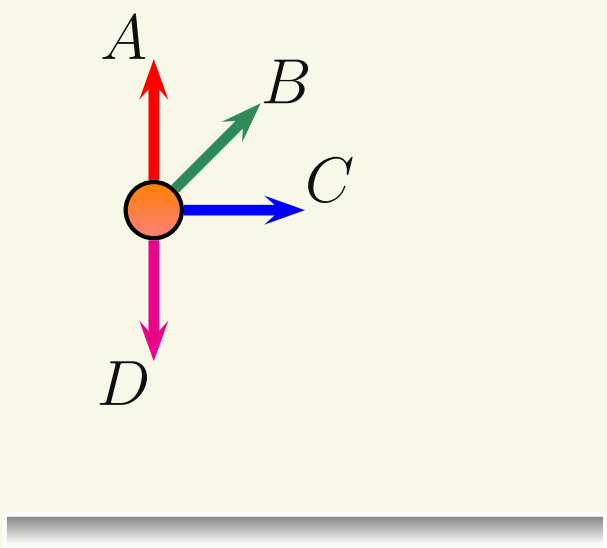

Each of them have the same v_i, y_i, and $y_f \Rightarrow$ same v_f.

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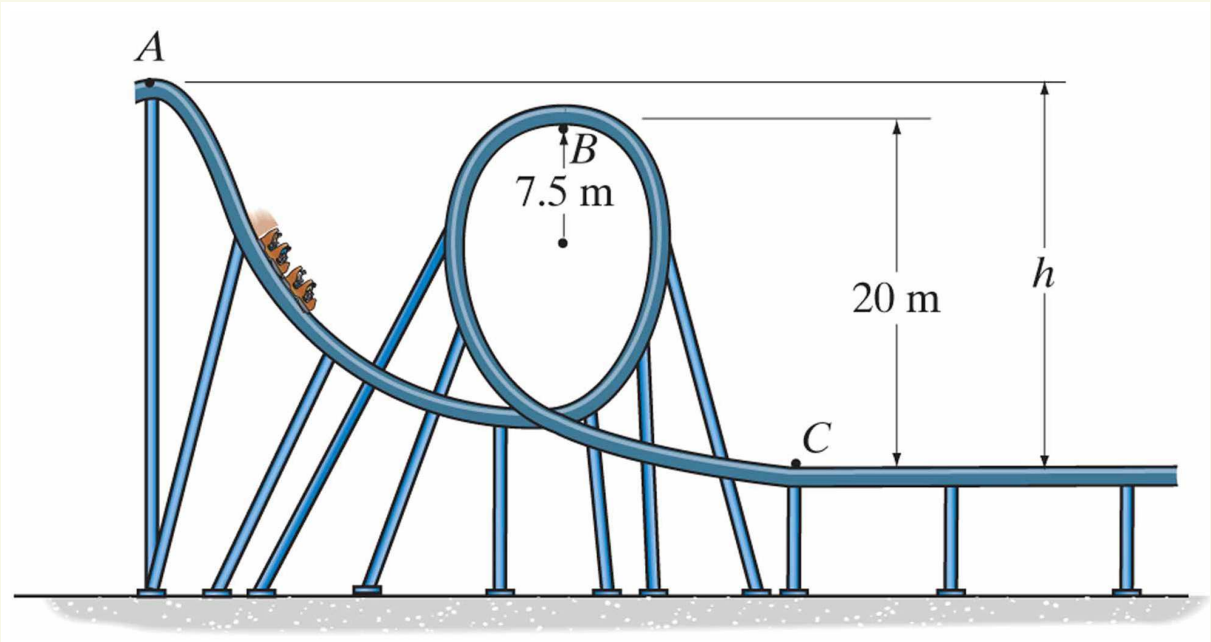
They do hit the ground at different times.

Conservation of energy doesn't give us any information about time

Mechanical Energy Exercise II

A roller coaster starts from rest at point A, goes through the loop-to-loop, and arrives at point C. If friction can be ignored, the roller coaster simply slides along its track, and $h = 25\,m$, how fast will the roller coaster be going at C?



