The flea and the space rocket. Speed and acceleration.

Fleas store energy in some pads that they have got at the base of their back legs. Inside these pads, there is a protein that can be compressed, the resiline. When the flea jumps, resiline acts as a string, releasing the energy and reaching an acceleration of 1500 m/s^2, 150 times gravitational acceleration. Since it acts only during 1 millisecond, the acquired speed is not so great, 1.5 m/s, just to jump from one animal to another.

Space rockets acceleration is much smaller than fleas, about 30 m/s^2, 3 times gravitational acceleration, but, as it acts during a long time, the speed it reaches is higher. As an example, space probe Voyager 1, which was launched in 1977, has already left our solar system and its current speed (increased by the gravitational momentum from the planets it has been passing by) is 62 000 km/h.

1. ¿What is a millisecond?

a) 1000 seconds

b) 0,1 s

c) 0,001 s

2. ¿If acceleration of the flea is so big, why is its speed so small?

3. Write T (true) or F (false) in the next sentences. Explain the false ones.

a) Fleas have got more acceleration than space rockets and, consequently, they reach more speed.

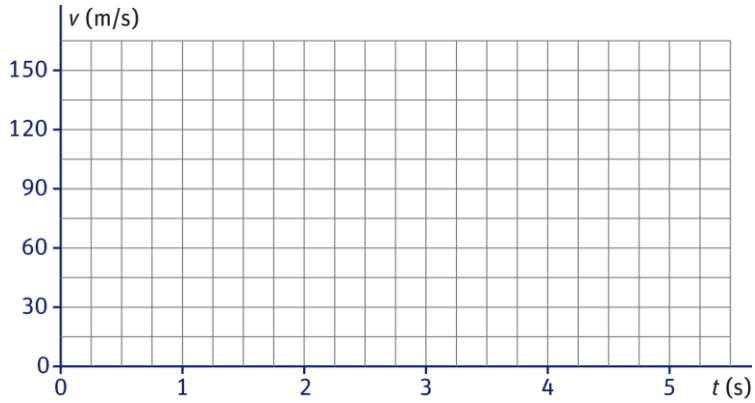
b) Fleas have got more acceleration than space rockets, but final speed is smaller.

c) The flea reaches a bigger speed than the rocket in 1 millisecond.

d) Space rockets have got a greater acceleration than fleas.

4. Acceleration of 30 m/s^2 means that speed increases 30 m/s in every second. Complete the table with this information and draw the speed-time graph during the first 5 seconds.

t (s)	*v* (m/s)
0	0
1	
2	
3	
4	
5	



5. a) Calculate the speed from the flea and the space rocket after 10 s of motion. Express the results in km/h.

b) Draw a v-t graph with both situations.