

## #6 Motion With Constant Acceleration, Free Fall Post-class

Due: 11:00am on Wednesday, September 5, 2012

**Note:** You will receive no credit for late submissions. To learn more, read your instructor's [Grading Policy](#)

### Exercise 2.33

A spaceship ferrying workers to Moon Base I takes a straight-line path from the earth to the moon, a distance of 384000 **km**. Suppose it accelerates at an acceleration  $19.5 \text{ m/s}^2$  for the first time interval 14.3 **min** of the trip, then travels at constant speed until the last time interval 14.3 **min**, when it accelerates at  $-19.5 \text{ m/s}^2$ , just coming to rest as it reaches the moon.

#### Part A

What is the maximum speed attained?

ANSWER:

$$v = 16.7 \text{ km/s}$$

**Correct**

#### Part B

What fraction of the total distance is traveled at constant speed?

ANSWER:

0.963

**Correct**

**Part C**

What total time is required for the trip?

ANSWER:

$$t = 2.38 \times 10^4 \text{ s}$$

**Correct**

**Exercise 2.49**

A 15-kg rock is dropped from rest on the earth and reaches the ground in 1.75 s. When it is dropped from the same height on Saturn's satellite Enceladus, it reaches the ground in 18.6 s.

**Part A**

What is the acceleration due to gravity on Enceladus?

ANSWER:

$$g_{\text{En}} = 8.68 \times 10^{-2} \text{ m/s}^2$$

**Correct**

**Exercise 2.25: Automobile Airbags**

The human body can survive a negative acceleration trauma incident (sudden stop) if the magnitude of the acceleration is less than **250 m/s<sup>2</sup>**.

---

**Part A**

If you are in an automobile accident with an initial speed of  $104 \text{ km/h}$  and are stopped by an airbag that inflates from the dashboard, over what distance must the airbag stop you for you to survive the crash?

ANSWER:

$$x = 1.67 \text{ m}$$

**Correct**

---

**Exercise 2.39**

---

**Part A**

If a flea can jump straight up to a height of  $0.440 \text{ m}$ , what is its initial speed as it leaves the ground?

ANSWER:

$$v = 2.94 \text{ m/s}$$

**Correct**

---

**Part B**

How long is it in the air?

ANSWER:

$$t = 0.599 \text{ s}$$

**Correct**

### Score Summary:

Your score on this assignment is 99.4%.  
You received 39.75 out of a possible total of 40 points.