7 The diagram shows two blocks at rest on a table, viewed from above.
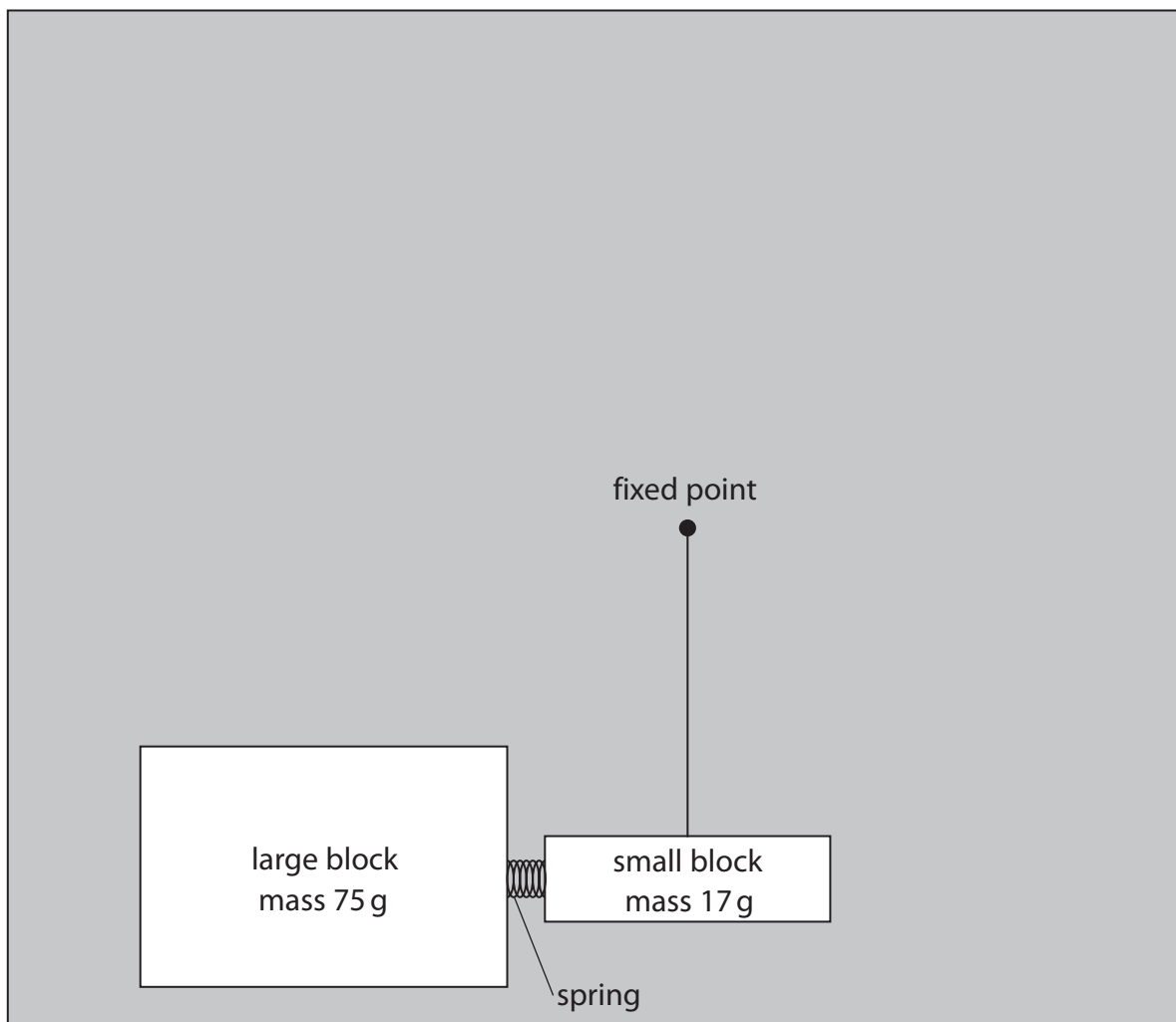
A spring is attached to the large block.

The small block is attached by a piece of string to a fixed point on the table.

A student pushes the two blocks together so that the spring is compressed.

fixed point
●

| large block
mass 75 g | small block
mass 17 g |

spring

(a) The student releases the blocks.

The kinetic energy (KE) store of the small block is 0.29 J when the blocks are no longer in contact.

Show that the speed of the small block is about 6 m/s.

(3)

(b) Using ideas about momentum, show that the speed of the large block is about 1 m/s after the blocks are no longer in contact.

(4)

(c) The small block takes 0.11 s to reach 6 m/s.

Calculate the mean force exerted on the small block by the spring.

(3)

mean force = ... N

QUESTION 7 CONTINUES ON NEXT PAGE

(d) The small block then moves around the fixed point on the table.

The block moves in a circular orbit of radius 17.6 cm at a constant orbital speed of 6 m/s.

The time period of the orbit can be found using the formula

$$\text{orbital speed} = \frac{2\pi \times \text{orbital radius}}{\text{time period}}$$

Calculate the time period of the orbit.

(3)

time period = ... s

(Total for Question 7 = 13 marks)

TOTAL FOR PAPER = 70 MARKS

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