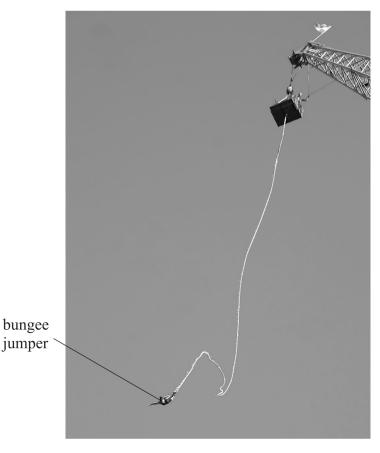5 The photograph shows a bungee jumper. The bungee jumper falls through a large distance and is then decelerated by the bungee rope.

bungee jumper

(Source: © ELINA/Pearson Asset Library)

For safety, a bungee rope needs to be tested to ensure it can withstand the stress applied as it decelerates the falling bungee jumper.

One bungee rope has a diameter of 2 cm. The manufacturer states that the rope can withstand a maximum force of 8000 N.

(a) A teacher is given a sample of the same material with diameter 1 mm.

Justify the teacher's decision that it would be safe for her students to determine the breaking stress of the sample.

(2)

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(b) To determine the breaking stress, a student used 100 g slotted masses hung vertically from the sample.

The maximum mass that the sample could hold before breaking was 1.9 kg.
The diameter was 0.95 mm.

The manufacturer gives the breaking stress of the rope as 2.55×10^7 Pa.

Determine whether the student's result supports the manufacturer's value.

(4)

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(Total for Question 5 = 6 marks)