Chapter 1   Linear Motion

Example Problems

1.5 Free Fall

E1. A monkey drops a banana from the top of a tall tree. The banana strikes the ground 3.4 s later. How far did the banana fall and what was its velocity as it hit the ground?

Record all givens, draw a picture, arrow all vectors, write the formula, substitute and solve

$g =$

$v_o =$

$v_f =$

$\Delta h =$

$t =$

a) _____ ←——— units   b) _____ ←——— units

E2. A worker accidentally drops a wrench down an elevator shaft of a tall building. Calculate how far the wrench will have fallen and how fast it will be moving after 1.7 seconds.

Record all givens, draw a picture, arrow all vectors, write the formula, substitute and solve
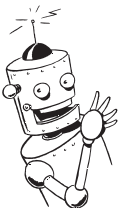
$g =$

$v_o =$

$v_f =$

$\Delta h =$

$t =$

a) _____ ←——— units   b) _____ ←——— units

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E3. At Six Flags over Texas there is a popular ride known as "The Scream". Passengers are lifted 62.5 meters above the ground and then dropped. Calculate the time the riders are in free fall and how fast they are moving at the bottom of the ride.

Record all givens, draw a picture, arrow all vectors, write the formula, substitute and solve

$g =$

$v_o =$

$v_f =$

$\Delta h =$

$t =$

a) _____ ⟵ units   b) _____ ⟵ units

E4. A monkey throws a coconut straight down at a gorilla standing 10 meters bellow him. The coconut leave the monkey's hand traveling 5 m/s, calculate how fast the coconut is moving when it hits the gorilla on the head and how long it was in the air.

Record all givens, draw a picture, arrow all vectors, write the formula, substitute and solve
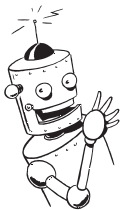
$g =$

$v_o =$

$v_f =$

$\Delta h =$

$t =$

a) _____ ⟵ units   b) _____ ⟵ units

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E5. An astronaut is standing on top of a 6.0 meter tall platform on the surface of Mars. The astronaut drops a hammer and the hammer hits the ground 1.78 seconds after release. Calculate the acceleration of gravity on Mars.

Record all givens, draw a picture, arrow all vectors, write the formula, substitute and solve

$g =$

$v_o =$

$v_f =$

$\Delta h =$

$t =$

a) _____ ⟵ units

E6. An astronaut is standing on top of a 6.0 meter tall platform on the surface of Jupiter. The astronaut drops a hammer and the hammer hits the ground 0.68 seconds after release. Calculate the acceleration of gravity on Jupiter.

Record all givens, draw a picture, arrow all vectors, write the formula, substitute and solve
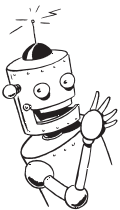
$g =$

$v_o =$

$v_f =$

$\Delta h =$

$t =$

a) _____ ⟵ units

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Name _____ Period _____ Date _____

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Student Problems

1.5 Free Fall

1. You are standing on top of the observation deck of the UT Tower at the University of Texas campus. You want to know how high up you are so you drop a rock and time its fall. You find it takes 3.79 seconds for the rock to hit the ground below. Calculate the height of the UT tower and the velocity of the rock as it hits the ground.

Record all givens, draw a picture, arrow all vectors, write the formula, substitute and solve

$g =$

$v_o =$

$v_f =$

$\Delta h =$

$t =$

a) _____ ⟵ units   b) _____ ⟵ units

2. A monkey drops a coconut from the side of a hovering helicopter. How far will the coconut have fallen and how fast will it be moving after 6.5 seconds?

Record all givens, draw a picture, arrow all vectors, write the formula, substitute and solve
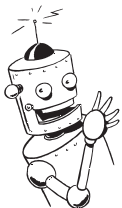
$g =$

$v_o =$

$v_f =$

$\Delta h =$

$t =$

a) _____ ⟵ units   b) _____ ⟵ units

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3. A monkey is going to do a bungee jump from a 120 meter high bridge. The monkey waves to the crowd below and then jumps. Unknown to the monkey he forgot to attach the bungee cord to the bridge. How long does the monkey have to think about his error and how fast will the monkey be traveling when he hits the ground?

Record all givens, draw a picture, arrow all vectors, write the formula, substitute and solve

$g =$

$v_o =$

$v_f =$

$\Delta h =$

$t =$

a) _____ ⟵ units   b) _____ ⟵ units

4. A monkey drops a penny from the observation deck located on the 102nd floor of the Empire State building in New York City. The observation deck is 1,250 ft (381 meters) above the ground. Calculate how long it will take the penny to hit the ground and how fast it will be moving upon impact.

Record all givens, draw a picture, arrow all vectors, write the formula, substitute and solve
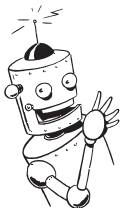
$g =$

$v_o =$

$v_f =$

$\Delta h =$

$t =$

a) _____ ⟵ units   b) _____ ⟵ units

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5. A ball is thrown down towards the ground from a window 50 meters above the ground. If the initial speed of the ball upon release is 12.0 m/s, how fast will the ball be traveling when it hits the ground and how long will the ball will be in the air?

Record all givens, draw a picture, arrow all vectors, write the formula, substitute and solve

$g =$

$v_o =$

$v_f =$

$\Delta h =$

$t =$

a) _____ ⟵ units   b) _____ ⟵ units

6. A stone is thrown vertically downward with an initial speed of 8 m/s from the roof of a 30 meter high building. Calculate the speed of the stone just before it strikes the ground and how long it will be in the air.

Record all givens, draw a picture, arrow all vectors, write the formula, substitute and solve
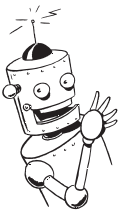
$g =$

$v_o =$

$v_f =$

$\Delta h =$

$t =$

a) _____ ⟵ units   b) _____ ⟵ units

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7. An astronaut is standing on a 6.0 meter tall platform on the surface of the Moon when he drops a hammer. If the hammer hits the ground in 2.7 seconds, calculate the acceleration of gravity on the moon.

Record all givens, draw a picture, arrow all vectors, write the formula, substitute and solve

$g =$

$v_o =$

$v_f =$

$\Delta h =$

$t =$

a) _____ ⟵——— units

8. On a planet ruled by apes, a rock is dropped from rest and takes 0.63 seconds to falls a vertical distance of 0.72 meter. Calculate the acceleration of gravity on this so called "Planet of the Apes".

Record all givens, draw a picture, arrow all vectors, write the formula, substitute and solve

$g =$

$v_o =$

$v_f =$

$\Delta h =$

$t =$

a) _____ ⟵——— units