Drawing Projectile Motion Graphs

A projectile is shot from the ground and lands on the ground. Its initial velocity is 26 m/s at 49°.

1. Calculate the initial x and y velocities:

2. Calculate the time the object is in the air:

3. Calculate the range (final x position):

4. Fill in the data tables at the right, doing whatever additional calculations that are necessary.

y-direction					
t (sec)	0	t/4	t/2	3t/4	t
a (m/s^2)					
y (m)					
v (m/s)					

x-direction					
t (sec)	0	t/4	t/2	3t/4	t
a (m/s^2)					
x (m)					
v (m/s)					

5. Transfer your table information to the duplicate tables on the back.

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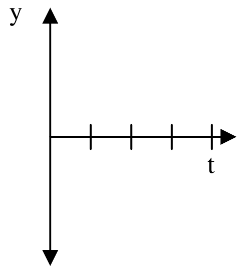
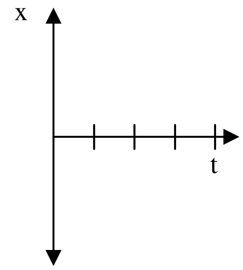
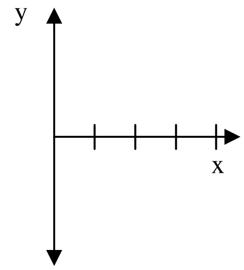
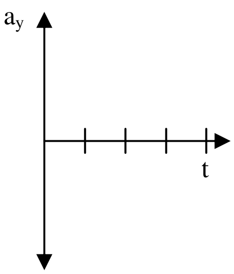
a (m/s^2)					
x (m)					
v (m/s)					

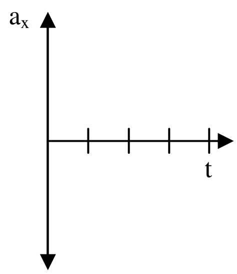
6. Use your data tables to draw the following graphs.

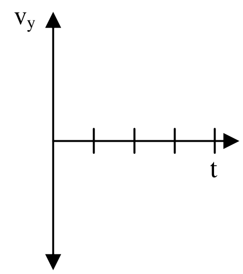


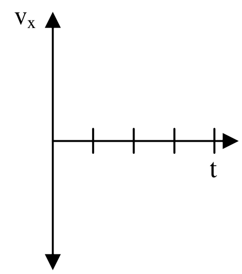












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y (m)					
v (m/s)					

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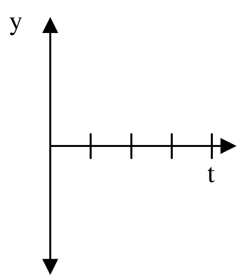

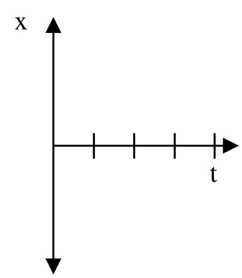

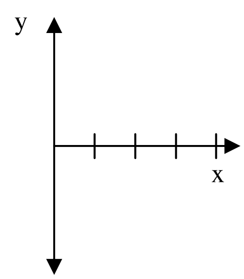

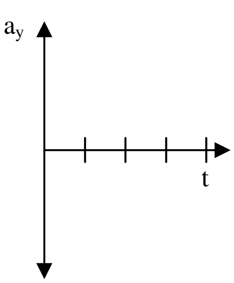

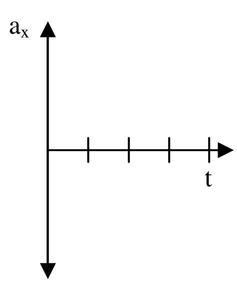

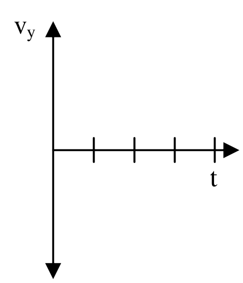

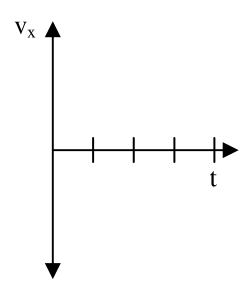

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1. Calculate the initial x and y velocities:
$V_y = 26\sin 49° = 19.6\ m/s$ | $V_x = 26\cos 49° = 17.1\ m/s$

