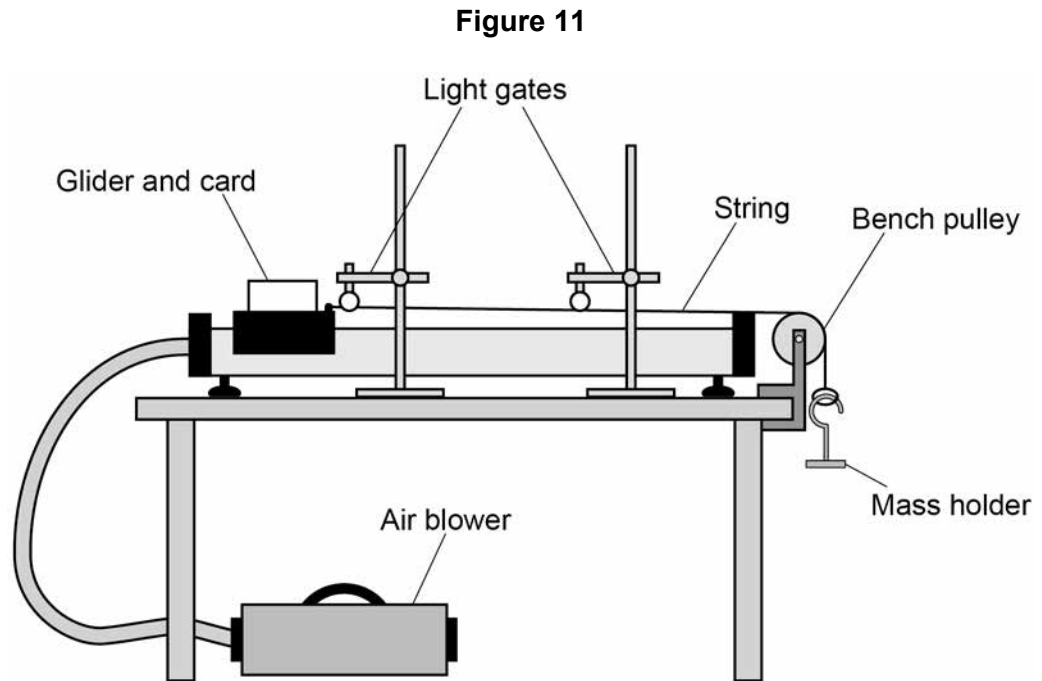


0 7

A student investigated acceleration using gliders, an air track and light gates.

The air track reduces friction between the glider and the track to zero.

Figure 11 shows the apparatus.



The glider was released from rest and moved along the track.

The mass holder hit the ground before the card passed through the second light gate.

0 7 . 1

Which **two** statements describe the effect this would have on the glider?

[2 marks]

Tick **two** boxes.

Its acceleration would decrease to zero.

Its acceleration would increase.

The resultant force on it would decrease to zero.

The resultant force on it would increase.

Its speed would increase.



07.2

The mass holder should **not** hit the ground before the card passes through the second light gate.

Suggest **one** way that the student could stop this happening.

[1 mark]

Question 7 continues on the next page

Turn over ►



The student increased the resultant force acting on the glider by adding more masses to the mass holder.

She calculated the acceleration of the glider for each resultant force.

Each test was done three times.

Table 2 shows the results.

Table 2

Resultant force in N	Acceleration in m/s^2			Mean acceleration in m/s^2
	Test 1	Test 2	Test 3	
0.20	1.3	1.2	1.3	1.26667
0.39	2.6	2.5	2.6	2.6
0.59	3.8	3.8	3.9	3.8
0.78	5.1	5.1	5.1	5.1
0.98	6.4	7.2	6.4	6.7

0 7 . 3 The student made **two** mistakes in the mean acceleration column.

Identify the mistakes the student made.

Suggest how each mistake can be corrected.

[4 marks]

Mistake _____

Correction _____

Mistake _____

Correction _____



0 7 . 4 Write a conclusion for this investigation.

Use the data in **Table 2**

[1 mark]

Question 7 continues on the next page

*Do not write
outside the
box*

Turn over ►



07.5

The student used a constant resultant force to accelerate the glider.

The student changed the mass of the glider and calculated the new acceleration.

She repeated this for different masses of the glider, keeping the resultant force constant.

