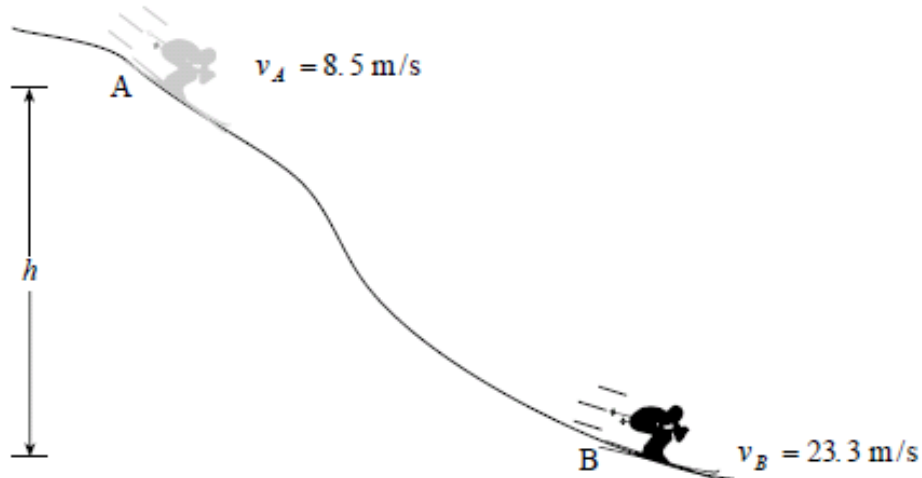
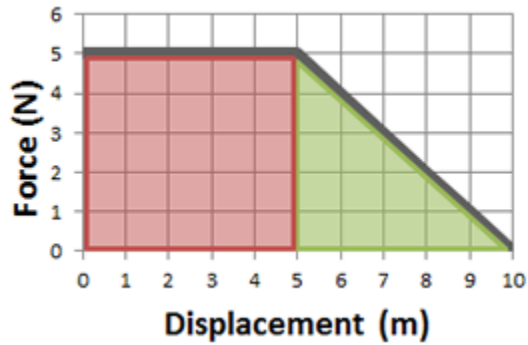


## Conservation of Energy and Work Examples:

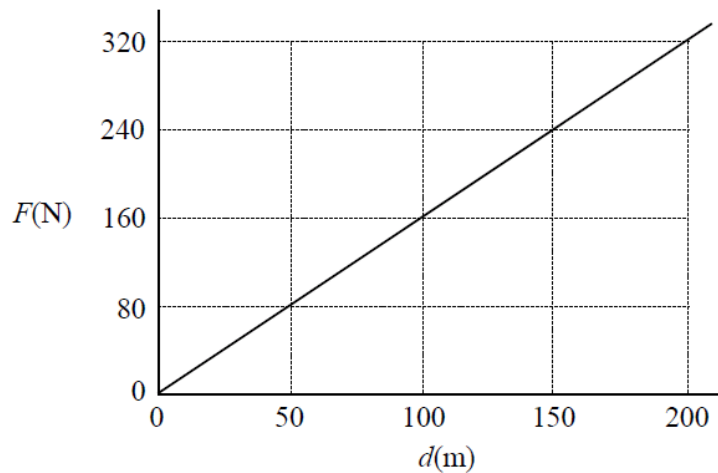
1. As a 62 kg skier descends from **A** to **B** her velocity increases from 8.5 m/s to 23.3 m/s. Friction between **A** and **B** generates 8 700 J of heat energy. Through what vertical height,  $h$ , did the skier descend?



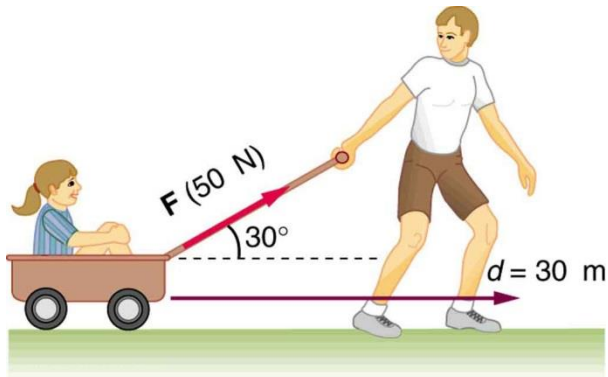
2. Find the Energy (work) required to move a textbook 10 meters if the force need to move it varies according to the graph below.



