Q7a

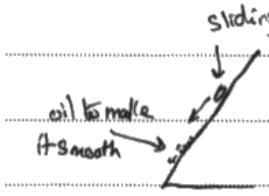
Mark scheme:

measuring equipment:	allow if clearly included in diagram
MP1. ruler / tape measure;	
MP2. stopclock / stopwatch;	condone 'timer'
	accept use of light gates if connected to timing device e.g. computer/datalogger
	accept 'camera' if subsequent method describes 'freeze-frame'/timestamp technique
variables:	
MP3. surface material is the independent variable;	
MP4. (average) speed is the dependent variable;	allow time as the dependent variable
MP5. any one control variable from;	allow 'keep constant' for 'control variable'
• size / mass / material / area /weight of block	
• height/angle/gradient of ramp	
• initial force given to block	allow 'push' given to block allow **initial** speed or velocity
• distance travelled down the ramp	allow same starting point and finishing point
determining average speed:	
MP6. use of (average) speed = distance travelled / time	accept use of light gate if description includes length of card/block and time of transit

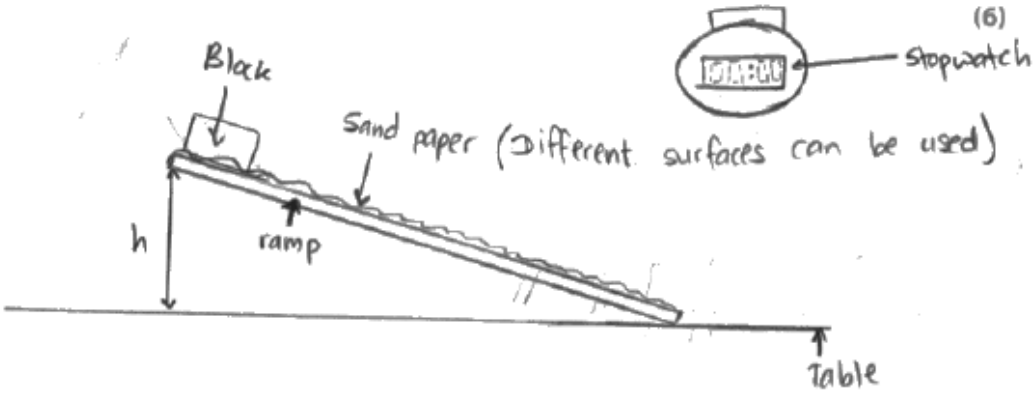
The measuring equipment needed is a measuring tape to measure the distance of the ramp. A stopwatch is used to measure the time taken for the block slide down the ramp. Ramps ~~will~~ of different materials are used like of metal, rubber, wood, etc. The independent variable is the type of surface material of the ramp. The dependent variable is the average speed of the block ~~of~~ sliding down the ramp. Control variables are the surface area of the ramp, the height of the ramp, the surface material ~~and~~ and ~~volume~~ size of block, ~~no still air or wind~~ no cross wind, and that the block is released from rest.

The average speed of the block is determined by applying the equation: average speed = total distance ÷ total time taken.

The surface material of a ramp affects the speed sliding down and its called friction, if we don't want the speed sliding down to be affected, the ramp should be smooth. the measuring equipments are stop watch and and ruler. the average speed will be determined by ~~comp~~ comparing it with an non smooth surface and ~~so~~ smooth surface



(6)



Take a block, ~~the~~ it should be of same material each time. The height 'h' should be constant throughout the experiment. ~~The~~ these are the controls. The independant variable is the surface material of a ramp. The dependant variable is the average speed of the block sliding down the ramp. Measure the length using measuring tape of the ramp and record it. ~~For~~ change the surface by either using a smooth surface or placing sand paper. For every different surface the time taken to reach the end should be recorded using a stopwatch. start the stopwatch ~~each~~ when the block starts sliding down ramp and stop it when the block reaches the end of the ramp. The average speed can be found using the equation;

average speed = $\frac{\text{distance}}{\text{time taken}}$. substitute values in the equation and find the average speed on different surfaces of the ramp.