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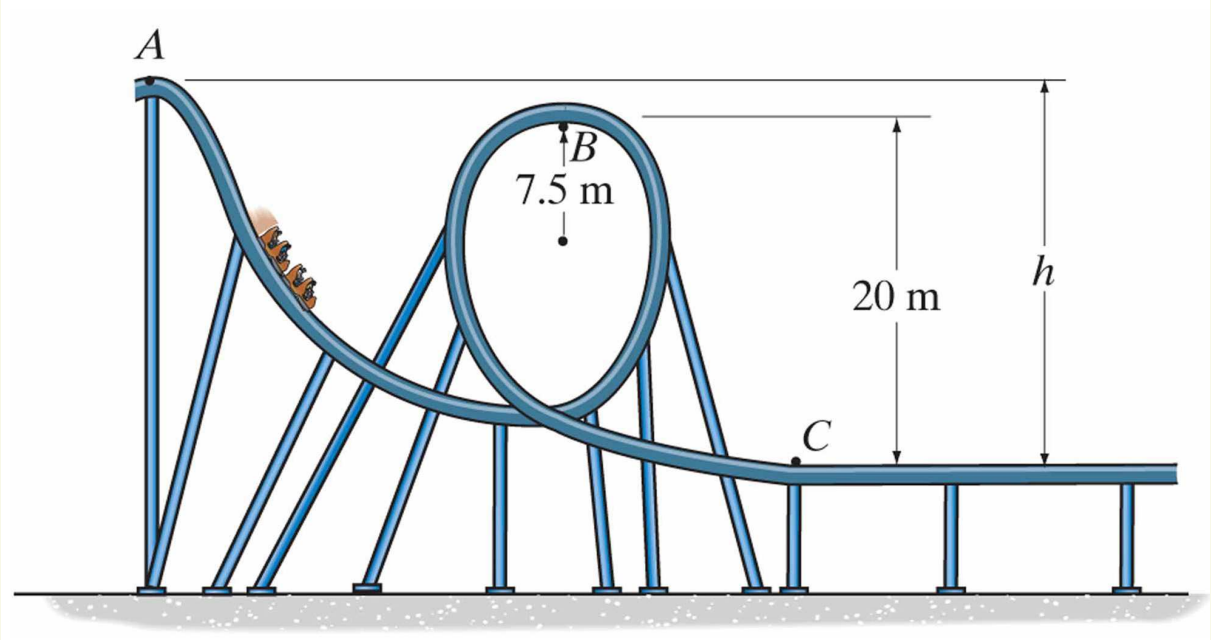

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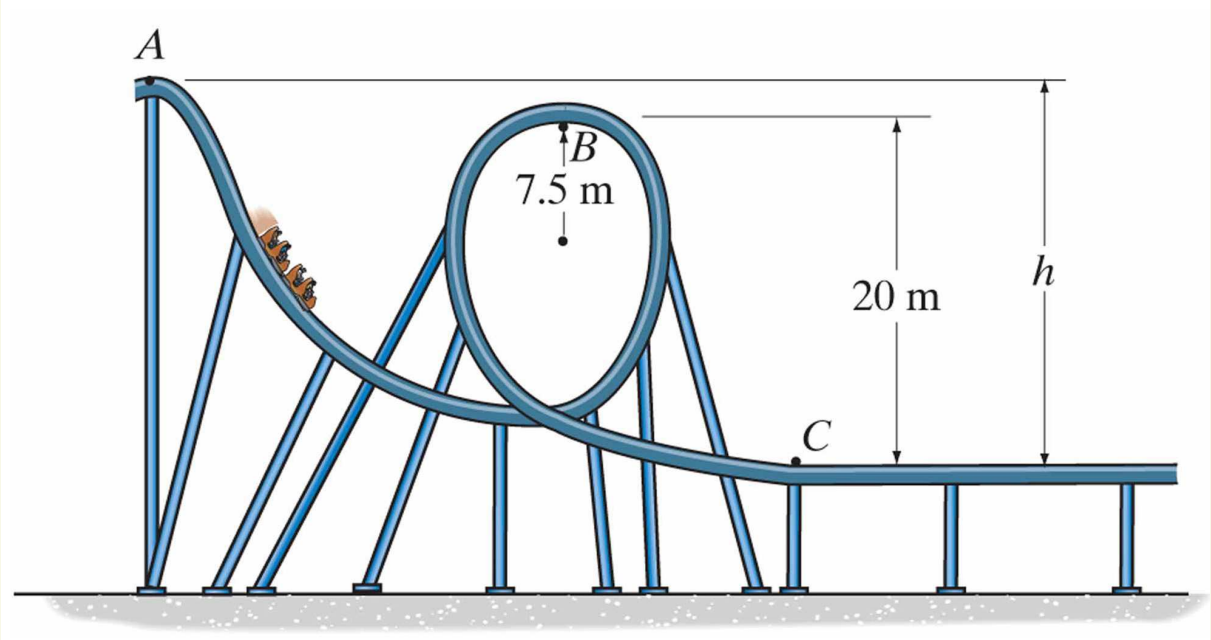

