Name of the Student:_____
Max. Marks : 19 Marks **Time : 19 Minutes**

Mark Schemes

Q1.

Question number	Answer	Additional guidance	Mark
(i)	50.0 to 55.0 (mm) inclusive		**(1)**

Question number	Answer	Additional guidance	Mark
(ii)	a description including note the original length (1) note the final length and subtract (1)		**(2)**

Question number	Answer	Additional guidance	Mark
(iii)	any two from: use a ruler with a smaller/millimetre divisions (1) use interim values of weight (1) add more weights (to increase the range) (1) move the ruler closer to the spring (1) use of pointer (1) repeat **and** average (1)	 ignore more accurate add fixed values of weights eye level / no parallax	**(2)**

Question number	Answer	Additional guidance	Mark
(iv)	the coils are {pushed together /touching} (1) or spring is fully compressed /cannot be made shorter (1)		(1)

Q2.

Question Number:	Answer	Additional Guidance	Mark
(i)	a description to include 4 of the following:		(4) AO 2 2
	• note position of pointer before current is switched on (1)	measure length of spring before current is switched on	
	• measure position of pointer when current in coil (1)		
	• (use an ammeter to) measure current (1)		
	• calculate the extension / stretch of the spring (1)	how far nail moves	
	• use force (of attraction) is proportional to extension / stretch (of spring) (1)	calculate force from spring constant and extension calibrate spring	
	• repeat with different currents (1)	increase the current calculate the extension of the spring using new position of pointer minus starting position of pointer is worth 3 marks	

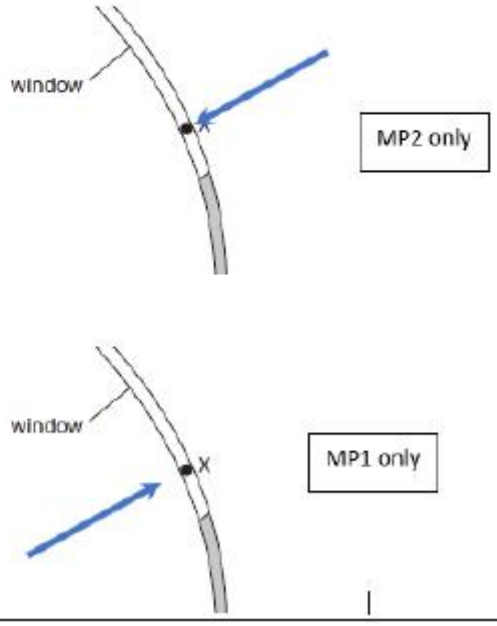
Question Number:	Answer	Additional Guidance	Mark
(ii)	select and substitute (1) (E =) ½ x 24 x 0.12^2 evaluation (1) (E =) 0.17 (J)	 ½ x 24 x 12^2 max 1 mark accept answers that round down to 0.17 e.g. 0.1728 POT error (e.g. 1728) max 1 mark award full marks for correct answer without working	**(2)** AO 2 1

Q3.

Question number	Answer	Additional guidance	Mark
(i)	(80 000 – 23 000) 57 000 (Pa) (1)	 -57 000 (Pa)	**(1)** **AO2**

Question number	Answer	Additional guidance	Mark
(ii)	substitution (1) 80 000 = $\frac{F}{0.094}$ rearrangement and evaluation (1) (F=) 7500 (N)	alternative method re-arrangement (1) (F =) P x A **or** (F=) 80 000 x 0.094 (substitution and) evaluation accept 7520 (N), award full marks for correct answer without working. allow 1 mark max for substitution using pressure of 57 000 **or** an answer that rounds to 5400 e.g. 5358 (calculated net force)	**(2)** **AO2**

Question number	Answer	Additional guidance	Mark
(iii)	force is less (on small window) (1) pressure is the same (1)	force is greater on large window	**(2)** **AO1**

Question number	Answer	Additional guidance	Mark
(iv)	arrow pointing towards outside of aeroplane (1) arrow is normal to surface at X (judge by eye) (1) Examples:  	may be inside or outside of aeroplane. need not touch X do not award if two or more conflicting arrows drawn must touch X or dot at X independent marks	**(2) AO1**