15. What about the heights of the balls in problem 14?
    a. They are the same
    b. 1 is twice that of 2
    c. 1 is √2 that of 2
    d. 1 is 4 times that of 2 *(circled)*
    e. 1 is ½ that of 2

$$T_1 = 2T_2$$

$$H_1 = 2^2 H_2$$

16. What about the launch angles of the balls in problem 14?
    a. They are the same
    b. 1 is greater than 2 *(circled)*
    c. 2 is greater than 1
    d. Not enough information to answer

In class we learned that you need to leave the ground at roughly 10 mph to reach 1m (40") high and that you are in the air for about 1sec. Suppose you have a professoresque vertical of 10":

17. How long are you in the air?
    a) 1 s
    b) 2 s
    c) ½ s *(circled)*
    d) ¼ s
    e) √½ s (0.7s)

$$H_{10} = \frac{1}{4} H_{40}$$

$$T_{10}^2 = \frac{1}{4} T_{40}^2 \qquad T_{10} = \sqrt{\frac{1}{4}} T_{40}$$

18. What speed do you hit the ground with when you land?
    a) 3 mph
    b) 7 mph
    c) 5 mph *(circled)*
    d) 10 mph

$$v \, \alpha \, T$$

$$v_{10} = \frac{1}{2} v_{40}$$

19. A fastball thrown upwards at 100 mph reaches a maximum height of roughly 120m. How high would a 25 mph throw go?
    a) 60m
    b) 40m
    c) 30m
    d) 120m
    e) 8 m *(circled)*

$$v_{25} = \frac{1}{4} v_{100}$$

$$T_{25} = \frac{1}{4} T_{100}$$

$$H \, \alpha \, T^2$$

$$H_{25} = \left(\frac{1}{4}\right)^2 H_{100}$$

20. Two half-marathoners run a total distance of roughly 13 miles. The winner covers the distance in 1 hour with an average velocity of 13 mph. The second runner finishes 15 minutes (0.25 hr) after the first. What is their average speed?
    a) 13 mph
    b) 10.4 mph *(circled)*
    c) 16.3 mph
    d) 12.8 mph
    e) 10 mph

$$T_{slow} = \frac{5}{4} T_{FAST}$$

$$V_{SLOW} = \frac{4}{5} V_{FAST} = 0.8 \,(13mph)$$

$$= 10.4 \, mph$$