(a) $\sqrt{2gh} = 22\,m/s$

(b) $\sqrt{2g(h - 20\,m)} = 10\,m/s$

Mechanical Energy Exercise II

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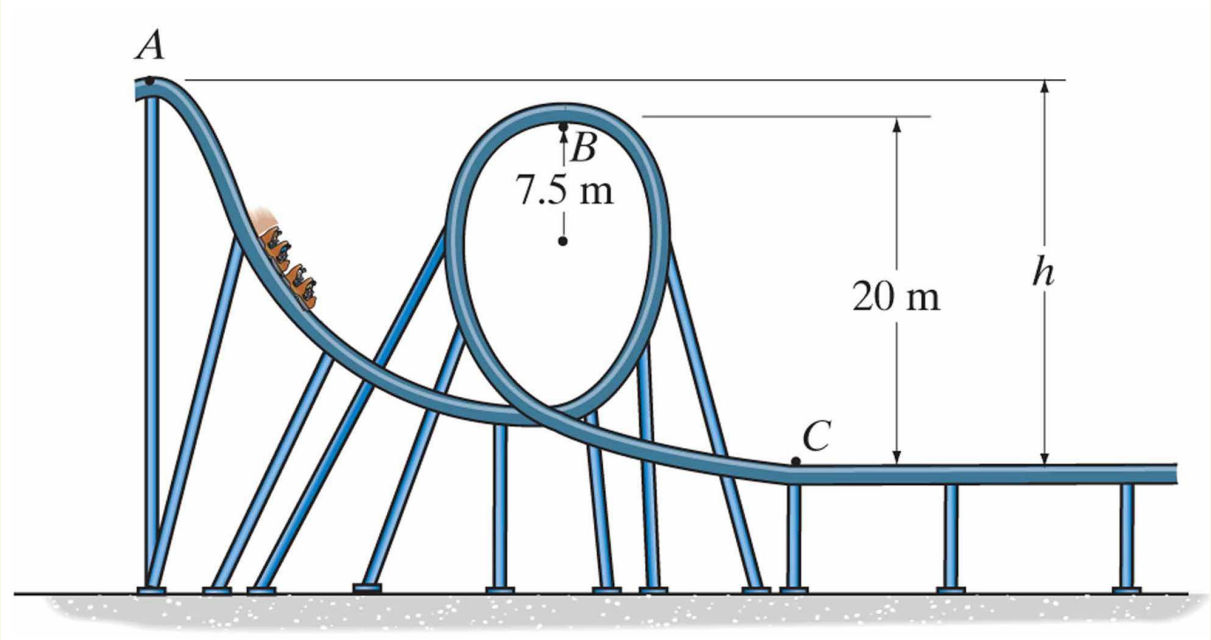

