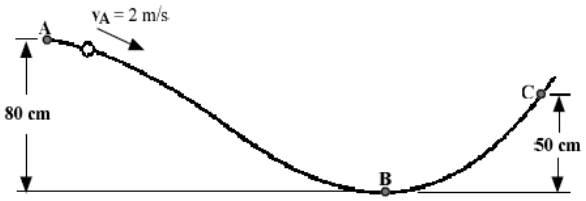
Name:_____ Date:_____

Dr. Croom's Physics Chapter 5B: Oscillatory Motion & Energy

Nonconservation of Energy (ANSWER KEY)

Solve the following problems

1. Suppose the 15-g bead in figure below has a velocity of 2 m/s at A, and it stops at point C. The length of the wire from A to C is 2.50 m. (**HINT**: Don't forget SI units!!)
How large is the **average friction force** ***f*** that opposed the motion of the bead?



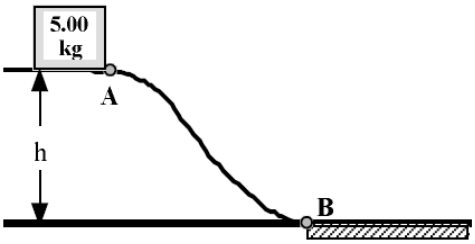
	A	B			
E_K	.03	0			
E_{pg}	.1176	.0735			
E_{pe}	0	0			
Heat	0	.0741			
E_T	.1476	.1476			
v	2	0			
h	.8	.5			
x	0	0			
Ff	0	0.0296			

2. A 5.00-kg body is placed at the top of the track, position A, 2.00 m above the base of the track, as shown in the diagram.

a) Find the **total energy** of the block,

b) The block is allowed to slide from rest down the frictionless track to the position B. Find the **velocity** of the body at B.

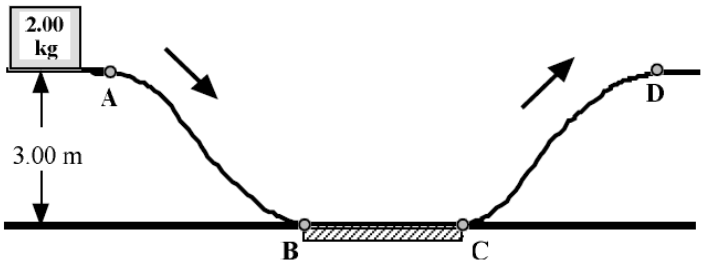
c) The block then moves over the rough surface where $\mu_k = 0.300$. **How far** will the block move before coming *to rest*?



	A	B	C		
E_K	0	98	0		
E_{pg}	98	0	0		
E_{pe}	0	0	0		
Heat	0	0	98		
E_T	98	98	98		
v	0	9.89	0		
h	2	0	0		
x	0	0	0		

d=W/F =98/5.88 = 16.6meters

3.



A 2.00-kg block is placed at the position A on the track that is 3.00 m above the ground. Paths **AB** and **CD** are frictionless, while section **BC** is rough with a $\mu_k = 0.350$ and a length of 1.50 m. Find:

a) the **total energy** of the block at **A**
b) the **velocity** of the block at **B**
c) the **energy** lost along path **BC**
d) **how high** the block rises along the path **CD**.

	A	B	C	D	
E_K	0	58.8	48.5	0	
E_{pg}	58.8	0	0	48.5	
E_{pe}	0	0	0	0	
Heat	0	0	10.3	10.3	
E_T	58.8	58.8	58.8	58.8	
v	0	7.7	6.96	0	
h	3	0	0	2.47	
x	0	0	0	0	

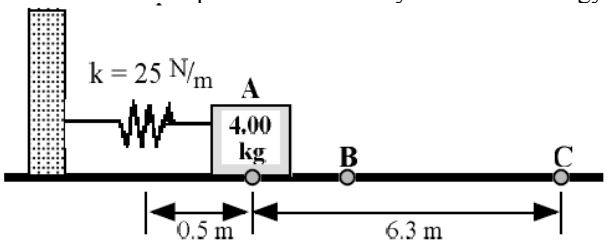
Name:_____ Date:_____

Dr. Croom's Physics Chapter 5B: Oscillatory Motion & Energy

A spring is compressed 0.5 m on a rough surface.

a) Complete an **energy table** for this diagram.

b) Calculate μ_k from the given information.

