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

1. B ½ mv^2=mgh, h=½gt^2, solve for t.
2. B AVE Fnet is zero bc KEf = KEi so the AVE Fplate - Fg = 0. Note the interval.
3. C The greatest product of x*y will be its final position. It will still be rolling when it reaches that position because there is no friction on the last segment. The rotational kinetic energy will be 1/3 of its total energy since the rotational inertia of a uniform disk is (1/2)mR^2 so it will only reach a final height of 2/3. At this height x is 11/3 and x*y is 22/9.
4. D V_oSin(2*theta)/g, V_o = 50
5. A r = 1.5R_e so a_g = 10/1.5^2
6. D 40/9*4 = 160/9, then the mass inside is only $(.75)^3$ as much so 160/9 * 27/64 = 7.5
7. C Towards one another
8. A m1v1-m2v2=(m1+m2)Vf
9. E Mechanical energy is constant so the change is zero.
10. B ½ radius → ¼ I → 4x speed → ¼ time.
11. A formula 2pisqrt(l/g)
12. C 1/180+1/120 = 1/72. A=.144*10/72=1/50
13. C 3rd Law
14. C they must all apply the same force by the 3rd law regardless of acceleration
15. D 150/(100+50)=1, 1*100-5$(1)^2$=95
16. A sqrt(2gh) = 5
17. B both 3, 4, 5 triangles 4+(-6)=-2
18. C negative area under
19. C 573-300=273
20. C 1-(T_c/T_H)=1-(P_0V_0)/(P_1V_1)=1-(P_0V_0)/(5P_0/8*5V_0/2)=1-16/25=36%
21. C g=10=GM_e/r_e^2, ⅖ r --> 8/125 the volume and 16/125 the mass. 10*(16/125)/(4/25)=8.
22. C v_ar_a=v_pr_p so 29.25x = 13(2a-x) & a=42.25 now use vis viva v=sqrt(GM(2/r-1/a))
23. E C+2C = 3C & $(1/(3C)+1/(3C))^{-1}$ is 3C/2
24. E y=mLl/d. 2xE-->½ l→ ½ y.
25. D 50*1.2/.8
26. D The ray that bends farthest away is moving fastest
27. C 1/5 + 1/image = 2/20 so image is -10 and virtual (upright) so M is + and 10/5=2
28. A $-1/20 = 1/10 + 1/x \therefore x=-20/3$ and distance is 6 ⅔ to mirror or 3 ⅓ from candle
29. B max force on top is 40 so net max is 80 but friction on bottom is 80,
30. E (m/2)v^2=mgLsin45+1*mgLcos45 L=45/(sqrt2)