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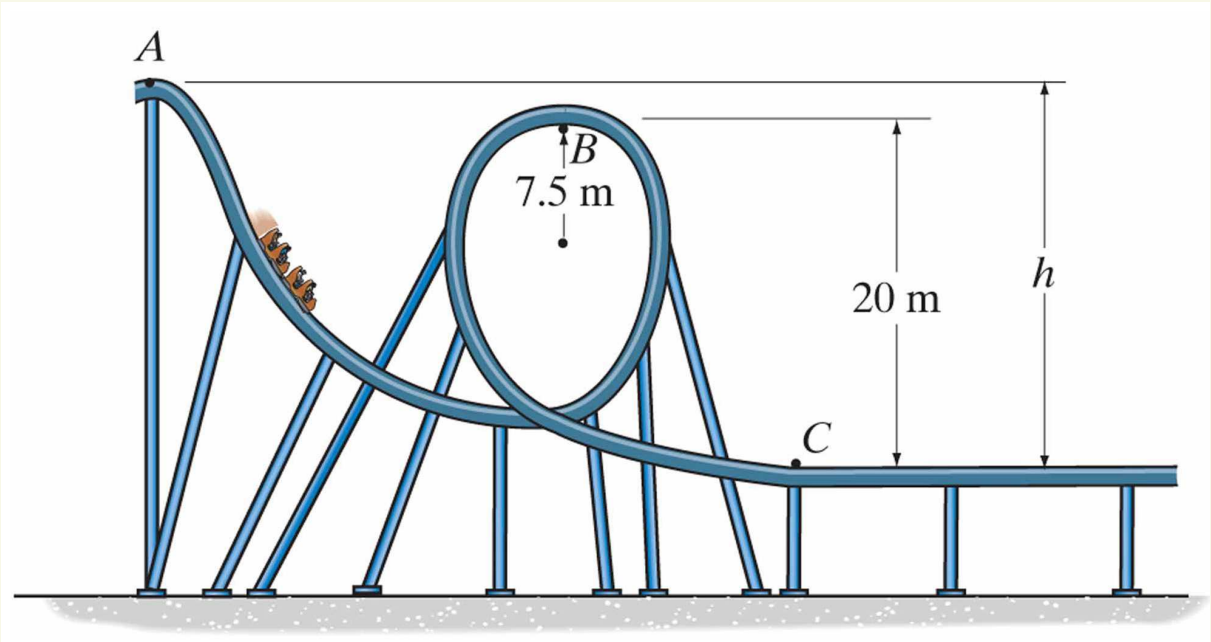

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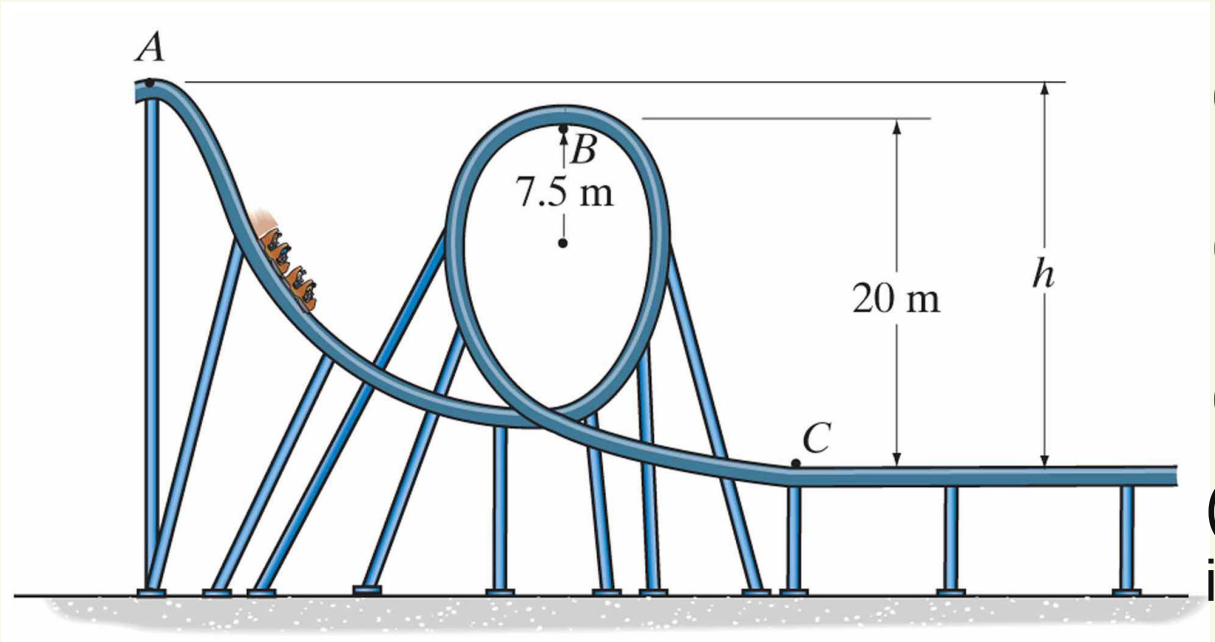

