

# Mark Scheme Hooke's Law Past Paper Questions Jan 2002 to Jan 2009

[ Note there are more Hooke's Law related questions under Young's Modulus]

Question 3		
(a)	<p>the force (needed to stretch a spring is directly) is proportional to the extension (of the spring from its natural length) or equation with all terms defined ✓</p> <p>up to the limit of proportionality ✓</p> <p style="text-align: center;"><b>Q3 Jan 2009</b></p>	2
(b) (i)	<p style="text-align: center;"><b>QWC descriptor</b></p> <p>The candidate provides a comprehensive and coherent description which includes all the necessary measurements in a logical order. The description should show awareness of the need to use a range of standard masses. In addition, the use of the measurements is explained clearly, including an outline of a graphical method to find the mass of the rock sample, or calculation using two or more standard masses and averaging. For 6 marks there must be a description of how to make accurate measurements.</p> <p>The candidate's description includes the necessary measurements using one standard mass as well as the rock sample. The description may not be presented in a logical order and they show little consideration in relation to making the measurements accurately. A clear explanation is provided of how to find the mass of the rock sample from their measurements, including correct use of Hooke's law through calculations or inadequate graphical method.</p> <p>The candidate knows the necessary measurements to be made using a standard mass and the rock sample. The explanation of how to find the mass of the rock sample may be sketchy.</p> <p><b>The explanations expected in a competent answer should include a coherent account of the following measurements and their use</b></p> <p><b>measurements</b></p> <p>(use a metre rule to) measure the length of the spring ✓</p> <p>when it supports a standard mass (or known) mass (<math>m</math>) and when it supports the rock sample</p> <p>repeat for different (standard) masses</p> <p>accuracy – use a set square or other suitable method to measure the position of the lower end of the spring against the (vertical) mm rule or method to reduce parallax</p> <p><b>use of measurements</b></p> <p><i>either</i></p> <p>plot graph of mass against length (or extension) ✓</p> <p>read off mass corresponding to length (or extension) due to the sample ✓</p> <p><i>or</i></p> <p>the extension of the spring = length – unstretched length ✓</p> <p>mass of rock sample = <math>\frac{\text{extension of spring supporting rock sample}}{\text{extension of spring supporting known mass}} \times M</math> ✓</p>	<p><b>mark range</b></p> <p>5 - 6</p> <p>3 - 4</p> <p>1 - 2</p>

(ii)	<p>use a (G) clamp (or suitable heavy weight) to fix/clamp the base of the stand to the table ✓</p> <p>clamp (or weight) provides an anticlockwise moment (about the edge of the stand greater than the moment of the object on the spring)/ counterbalances (the load) ✓</p> <p><b>or</b> adjust the stand so the spring is nearer to it ✓</p> <p>so the moment of the load is reduced (and is less likely to overcome the anticlockwise moment of the base of the stand about the edge of the stand) ✓</p> <p><b>or</b> turn the base of the stand/rotate the boss by <math>180^\circ</math> ✓</p> <p>so the weight of the load acts through the base ✓</p>	
	<b>Total</b>	<b>10</b>