The results are shown in **Table 3**

Table 3

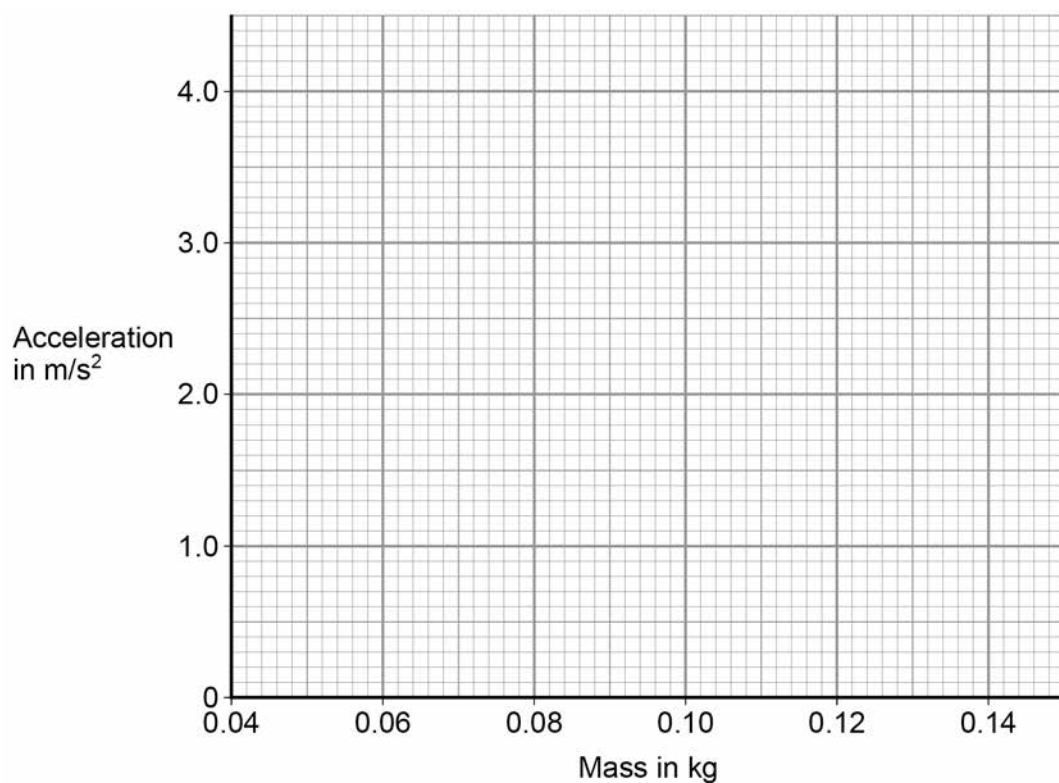
Mass of the glider in kg	Acceleration in m/s^2
0.060	3.5
0.080	2.6
0.10	2.0
0.12	1.7
0.14	1.4

Plot the results on **Figure 12**

Draw a line of best fit.

[3 marks]

Figure 12



07.6

Describe the relationship between mass and acceleration.

[1 mark]*Do not write
outside the
box*

12**Turn over for the next question****Turn over ►**

Question	Answers	Extra information	Mark	AO / Spec Ref.
07.1	its acceleration would decrease to zero		1	AO3 6.5.4.2.2
	the resultant force on it would decrease to zero		1	
07.2	any one from: <ul style="list-style-type: none"> • move the second light gate closer to the first • shorten the string length 	allow use a taller table	1	AO3 6.5.4.2.2
07.3	1.26667 (m/s ²) (is wrong)	each mistake and its correction may be given in any order allow (mean value calculated at) 0.20 (N)	1	AO3 6.5.4.2.2
	give value to 2 significant figures	allow give value to 1 decimal place allow 1.3 (m/s ²)	1	
	6.7 (m/s ²) (is wrong)	allow (mean value calculated at) 0.98 (N) allow test 2 for 0.98 (N) or 7.2 is an anomaly	1	
	discard the anomalous result and recalculate the mean	allow repeat the anomalous test result and re-calculate the mean allow 6.4 (m/s ²)	1	
07.4	(resultant) force is directly proportional to acceleration	allow the larger the (resultant) force, the greater the acceleration allow positive correlation between (resultant) force and acceleration allow mass / weight (of the holder) for (resultant) force	1	AO3 6.5.4.2.2

Question	Answers	Extra information	Mark	AO / Spec Ref.
07.5	all points correctly plotted within $\frac{1}{2}$ small square	allow 1 mark for 3 or 4 points correctly plotted	2	AO2 6.5.4.2.2
	curved line of best fit		1	
07.6	inversely proportional	allow as mass increases, acceleration decreases	1	AO3 6.5.4.2.2
Total			12	