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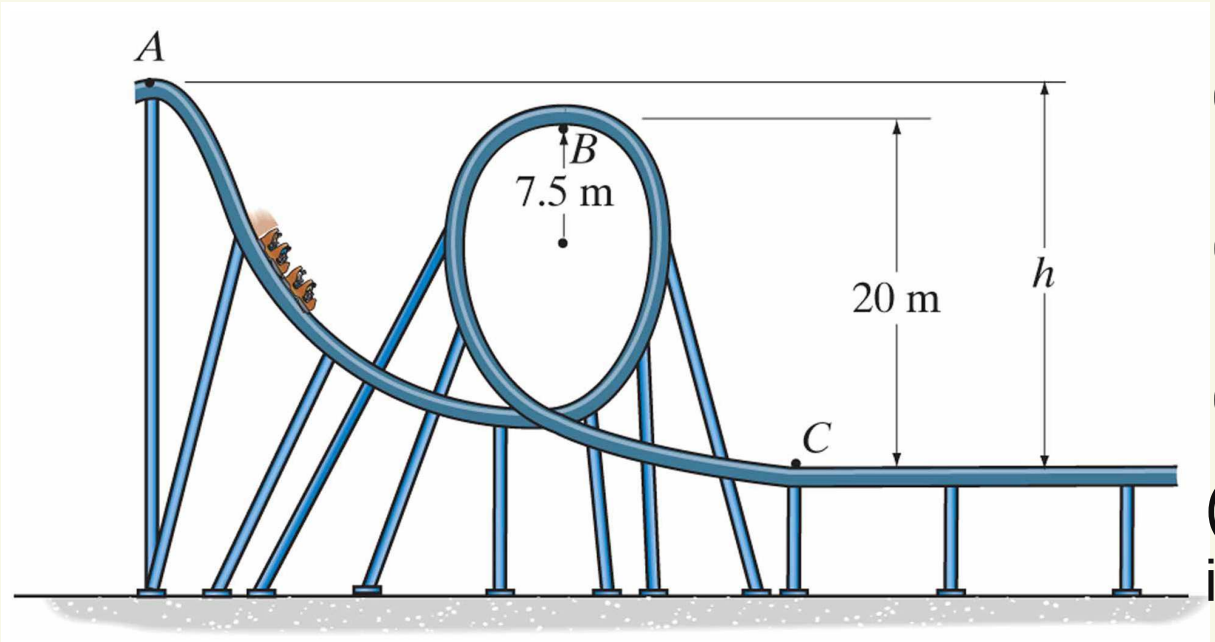

