

Name of the Student: _____

Max. Marks : 20 Marks

Time : 20 Minutes

Q1.

Figure 10 shows two students investigating reaction times.

Student B supports his left hand on a desk.

Student A holds a ruler so that the bottom end of the ruler is between the finger and thumb of student B.

When student A releases the ruler, student B catches the ruler as quickly as he can with his left hand.

The investigation is repeated with the right hand of student B.

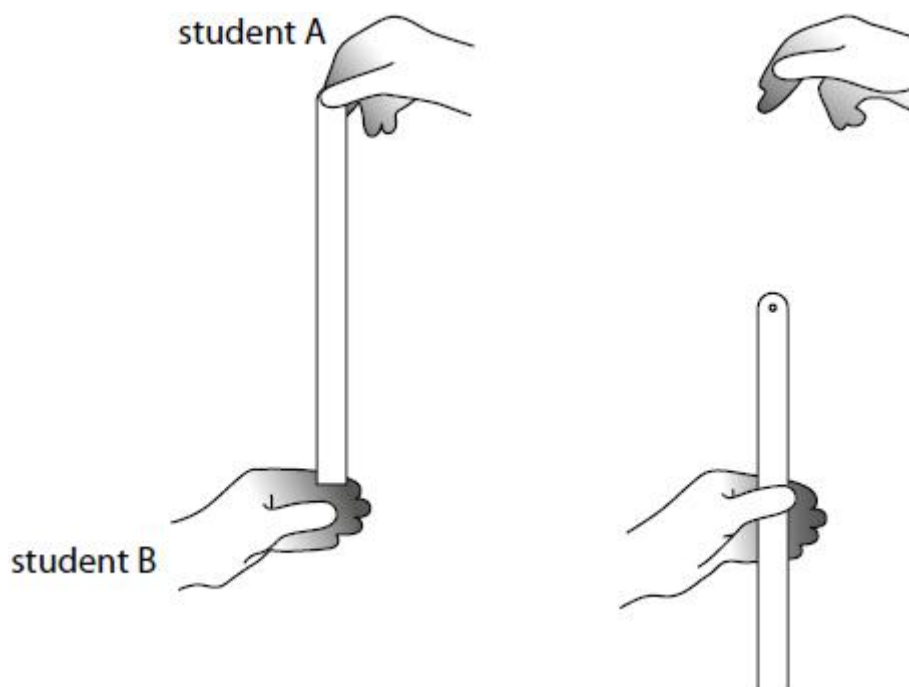


Figure 10

(a) Give a reason why it is better to have the 0 cm mark at the bottom of the ruler rather than at the top.

(1)

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(b) Give a reason why two students are needed for this investigation.

(1)

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(c) The students took five results for the left hand and five results for the right hand.

Figure 11 shows their results.

which hand	distance dropped (cm)					
	trial 1	trial 2	trial 3	trial 4	trial 5	average
left	10.1	25.5	18.4	14.6	11.7	14
right	17.5	16.1	19.4	18.6	20.2	

Figure 11

(i) Calculate the average distance dropped for the right hand. Give your answer correct to 2 significant figures.

(2)

distance = cm

(ii) Calculate the average time for the left hand.
Use the equation

$$\text{time}^2 = \frac{\text{distance}}{500}$$

(2)

average time = s

(d) Explain whether any of the readings are anomalous.

(2)

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(e) Give **two** ways that the students can improve the quality of their data, other than ignoring anomalous results.

(2)

- 1
- 2

(f) Describe how the students could develop their investigation to investigate how reaction time changes with another variable.

(2)

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(Total for question = 12 marks)

Q2.

A student has some cupcake cases.
One cupcake case is shown in Figure 7.



(Source: © Anton Starikov/Shutterstock)

Figure 7

The student drops a stack of cupcake cases with the base facing downwards, as shown in Figure 8.



(Source: © Elena Schweitzer/Shutterstock)

Figure 8

The speed of the falling stack of cupcake cases depends on the number of cupcake cases in the stack.

(i) The student also has a stop clock and a metre rule.
Describe an investigation to show how the speed of the falling stack of cupcake cases depends on the number of cupcake cases in the stack. (4)

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(ii) A stack of cupcake cases has a mass of 0.005 kg.
Calculate the weight, in newtons, of the stack of cupcake cases.
Gravitational field strength = 10 N / kg (2)

Use the equation

$W = mg$

weight = N

Figure 9 shows a cupcake case that is falling at a constant velocity.

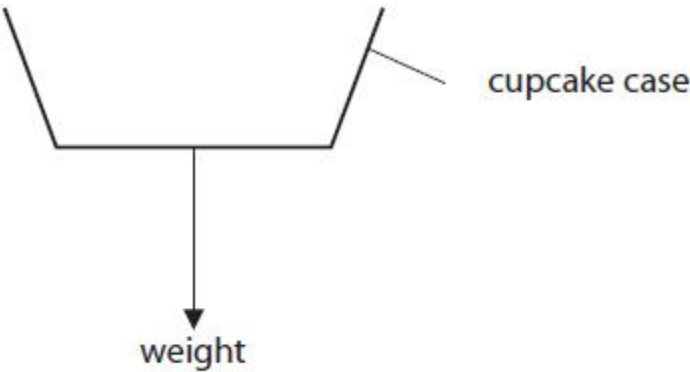


Figure 9

(iii) Draw an arrow on Figure 9 to show the force due to air resistance on the cupcake case. (1)

(iv) State the value of the acceleration of the cupcake case when it is falling at a constant velocity (1)

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(Total for question = 8 marks)