2 A child slides down a slope PQ of height 7.0 m, as shown in Fig. 2.1.

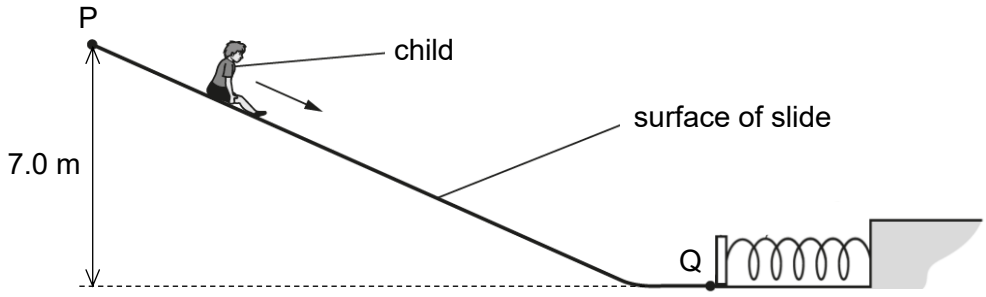

Fig. 2.1 (not drawn to scale)

She started from rest at P and reaches a speed of 4.8 m s^{-1} at Q. A resistive force opposes the motion of the child as she slides down.

(a) Determine the ratio $\frac{\text{kinetic energy of the child at Q with resistive force}}{\text{kinetic energy of the child at Q if there is no resistive force}}$.

ratio = ... [2]

(b) At Q, the child, of mass 20 kg, makes contact with a soft board attached to a spring. The spring compresses and the child is eventually brought to rest, as shown in Fig. 2.2.

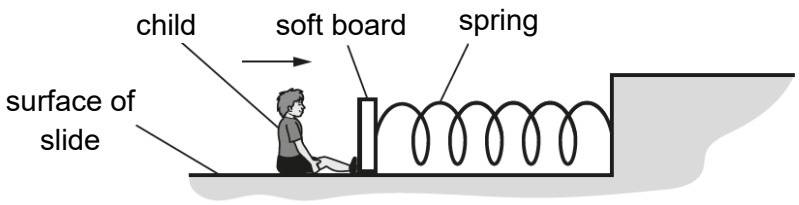

Fig. 2.2

The spring has a spring constant of 54 N m^{-1}. The maximum compression of the spring is 2.1 m.

Calculate the efficiency of the transfer of the kinetic energy of the child at Q to the elastic potential energy of the spring.

efficiency = …… % [2]

(c) Suggest two reasons why the efficiency in **(b)** is not 100%.

1 ……...

……...

2 ……...

……. [2]