



Name: \_\_\_\_\_

Period: \_\_\_\_\_

### 3. Rope Climb

Heidi climbs 5m up a rope three times in 40 seconds. She has a mass of 50 kg.

A) What minimum force must Heidi apply to the rope in order to move upward?

B) What minimum amount of work must Heidi do to climb the rope?

C) What minimum amount of energy must Heidi expend to climb the rope?

D) What is Heidi's gravitational potential energy with respect to the ground when she is at the top of the rope?

E) If Heidi were to release the rope while at her highest point, with what velocity would she strike the ground? (Neglect air resistance).

F) Calculate Heidi's maximum kinetic energy if she were to release the rope while at her highest point.



### 4. Pull-ups

James perform 21 butterfly chest-to-bar pull-ups in 24 seconds.

A) With what frequency does James execute his pull-ups?

B) What is the period of each pull-up?

Name: \_\_\_\_\_

Period: \_\_\_\_\_

### 5. Box Jumps

Erin, weighing 500 newtons, jumps from the ground onto a 0.6-meter wood box 20 times in 52 seconds.

- A) How much work does Erin do in jumping from the ground onto the box?
  
  
  
  
  
  
  
  
  
  
- B) What minimum amount of energy must Erin expend in order to jump to the top of the box?
  
  
  
  
  
  
  
  
  
  
- C) What minimum velocity must Erin leave the ground with in order to reach the top of the box (neglect bending of legs for the purposes of this calculation).
  
  
  
  
  
  
  
  
  
  
- D) What is the minimum amount of energy Erin must expend to complete her 20 jumps?
  
  
  
  
  
  
  
  
  
  
- E) What average power does Erin expend during her 20 jumps?
  
  
  
  
  
  
  
  
  
  
- F) What is the **net** work done on Erin at the end of the exercise by **all** forces?



Work harder today -  
be smarter tomorrow.