

# Chapter 7 - Exercises

# Exercise 1

How much work is needed to lift a bag of groceries that weights 200N to a height of 3 m?

# Exercise 2

- a) How much work is done in lifting a 100 N block of ice a vertical distance of 2m?
- b) What is the potential energy stored in this block of ice at the final position?

# Exercise 3

When you are driving at 90 km/h, how much distance do you need to stop , compared with driving at 30 km/h?

# Exercise 4

Objects can have momentum or energy. Can an object have work?

# Exercise 5

A moving car has kinetic energy. If it speeds up until it is going 4 times as fast, how much kinetic energy does it have in comparison?

# Exercise 6

Two cars are raised to the same elevation on service station lifts. If one car is twice as massive as the other, how do their gains of potential energies compare?

# Exercise 7

Which requires more work - lifting a 50 kg sack a vertical distance of 2m or a 25 kg sack a vertical distance of 4m?



## Exercise 8

You push a crate horizontally with 100N across a 10m factory floor. The friction between the crate and the floor is a steady 70N. How much kinetic energy is gained by the crate?

# Exercise 9

An apple hanging from a limb has potential energy because of its height. If it falls, what becomes of this energy just before it hits the ground? When it hits the ground?

# Exercise 10

Can a machine multiply input force?

# Exercise 11

Can a machine multiply input distance?

# Exercise 12

Can a machine multiply input energy?

# Exercise 13

What is the efficiency of a machine that miraculously converts all the input energy to useful output energy?

# Exercise 14

If an input of 100 J in a pulley system increases the potential energy of a load by 60J, what is the efficiency of the system?

# Exercise 15

If you push for a half hour or a whole hour against a stationary wall

- A) no work on the wall is done in either case.
- B) half as much work is done during the half hour.
- C) twice as much work is done during the half hour.
- D) it is impossible to determine how much work is done.



# Exercise 16

If you push an object a given distance, while applying twice the force, you do

- A) twice as much work.
- B) four times as much work.
- C) the same amount of work.
- D) half as much work.

# Exercise 17

If you do work on an object in one-third the usual time, your power output is

- A) one third the usual power output.
- B) the usual power output.
- C) three times the usual power output.
- D) impossible to predict without additional information.

# Exercise 18

An object lifted 10 meters gains 200 J of potential energy. If the same object is lifted 20 meters, its potential energy gain is

- A) half as much.
- B) the same.
- C) twice as much.
- D) four times as much.
- E) more than four times as much.

# Exercise 19

An object that has kinetic energy must be

- A) moving.
- B) falling.
- C) at an elevated position.
- D) at rest.
- E) none of these

# Exercise 20

An object may have potential energy because of its

- A) speed.
- B) acceleration.
- C) momentum.
- D) location.
- E) none of these

# Exercise 21

A bow is drawn so that it has 40 J of potential energy. When fired, the arrow will ideally have a kinetic energy that is

- A) less than 40 J.
- B) more than 40 J.
- C) 40 J.
- D) impossible to predict without additional information

# Exercise 22

After rolling halfway down an incline, a marble's kinetic energy is

- A) less than its potential energy.
- B) greater than its potential energy.
- C) the same as its potential energy.
- D) impossible to determine.

# Exercise 23

A ball rolling down an incline has its minimum speed

- A) at the end the incline.
- B) half way down the incline.
- C) near the top of the incline.
- D) impossible to predict without knowing the ball's mass
- E) impossible to predict without knowing the size of the ball



# Exercise 24

Both a 50-kg sack is lifted 2 meters from the ground and a 25-kg sack is lifted 4 meters in the same time. The power expended in raising the 50-kg sack is

- A) twice as much.
- B) half as much.
- C) the same.
- D) impossible to predict without further information

# Exercise 25

It takes 40 J to push a large box 4 m across a floor. Assuming the push is in the same direction as the move, what is the magnitude of the force on the box?

- A) 4 N
- B) 10 N
- C) 40 N
- D) 160 N
- E) none of these

# Exercise 26

Using 1000 J of work, a toy elevator is raised from the ground floor to the second floor in 20 seconds. The power needed to do this job was

- A) 20 W.
- B) 50 W.
- C) 100 W.
- D) 1000 W.
- E) 20,000 W.

# Exercise 27

A ball is projected into the air with 100 J of kinetic energy which is transformed to gravitational potential energy at the top of its trajectory. When it returns to its original level after encountering air resistance, its kinetic energy is

- A) less than 100 J.
- B) more than 100 J.
- C) 100 J.
- D) not enough information given

# Exercise 28

A woman carries a heavy box across a room at a constant speed. How much work does she do on the box while walking?

- A) none
- B) More information is needed about the weight of the box.
- C) More information is needed about the distance walked.
- D) More information is needed about the speed and the distance.
- E) More information is needed about the weight, distance, and her speed.