3. A 24 kg rocket car is initially at rest on a frictionless horizontal surface. The engine is ignited and the graph below shows thrust force,  $F$ , versus distance travelled,  $d$ , for the rocket car. Find the rocket car's speed after it has travelled 200 m.

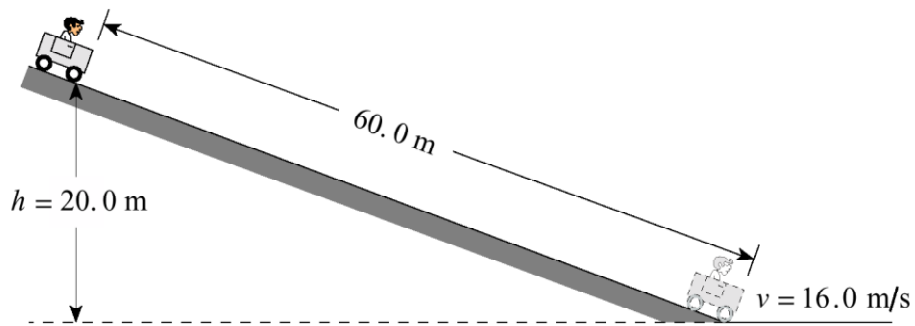


4. How much work is done by the boy pulling his sister 30.0 m in a wagon as shown in Figure below? Assume no friction acts on the wagon.



5.

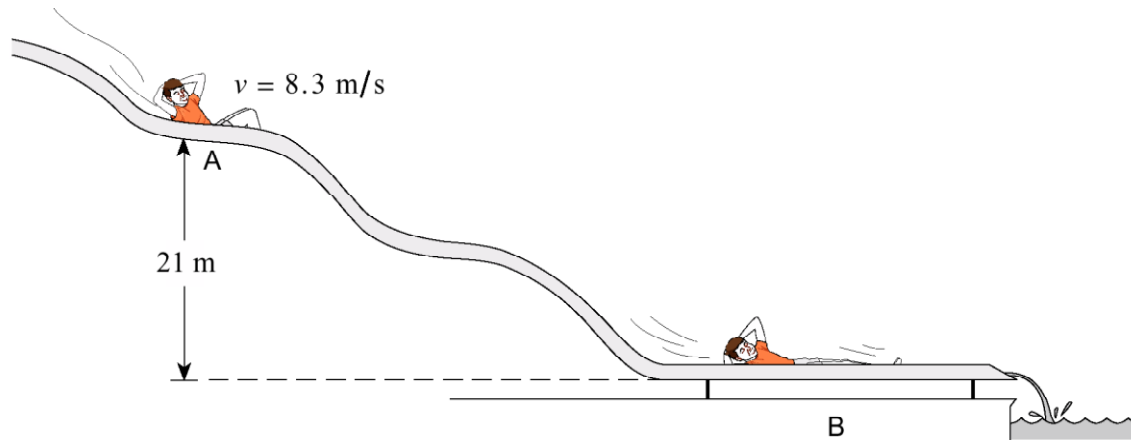
A 170 kg cart and rider start from rest on a 20.0 m high incline.



- a) How much energy is transformed to heat? **(5 marks)**
- b) What is the average force of friction acting on the cart? **(2 marks)**

6.

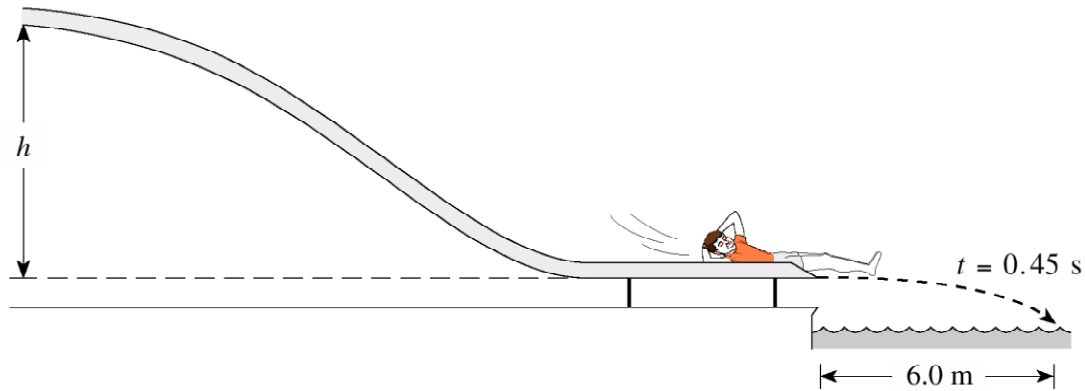
A 45 kg child on a water slide passes point A at 8.3 m/s.



