1. A
2. D
3. C
4. C
5. D
6. B
7. D
8. A
9. A
10. B
11. E
12. A
13. B
14. B
15. A
16. C
17. A
18. C
19. C
20. A
21. C
22. C
23. C
24. B
25. B
26. B
27. B
28. E
29. C
30. D

1.	A	d=1/2 a t^2, 5m takes 1 sec, 20 m takes 2 sec. 1 sec longer
2.	D	Mgh
3.	C	L=Iw; $I=2/5MR^2$; w=v/r; v=sqrt(2g*10sin30/1.4)
4.	C	$(FgSin-Fk)/m = v^2/2d$, $v^2=\sqrt{(2gh/(7/5))}$
5.	D	All energy is now kinetic some is rotational not dissipated
6.	B	Total Energy Formula
7.	D	integrate the force on 0 to 2 to get V_f is 2.4.
8.	A	Integrate a to get v, remember it starts at 2, integrate v to get x
9.	A	integrate force 0 to 3 and add initial
10.	B	force is the derivative of momentum
11.	E	-9/-12=.75; use conservation of momentum to get the unknown velocity
12.	A	In collision at the bottom p is constant but 3xMass →1/3 of speed and 1/9 height
13.	B	3rd law
14.	B	Inelastic collision, note the unit trap
15.	A	Perp axis theorem, $(1/12)(L^2+W^2)$
16.	C	When the spring is compressed, it gains 9e16 joules of energy. Due to relativistic mass-energy equivalence, this increases rest mass from 0.5kg to 1.0kg. We can then apply conservation of momentum to find that the spring will move at 20 m/s.
17.	A	Work done on the particle plus initial KE equals final KE
18.	C	Torque about the square must be sufficient to topple before force down the incline>friction.
19.	C	3A initially and then half that when the cap is half charged
20.	A	small angle approximation for physical pendulum
21.	C	Gauss' Law
22.	C	Change in magnetic flux equal the magnitude of the induced voltage
23.	C	Net F=ma. Include force due to magnetic field
24.	B	$12*1+.5(10)1^2=17$
25.	B	T=2pi(sqrt(l/g)), use 40 as the apparent gravity
26.	B	They will oscillate about the com. 1/3 of L from 2m. That segment has $k_2=3k$. T=2pi(sqrt(2M/3K))
27.	B	$t=d/v$; $d=d_o/\gamma$; (4.5ly/.6c)sqrt(1-.36)=6years
28.	E	$w(t)=\pi t^2$, a point on the ground will have total acceleration equal to a_c. $w^2*r=(1.5\pi)^2$
29.	C	deltaX = Acos(wt), T=1 so w=2pi, A = .2m, deltaX = .1m
30.	D	the ball travels 4A each cycle, 1.5s is 1.5 cycles so the distance is 6A