Name of the Student:_____
Max. Marks : 24 Marks **Time : 24 Minutes**

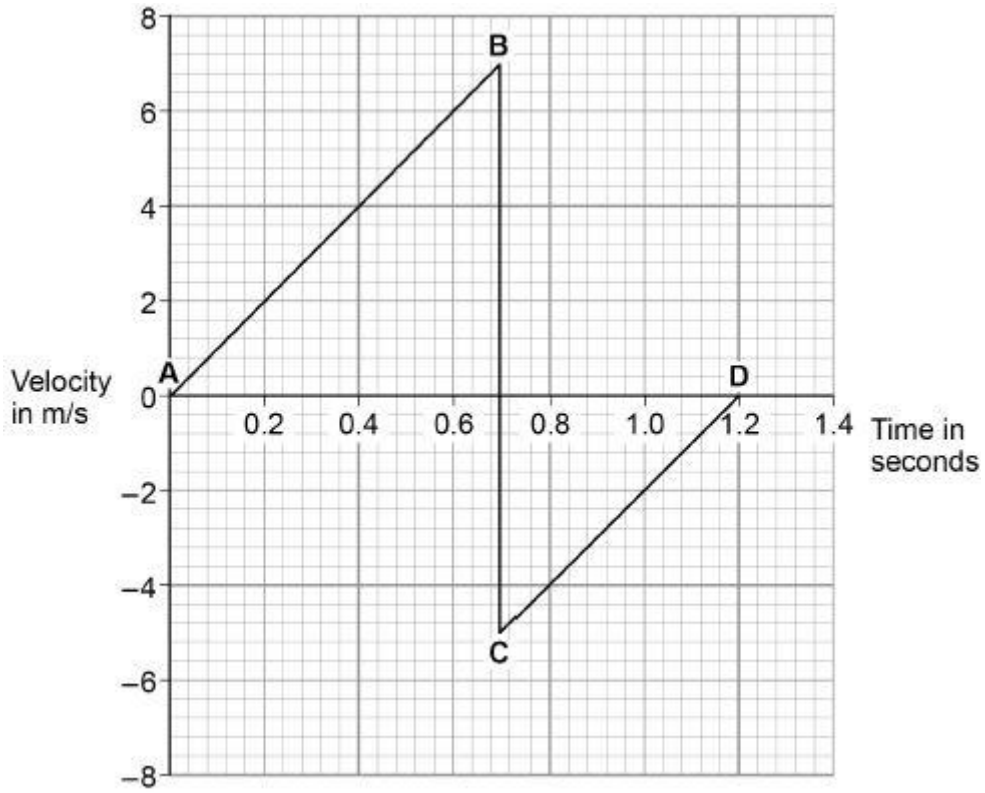
Q1.

A child drops a ball.

The ball hits the ground and bounces.

The graph below shows the velocity-time graph for the ball from when the ball is dropped until when the ball reaches the top of its first bounce.

Air resistance has been ignored.



(a) Describe the motion of the ball between points **A** and **B** on the graph above.

_____

_____

_____

_____

(2)

(b) What direction is the ball moving between points **C** and **D** on the graph above?

_____

(1)

(c) The ball and the Earth form a system.

What is meant by 'a system'?

Tick **one** box.

A group of objects that interact. ☐

Objects with big differences in mass. ☐

Objects with gravitational potential energy. ☐

(1)

(d) When the ball hits the ground, energy is transferred from the ball to the Earth.

Explain how the data in the graph above shows this energy transfer.

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(4)

(Total 8 marks)

Q2.

A student carried out an investigation to determine the spring constant of a spring.

The table below gives the data obtained by the student.

Force in N	Extension in cm
0	0.0
2	3.5
4	8.0
6	12.5
8	16.0

10	20.0

(a) Describe a method the student could have used to obtain the data given in the table above.

Your answer should include any cause of inaccuracy in the data.

Your answer may include a labelled diagram.

(6)

(b) The student measured the extension for five different forces rather than just measuring the extension for one force.

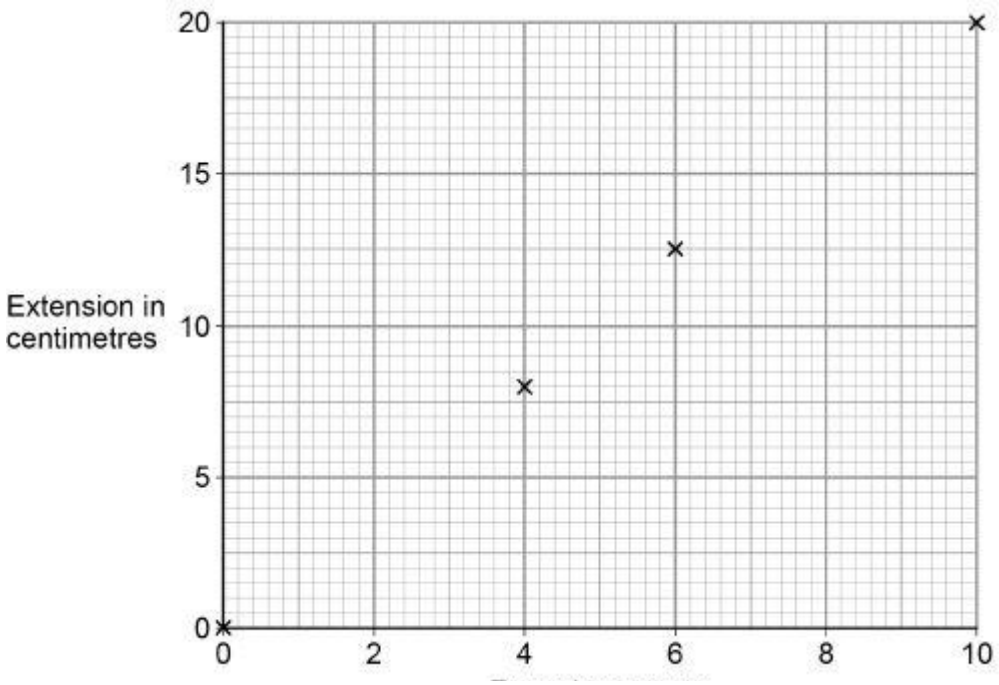
Suggest why.

_____

_____

(1)

The diagram below shows some of the data obtained by the student.



(c) Complete the diagram above by plotting the missing data from the table above.

Draw the line of best fit.

The table above is repeated here to help you answer this question.

Force in N	Extension in cm
0	0.0
2	3.5
4	8.0
6	12.5
8	16.0
10	20.0

(2)

(d) Write down the equation that links extension, force and spring constant.

_____

(1)

(e) Calculate the spring constant of the spring that the student used.

Give your answer in newtons per metre.

_____

_____

_____

_____

Spring constant = _____ N/m

(4)

(f) Hooke's Law states that:

‘The extension of an elastic object is directly proportional to the force applied, provided the limit of proportionality is not exceeded.’

The student concluded that over the range of force used, the spring obeyed Hooke’s Law.

Explain how the data supports the student’s conclusion.

_____

_____

_____

_____

(2)

(Total 16 marks)