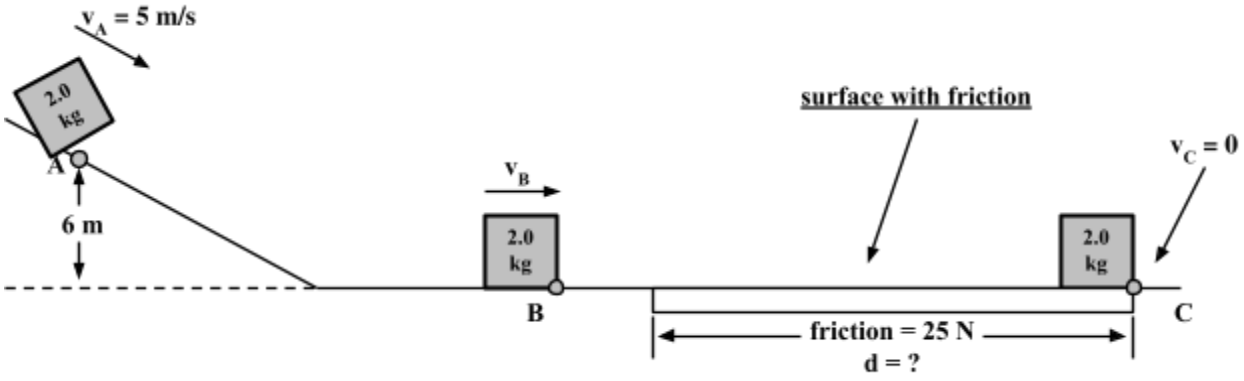


4.

	A	B	C		
E_K	0	3.125	0		
E_{pg}	0	0	0		
E_{pe}	3.125	0	0		
Heat	0	0	3.125		
E_T	3.125	3.125	3.125		
v	0	1.25	0		
h	0	0	0		
x	.5	0	0		
Ff	0	0	.5		

$\mu = Ff/Fn = .5/39.2 = 0.013$

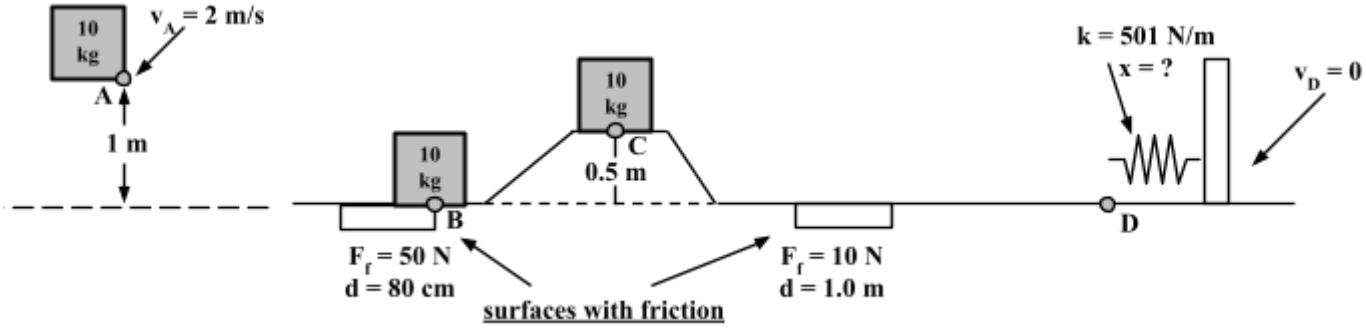
5. Use an energy table to describe the energy at each of the points in the picture below. What is the distance the block travels before it stops?



	A	B	C		
E_K	25	142.6	0		
E_{pg}	117.6	0	0		
E_{pe}	0	0	0		
Heat	0	0	142.6		
E_T	142.6	142.6	142.6		
v	5	11.9	0		
h	6	0	0		
x	0	0	0		
Ff	0	0	25		

