Year 11 Physics NAME_____

Newton's Laws Test 2

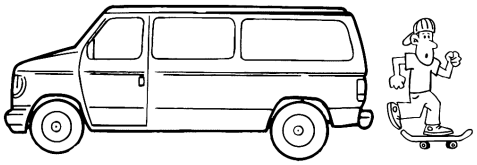
1. State the meaning of the following terms:

   (a) Friction /1

   (b) Weight /1

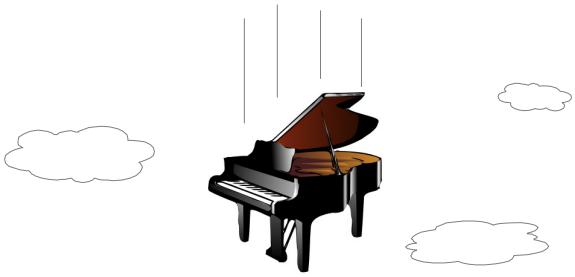
   (c) Inertia /1

2. Consider a skateboarder standing on a skateboard behind a van. Both the skateboarder and the car are at rest to start with, but then the skateboarder pushes off from the van, as shown below:



   Compare and explain, using at least two of Newton's laws, the acceleration of the van and the accceleration of the skateboarder. /3

3. Consider a grand piano that has been dropped from an aircraft in flight.

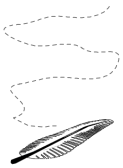


   (a) State the magnitude of the acceleration of the grand piano as soon as it is dropped. /1

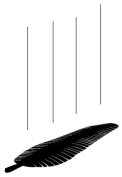
   (b) After falling for some time, the grand piano's acceleration is zero, but it is still falling. Explain, using net forces, how and why this happened. /3

MORE QUESTIONS ON OTHER SIDE

4. If a bird feather and a feather made of lead are dropped on earth (or anywhere else with air), the bird feather takes much longer to reach the ground.



Bird feather



Feather made of lead

Explain why the bird feather falls slower than the feather made of lead. /2

5. Arguably the best part of a fireman's job is sliding down the pole at the fire station.

   (a) If the fireman's mass is 70 kg and the sliding friction he experiences is 200 N, calculate the net force sliding down the pole. /3

   (b) Hence calculate the magnitude of the acceleration of the fireman. /2

   (c) Draw a picture of this situation. Draw and label one action-reaction pair of forces. /2

6. An experiment was conducted to determine the relationship between the height of a dropped object and the time it takes to fall. The hypothesis for this experiment was that the time would be proportional to the square root of the height, that is $t \propto \sqrt{h}$

Height h (m)	$\sqrt{h}$	Time t (s)
1.0		0.45
2.0		0.64
3.0		0.78
4.0		0.90

   (a) Complete the table by calculating $\sqrt{h}$ for each height. /2

   (b) The values for t recorded in the table are actually averages of multiple measurements that were taken. Explain the advantage of averaging multiple measurements. /2