Kinematics #3 : Projectiles ______________________

(name)

1. A golf ball was struck from the first tee at Lunar Golf and Country Club. It was given a velocity of 48 $^{m}/_{s}$ at an angle of 40.° to the horizontal. On the moon, g = 1.6 $^{m}/_{s}{}^{2}$. (a) What are the vertical and horizontal components of the ball's initial velocity?

v_x = __________.

v_y = __________.

(b) For what interval of time is the ball in flight?

t = __________.

(c) How far will the ball travel horizontally?

d_y = __________.

2. A rock is thrown horizontally from the top of a cliff 98 m high, with a horizontal speed of 27 $^{m}/_{s}$. (a) For what interval of time is the rock in the air?

t = __________.

(b) How far from the base of the cliff does the rock land?

d_x = __________.

(c) With what velocity does the rock hit?

v = __________.

3. An earth bound golfer strikes a golf ball giving it a velocity of 48 $^m/_s$ at an angle of 50.° to the horizontal.(a) What are the vertical and horizontal components of the ball's initial velocity?

v_x = __________.

v_y = __________.

(b) How long is the ball in the air?

t = __________.

(c) What is the horizontal distance covered by the ball while in flight?

d_x = __________.

(d) What velocity does the ball have at the top of its trajectory?

v = __________.

4. A rescue pilot wishes to drop a package of emergency supplies so that it lands as close as possible to a target. If the plane travels with a velocity of 81 $^m/_s$ and is flying 125 m above the target, how far away (horizontally) from the target must the rescue pilot drop the package?

d_x = __________.

Answers: 1. a) 37 $^m/_s$, 31 $^m/_s$ b) 39 s c) 1.4×10^3 m 2. a) 4.5 s b) 120 m c)51 $^m/_s$ [58° below horiz] 3. a) 37 $^m/_s$, 31 $^m/_s$ b) 7.5 s c) 230 m d) 31 $^m/_s$ 4. 410 m

Kinematics #4

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(name)

1. A ball is thrown with a velocity of 24 $^m/_s$ at an angle of 30.° to the horizontal.
(a) What are the vertical and horizontal components of the initial velocity?

v_x = ____________.
v_y = ____________.

(b) How long is the ball in the air?

t = ____________.

(c) How far away will the ball land?

d_x = ____________.

(d) To what maximum height will the ball rise?

d_y = ____________.

(e) With what velocity will the ball land?

v = ____________.

2. A youngster hits a baseball giving it a velocity of 22 $^m/_s$ at an angle of 62° with the horizontal. How far will the ball travel before a fielder catches it (assuming the fielder catches the ball at the same height that it is hit.)

d_x = ____________.

3. A pebble is fired from a slingshot with a velocity of 30. $^m/_s$. (a) If it is fired at an angle of 30.° to the horizontal, what height will it reach?

d_y = __________.

(b) If its flight is interrupted be a vertical wall 12 m away, how high above the ground will it hit the wall?

d_y = __________.

4. A fireman is standing on top of a building 20. m high. He finds that if he holds the hose so that water issues from it horizontally at 12 $^m/_s$, the water will hit a burning wall of an adjacent building at a height of 15 m above the ground. What is the horizontal distance from the fireman to the building?

d_x = __________.

Answers: 1. a) 21. $^m/_s$, 12 $^m/_s$ b) 2.4 s c) 51 m d) 7.3 m e) 24 $^m/_s$ [30° above horiz]
2. 41 m 3. a) 11 m b) 5.9 m up 4. 12 m

Kinematics #5 ______________________

(name)

1. A diver takes off with a speed of 8.0 $^{m}/_{s}$ from a 3.0 m high diving board at 30.° above the horizontal. How much later does she strike the water?

t = ___________.

2. A pilot cuts loose two fuel tanks in an effort to gain altitude. At the time of release, the plane was 120 m above the ground and travelling upward at 30° to the horizontal, with a speed of 84 $^{m}/_{s}$. For how long did the tanks fall and with what speed did they hit the ground?

v_f = ___________.

t = ___________.

3. On level ground, a ball is thrown forward and upward. The ball is in the air 2.0 s and strikes the ground 30.m from the thrower. What was the ball's initial velocity?

v_i = __________.

4. An archer standing on the back of a pickup truck moving at 28 $^m/_s$ fires an arrow straight up at a duck flying directly overhead. The archer misses the duck! The arrow was fired with an initial velocity of 49 $^m/_s$ relative to the truck.

(a) For how long will the arrow be in the air?

t = __________.

(b) How far will the truck travel while the arrow is in the air?

d = __________.

(c) Where, in relation to the luckless archer, will the arrow come down? Will the archer have to 'duck'?

Answers: 1. 1.3 s 2. 11s, 97 $^m/_s$[41° below horiz] 3. 18 $^m/_s$ [33° above horiz]
4. a) 10. s b) 280 m c) on top of the archer, he needs to 'duck'!