1 Let the length of the wire be L and the magnetic flux density be B

F_B = difference in reading
BIL = difference in reading
$B(2.0)L = (144.6 - 142.0)(10^{-3})(10)$
BL = 0.013 T m

New reading = $W - F_B$
= $mg - BIL$
= $[(142.0)(10^{-3})(10) - (0.013)(3.0)] / 10$
= 0.1381 kg
= 138.1 g

2 **(a)** Apply Fleming's left hand rule: **out of the plane of the page**

(b) $F_C = F_B$
$mv^2 / r = Bqv$
$r = mv / Bq$
= $(1.67 \times 10^{-27})(4.5 \times 10^6) / (0.12)(1.60 \times 10^{-19})$
= 0.3914
= 0.39 m (2 sf)

(c) **(i)** As magnetic force is downwards, electric force must be downward. Therefore, direction of electric field is **upwards**.

(i) $F_E = F_B$
$Eq = Bqv$
$E = Bv$
= $(0.12)(4.5 \times 10^6)$
= 5.4×10^5 N C^{-1}