2. Calculate the time the object is in the air:
$V_f = V_i + at$
$-19.6 = 19.6 - 9.8t$
$-39.2 = -9.8t$
$t = 4 sec$

3. Calculate the range (final x position):
$S = \frac{D}{T}$ $D = ST = 17.1(4) = 68.4\ m$

4. Fill in the data tables at the right, doing whatever additional calculations that are necessary.

$V_f^2 = V_i^2 + 2a\Delta y$ (at top)
$0 = 19.6^2 + 2(-9.8)\Delta y$
$0 = 384.16 - 19.6\Delta y$
$-384.16 = -19.6\Delta y$
$\Delta y = 19.6\ m$

at 1sec:
$\Delta y = V_i t + \frac{1}{2}at^2$
$\Delta y = 19.6(1) - 4.9(1^2)$
$\Delta y = 14.7m$
V at 1sec:
$V_f = V_i + at = 19.6 - 9.8(1)$
$= 9.8\ m/s$

at 3sec:
$\Delta y = V_i t + \frac{1}{2}at^2$
$\Delta y = 19.6(3) - 4.9(3^2)$
$\Delta y = 14.7m$

at 3sec
$V_f = V_i + at$
$V_f = 19.6 - 9.8(3)$
$= -9.8\ m/s$

5. Transfer your table information to the duplicate tables on the back.

y-direction					
t	0	t/4	t/2	3t/4	t
a m/s^2	-g	→			
y (m)	0	14.7m	19.6	14.7	0
v m/s	19.6	9.8m/s	0	-9.8	-19.6

x-direction					4
t	0	t/4	t/2	3t/4	t
a	0	→			
x(m)	0	17.1	34.2	51.3	68.4
v	17.1	→			

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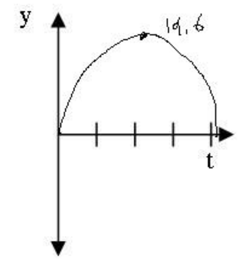

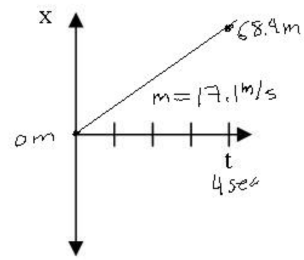

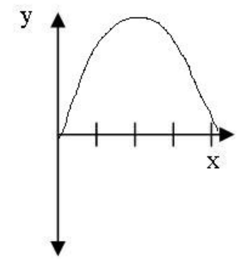

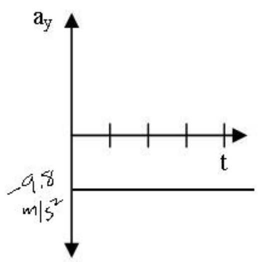

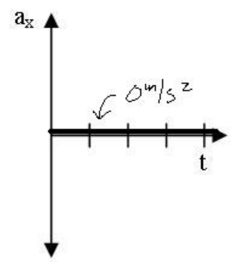

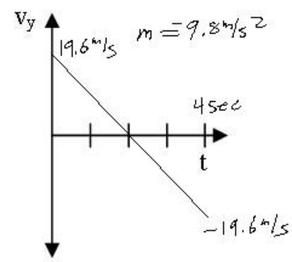

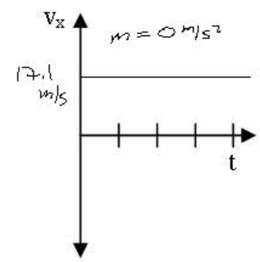

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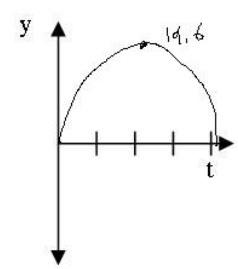

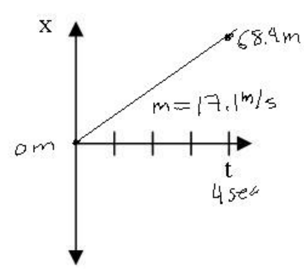

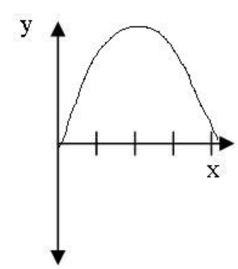

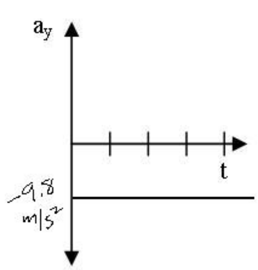

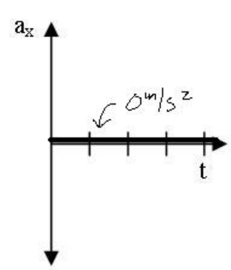

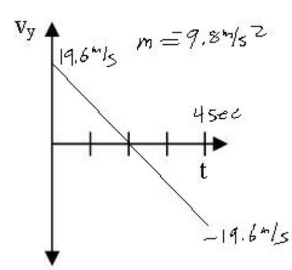

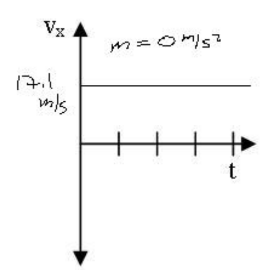

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