

Question 1

(a)



The picture shows the brake of a bicycle. When the cyclist wishes to slow down, she pulls a lever which pushes the rubber brake-pad against the rim of the wheel.

Explain why the brakes may not work as well after it has been raining.

(1) (2)

(6)

Question 2

(h) When one surface in contact with another surface moves, frictional forces arise. Friction makes movement more difficult. Sometimes friction is useful, other times it is unhelpful.

(i) Give one example where friction can be useful.

Example _____

(ii) Give one example where friction can be unhelpful.

Example _____

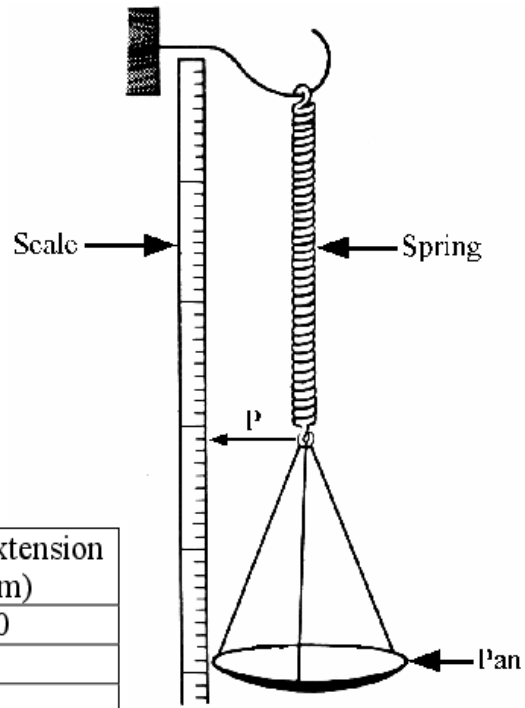
(iii) How can unhelpful friction be reduced?

How? _____

(iv) How can friction between air and a moving vehicle be reduced?

How? _____

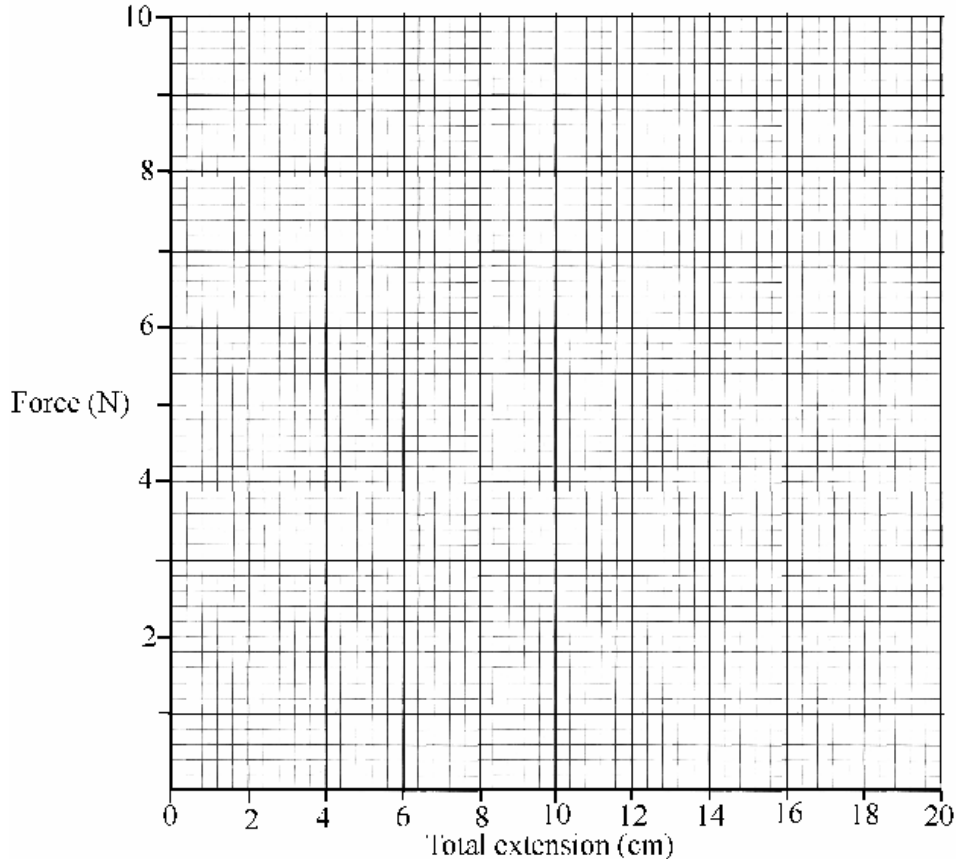
- (a) A pupil used the apparatus shown in the diagram to investigate the relationship between the force applied and the extension produced in the spring by that force. Pointer, P, was used to read the scale. Weights were added to the pan to apply forces to the spring. The data recorded is in the table.



- (i) Calculate the **total extension** for each force and enter them in the table. (6)

Force (N)	Scale reading (cm)	Total extension (cm)
0	31.0	0
2	35.0	
4	39.0	
6	43.0	
8	47.0	
10	51.0	

- (ii) Draw a **graph** of force against total extension in the grid below. (6)



(1) (2)

- (iii) What **conclusion** can be drawn from the graph regarding the relationship between the force applied to the spring and the extension produced by it? (6)

What? _____

- (iv) Use the graph to **determine the weight** of a stone that produced an extension of 14 cm in the spring. (3)

Use _____

(1) (2)

Question 4

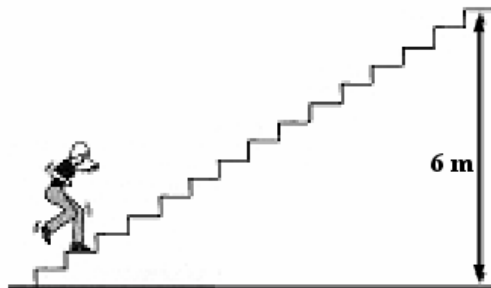
- (b) The driver of a moving car applied the brakes. The brakes produced an average stopping force of 8 kN (8000 N) and the car stopped having travelled 20 m after the brakes were applied. Calculate the **work done** in stopping the car. (6)

When work is done energy is converted from one form to another. Identify one **energy conversion** that occurred when the car braked. (6)

Question 5

- (c) A girl of mass 60 kg (weight 600 N) climbed a 6 m high stairs in 15 seconds.

Calculate the **work** she did and the average **power** she developed while climbing the stairs.



Work _____

Power _____