

Chapter 1 Linear Motion

Example Problems

1.6 Going Up

E1. A ball is thrown straight upwards with an initial velocity of 15 m/s. Calculate how long the ball will remain in the air and the maximum height the ball reaches.

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

$g =$

$v_o =$

$v_f =$

$\Delta h =$

$t_{up} =$

$t_{total} =$

a) _____ ← units b) _____ ← units

E2. A monkey is trying out to be a ballerina. The monkey performs a pirouette jumping straight up in the air with an initial speed of 1.8 m/s. Calculate how long the monkey is in the air and how high she goes.

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

$g =$

$v_o =$

$v_f =$

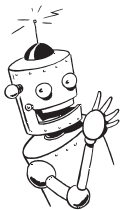
$\Delta h =$

$t_{up} =$

$t_{total} =$

a) _____ ← units b) _____ ← units

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E3. The Steamboat Geyser in Yellowstone National Park, Wyoming, is capable of shooting hot water straight up from the ground with a speed of 48.0 m/s. Calculate how high up the geyser can go.

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

$g =$

$v_o =$

$v_f =$

$\Delta h =$

$t_{up} =$

$t_{total} =$

a) _____ ← units

E4. During a baseball game, a batter hits a pop-up. The ball goes straight upwards into the air and then comes back down to the ground in 6.0 seconds, calculate how fast the ball came off the bat and how high the ball went.

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

$g =$

$v_o =$

$v_f =$

$\Delta h =$

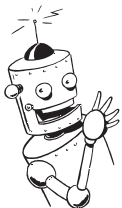
$t_{up} =$

$t_{total} =$

a) _____ ← units

b) _____ ← units

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E5. A startled armadillo jumps straight up into the air. If the total time the armadillo is in the air is 0.87 seconds, how high did the armadillo rise and what was the original velocity of the jump?

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

$g =$

$v_o =$

$v_f =$

$\Delta h =$

$t_{up} =$

$t_{total} =$

a) _____ ← units b) _____ ← units

E6. With what initial speed must a ball be thrown upward in order to reach a height of 24.0 meters above a point of release and how long will the ball stay in the air?

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

$g =$

$v_o =$

$v_f =$

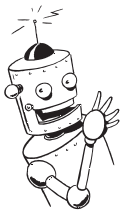
$\Delta h =$

$t_{up} =$

$t_{total} =$

a) _____ ← units b) _____ ← units

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E7. Former NBA player Michael Jordan has an impressive vertical jump of 1.22 meters. What initial velocity is needed to reach this height and what is the total hang time?

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

$g =$

$v_o =$

$v_f =$

$\Delta h =$

$t_{up} =$

$t_{total} =$

a) _____ ← units b) _____ ← units

E8. A stone is thrown vertically upwards from the roof of a 50 meter tall building. The stone strikes the ground 5 seconds after it is released. With what speed was the stone thrown and with what speed did the stone hit the ground?

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

$g =$

$v_o =$

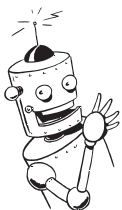
$v_f =$

$\Delta h =$

$t =$

a) _____ ← units b) _____ ← units

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Student Problems

1.6 Going Up

1. A basketball player jumped straight up into the air and grabs a rebound. If she was in the air for a total of 0.80 second (up and down), how high did she jump?

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

$$g =$$

$$v_o =$$

$$v_f =$$

$$\Delta h =$$

$$t_{up} =$$

$$t_{total} =$$

a) _____ ← units

2. A bullet is fired from a gun pointed straight up into the air. The bullet leaves the muzzle of the gun with a velocity of 460 m/s. How long did it take the bullet to reach its maximum height and how high did the bullet travel?

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

$$g =$$

$$v_o =$$

$$v_f =$$

$$\Delta h =$$

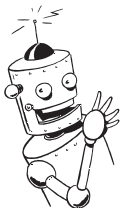
$$t_{up} =$$

$$t_{total} =$$

a) _____ ← units

b) _____ ← units

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3. A monkey throws a banana vertically upward into the air and it takes 3.5 seconds to reach its highest point. What was the total time the banana was in the air and what was the maximum height the banana attained?

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

$g =$

$v_o =$

$v_f =$

$\Delta h =$

$t_{up} =$

$t_{total} =$

a) _____ ← units b) _____ ← units

4. A ball is thrown vertically upward and is in the air for a total of 4.6 seconds (up and down), how long did it take the ball to reach it's maximum height and what was the maximum height attained by the ball?

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

$g =$

$v_o =$

$v_f =$

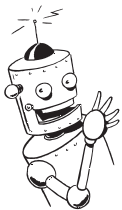
$\Delta h =$

$t_{up} =$

$t_{total} =$

a) _____ ← units b) _____ ← units

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5. A monkey is trying out to be a basketball player. The monkey try to perform a dunk. The monkey leaves the ground with an initial speed of 2.8 m/s. If the hoop is 3.05 m from the ground, how long is the monkey in the air and does he make the dunk?

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

$g =$

$v_o =$

$v_f =$

$\Delta h =$

$t_{up} =$

$t_{total} =$

a) _____ ← units

6. At the beginning of a basketball game, a referee tosses the ball straight up into the air with a speed of 4.6 m/s. A player cannot touch the ball until the ball reaches it's maximum height. What is the minimum time that a player must wait before touching the ball and how high does the ball go from it point of released?

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

$g =$

$v_o =$

$v_f =$

$\Delta h =$

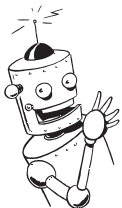
$t_{up} =$

$t_{total} =$

a) _____ ← units

b) _____ ← units

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7. At what speed do you have to throw a ball upwards into the air in order for the ball to reach a maximum height of 15 meters and how long will the ball be in the air?

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

$g =$

$v_o =$

$v_f =$

$\Delta h =$

$t_{up} =$

$t_{total} =$

a) _____ ← units b) _____ ← units

8. The world record for a vertical jump was achieved by Kevin Bania. Kevin jumped an incredible 1.626 meters (64 inches) from a standing start in 2013, calculate how long Kevin was in the air and how fast he was going when he left the ground.

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

$g =$

$v_o =$

$v_f =$

$\Delta h =$

$t_{up} =$

$t_{total} =$

a) _____ ← units b) _____ ← units

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