5(a)	work done per unit charge
	work (done) moving positive charge from infinity (to the point)
5(b)(i)	potential (due to proton) = $(1.60 \times 10^{-19}) / (4\pi \times 8.85 \times 10^{-12} \times 10 \times 10^{-12})$ **or** potential (due to electron) = $(-1.60 \times 10^{-19}) / (4\pi \times 8.85 \times 10^{-12} \times 110 \times 10^{-12})$
	$V = [(1.60 \times 10^{-19}) / (4\pi \times 8.85 \times 10^{-12})] \times [(10^{-1} - 110^{-1}) \times 10^{12}] = 130$ V
5(b)(ii)	$V = [(1.60 \times 10^{-19}) / (4\pi \times 8.85 \times 10^{-12})] \times [(30^{-1} - 90^{-1}) \times 10^{12}]$
	= (+) 32 V
5(b)(iii)	cross drawn midway between the electron and the proton
5(b)(iv)	line from (10, +130) to (110, –130)
	curve getting shallower until $x = 60$ pm, crossing $V = 0$ at (60, 0) and then getting steeper after $x = 60$ pm
	curve passing through (30, ±32) and (90, ±32)

5(a)	potential is (defined as) zero at infinity
	proton has a positive charge and so repels another positive charge
	work is done on two (positive) charges to move them towards each other **or** work is done by two (positive) charges as they move apart from each other
5(b)(i)	arrow drawn through Q in a WSW direction directly away from the centre of the sphere
5(b)(ii)	curve in at least one quadrant passing through $(\pm R, \pm E_0)$ and $(\pm 2R, \pm ¼E_0)$
	curve between $-3R$ and $-R$ of increasing magnitude of gradient **and** curve between R and $3R$ of decreasing magnitude of gradient
	two lines drawn, one in the top right quadrant, the other in the bottom left quadrant
5(c)	$E_P = -(1.60 \times 10^{-19})^2 / [4\pi \times 8.85 \times 10^{-12} \times (5.3 \times 10^{-11})]$
	$= -4.3 \times 10^{-18}$ J

5(a)	work done per unit charge
	work done (on charge) in moving positive charge from infinity (to the point)
5(b)(i)	electric field strength inversely proportional to distance^2
	$E = 3^2 \times 2.0 \times 10^5$ $= 1.8 \times 10^6$ N C^{-1}
5(b)(ii)	$V = Q / 4\pi\varepsilon_0 r$ **and** $E = Q / 4\pi\varepsilon_0 r^2$ (so $E = V / r$)
	$r = (9.0 \times 10^4) / (1.8 \times 10^6) = 0.050$ m = 5.0 cm
5(b)(iii)	$Q = 4\pi\varepsilon_0 Vr$ $= 4\pi \times 8.85 \times 10^{-12} \times 9.0 \times 10^4 \times 0.050$
	$= 5.0 \times 10^{-7}$ C
5(b)(iv)	$C = Q / V$
	$= (5.0 \times 10^{-7}) / (9.0 \times 10^4)$ $= 5.6 \times 10^{-12}$ F