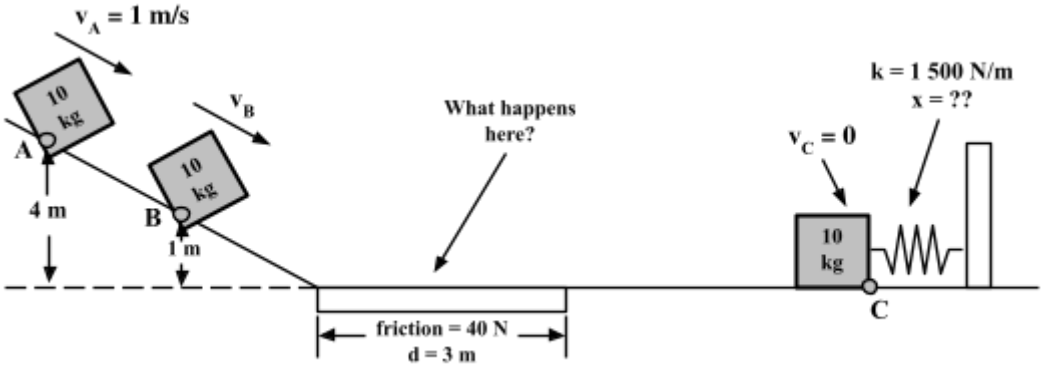
d=W/Ff = 142.6/25= 5.7m

6. Use an energy table to describe the energy at each of the points in the picture below.



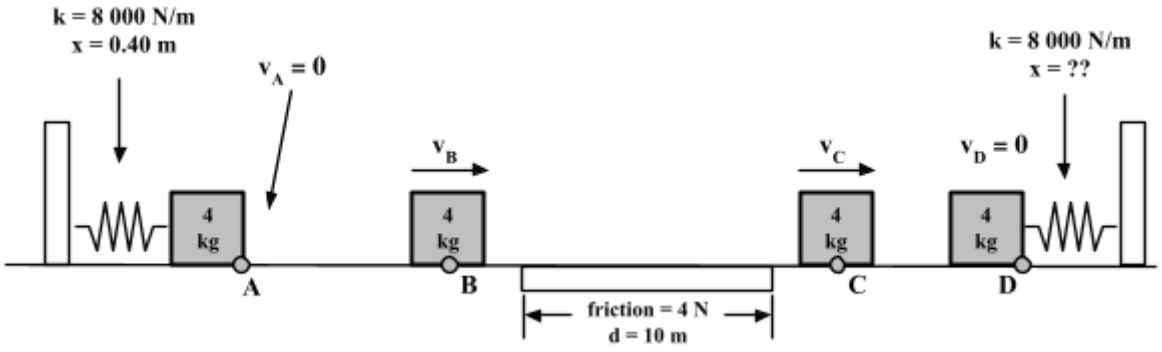
	A	B	C	D	
E_K	20	78	29	0	
E_{pg}	98	0	49	0	
E_{pe}	0	0	0	68	
Heat	0	40	40	50	
E_T	118	118	118	118	
v	2	3.94	2.4	0	
h	1	0	0.5	0	
x	0	0	0	.52	
Ff	0	50	0	10	

7. Use an energy table to describe the energy at each of the points in the picture below.



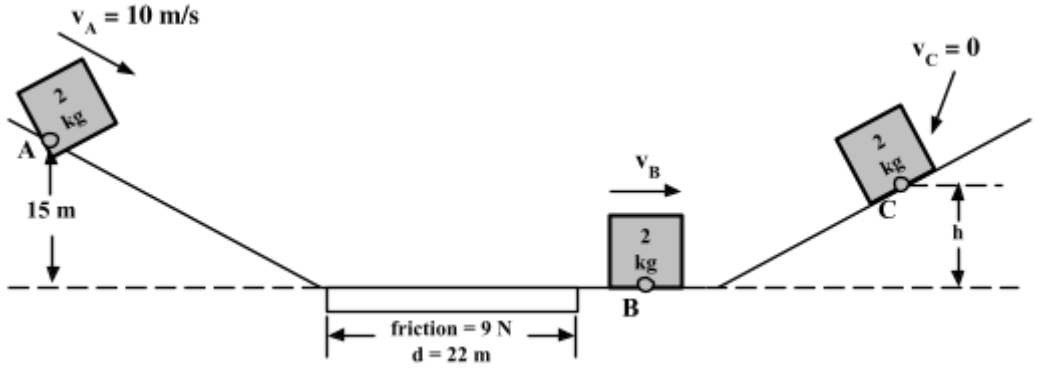
	A	B	C		
E_K	5	299	0		
E_{pg}	392	98	0		
E_{pe}	0	0	277		
Heat	0	0	120		
E_T	397	397	397		
v	1	7.7	0		
h	4	1	0		
x	0	0	0.61		
Ff	0	0	40		

8. Use an energy table to describe the energy at each of the points in the picture below.



	A	B	C	D	
E_K	0	640	600	0	
E_{pg}	0	0	0	0	
E_{pe}	640	0	0	600	
Heat	0	0	40	40	
E_T	640	640	640	640	
v	0	17.8	17.3	0	
h	0	0	0	0	
x	.4	0	0	.39	
Ff	0	0	4	0	