As the child descends from A to B, 3 600 J of heat energy is created because of friction. What is his speed at B? **(7 marks)**

#7

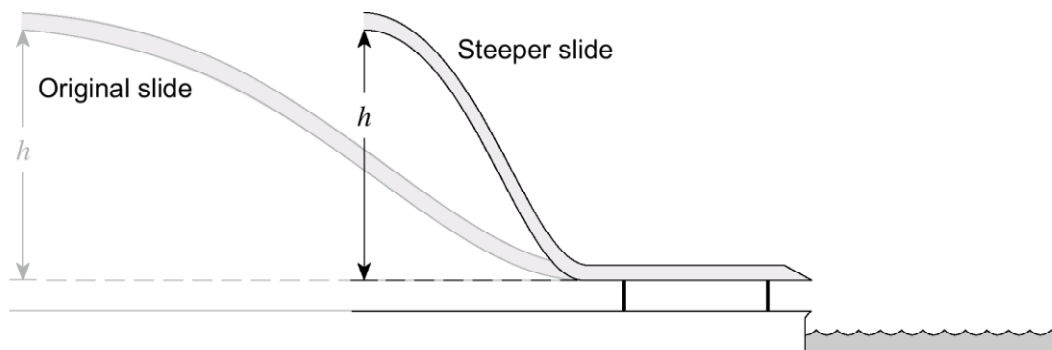
A water slide is made so that swimmers, starting from rest at the top, leave the end of the slide travelling horizontally as shown.



One person is observed to hit the water at a horizontal distance of 6.0 m from the end of the slide 0.45 s after leaving the slide. The effects of friction and air resistance are negligible.

a) From what vertical height,  $h$ , did the person start? **(5 marks)**

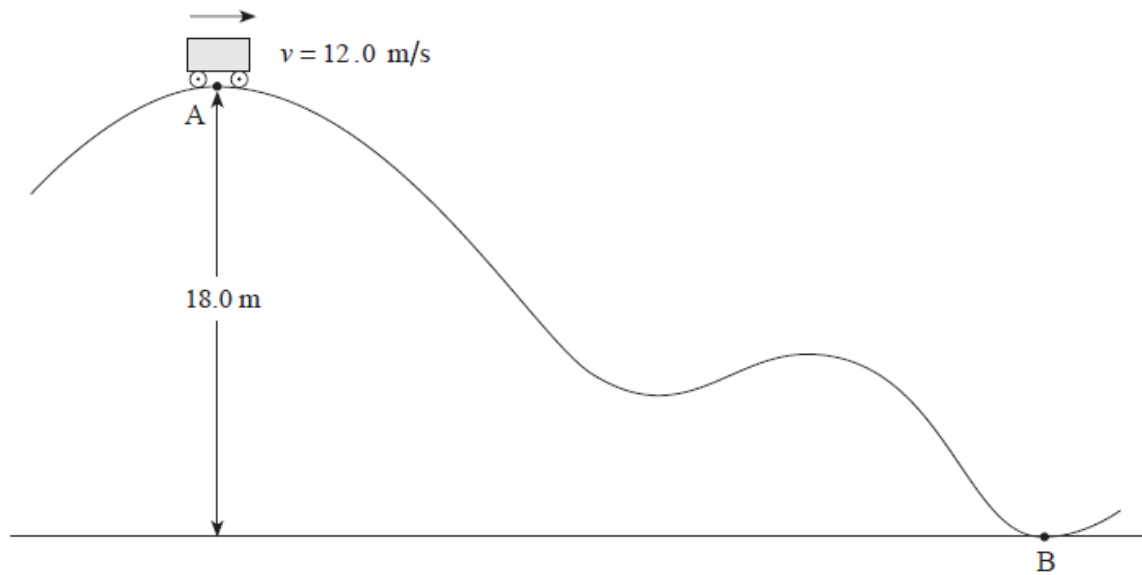
b) Another slide has the same vertical height,  $h$ , as the original slide, but has a much steeper slide angle.



The same person is observed to go down this steep slide. Using principles of physics, explain how the new horizontal distance from the edge of the slide compares with the first situation. The effects of friction and air resistance are negligible. **(4 marks)**

#8

A 250 kg roller coaster passes point A at 12.0 m/s.



What is the speed of the roller coaster at point B at the bottom of the hill if 8 500 J of energy is transformed to heat during the journey? **(7 marks)**