A curling question

Curling is a sport where teams take it in turns to push stones along a sheet of ice, aiming for a target. The sport started in Scotland in the 1500s, when men would play it on frozen ponds or lochs. Today curling is an Olympic sport.

Stones-R-Us manufactures and sells curling stones. The normal stones have a weight of over 190 N. The company are interested in making smaller stones so that children can learn the sport. Their research department tested the friction beneath different masses of stone to find out if the mass of the stone affected the friction between the stone and the ice. They did this by measuring the force that was needed to keep each stone moving at a steady speed along a sheet of ice. The table shows their results.

Weight of stone (N)	Force needed to move stone at steady speed (N)		
	1st go	2nd go	3rd go
20	0.39	0.38	0.42
40	0.78	0.81	0.81
60	1.23	1.18	1.19
80	1.61	1.63	1.57
100	2.02	1.92	2.05

1 Draw up a table like this. Work out the mean of each set of three forces and complete the second column of the table.

Weight of stone (N)	Force needed to move stone at steady speed (N)
20	

2 Plot a scatter graph of the results on graph paper. Put the weight of the curling stones on the horizontal axis, and the force needed to keep the stone moving on the vertical axis. Draw a line of best fit on your graph. This is a straight line that goes through as many points as possible.

3 From your graph, find out the force needed to keep a stone moving if it has a mass of 7.0 kg.

4 Suggest why the research department tested each stone three times.

5 Which stone would go the furthest if they were all given exactly the same push to start them off? Explain your answer.

2 N is quite a small force to keep a 100 N stone moving. The friction between the stones and the ice is so low because there is usually some water on the surface of the ice.

6 Explain why water makes the friction low.

7 In curling, two members of the team sweep the ice in front of the stone. The amount of sweeping they do can affect how far the stone travels. Suggest two different ways in which sweeping the ice can help the stone to go further, and explain your answers.

I can...

- work out means
- present data as a scatter graph and draw a line of best fit
- use data from a graph
- explain ways of changing friction.