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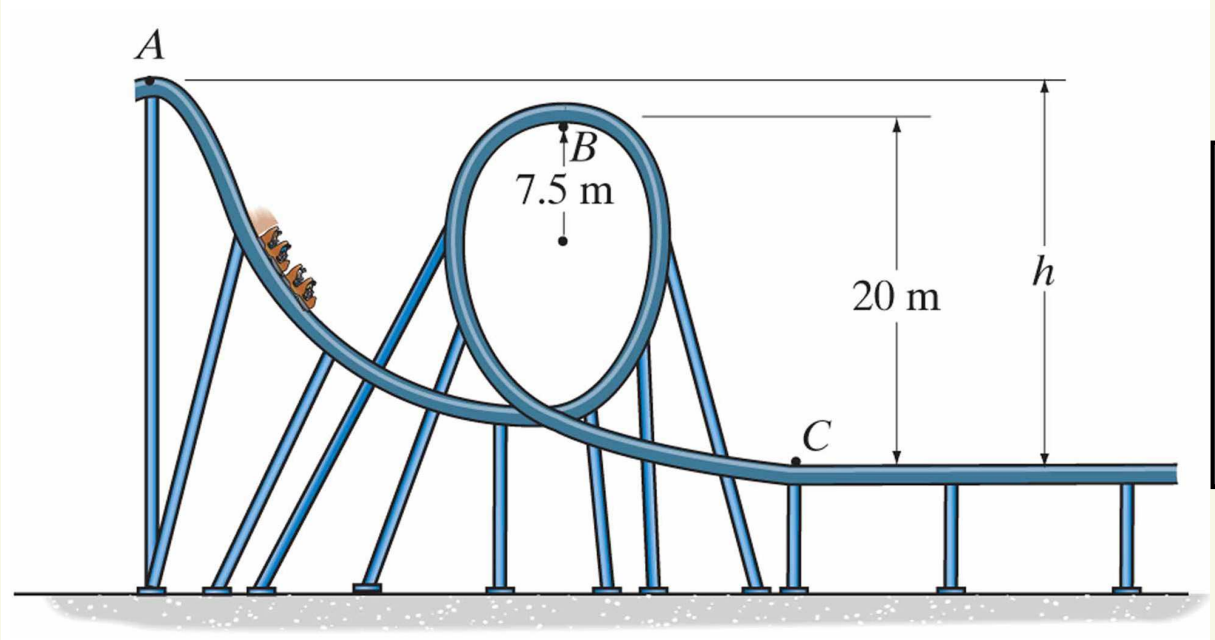

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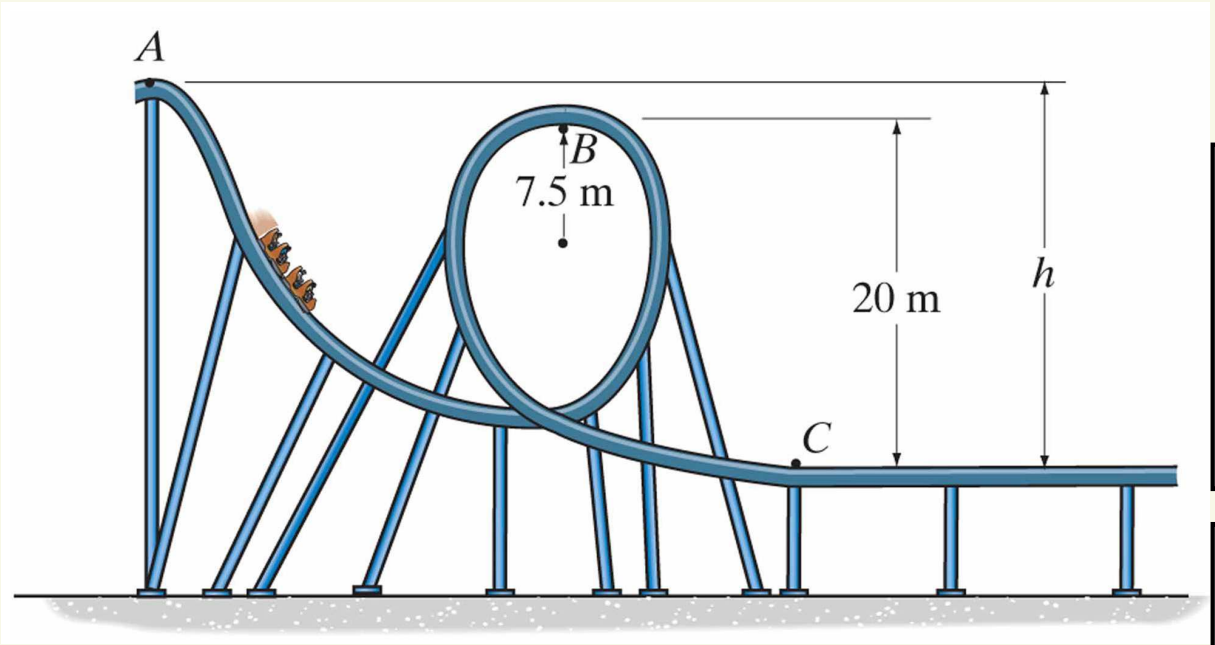

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$y = 0$ can be set wherever is most convenient