9. Use an energy table to describe the energy at each of the points in the picture below.

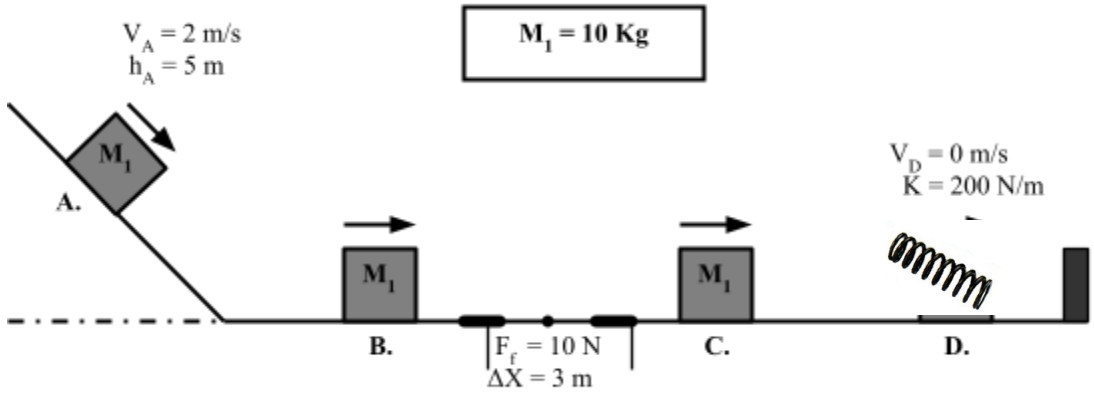


	A	B	C		
E_K	100	196	0		
E_{pg}	294	0	196		
E_{pe}	0	0	0		
Heat	0	198	198		
E_T	394	394	394		
v	10	14	0		
h	15	0	10		
x	0	0	0		
Ff	0	9	0		

10. A skier, mass 80 kg, is standing at rest at the top of a large hill, 300 meters above sea level. He starts down the hill, just gliding down to the bottom which has an elevation of 0 meters above sea level. When he reaches the bottom, he has traveled 600 meters from where he began, and is traveling at 33 m/s. If the friction acting on him was constant during the whole ride down, how much friction was there?

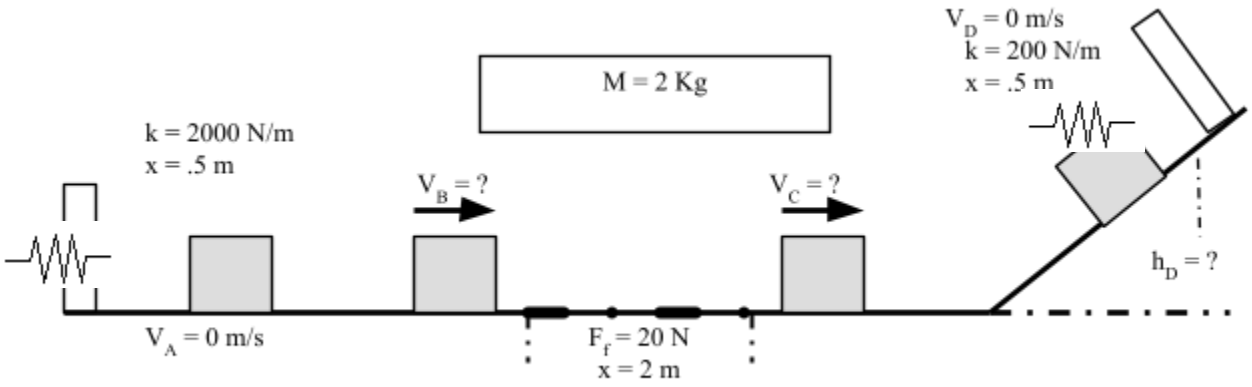
	A	B	C		
E_K	0	43560			
E_{pg}	235200	0			
E_{pe}	0	0			
Heat	0	191640			
E_T	235200	235200			
v	0	33			
h	300	0			
x	0	0			
Ff	0	319.4			

11. Use an energy table to describe the energy at each of the points in the picture below.



	A	B	C	D	
E_K	**20**	**520**	**490**	0	
E_{pg}	**500**	**0**	**0**	0	
E_{pe}	**0**	**0**	**0**	490	
Heat	**0**	**0**	**30**	30	
E_T	**520**	**520**	**520**	520	
v	**2**	**10.2**	**9.9**	0	
h	**5**	**0**	**0**	0	
x	**0**	**0**	**0**	0	
Ff					

12. Use an energy table to describe the energy at each of the points in the picture below.



	A	B	C	D	
E_K	0	250	210	0	
E_{pg}	0	0	0	185	
E_{pe}	250	0	0	25	
Heat	0	0	40	40	
E_T	250	250	250	250	
v	0	15.8	14.5	0	
h	0	0	0	9.43	
x	.5	0	0	.5	
Ff	0	0	20	0	