3(a)	force per unit mass
3(b)(i)	$F = GMm / x^2$
	$g = F / m$ $g = [GMm / x^2] / m = GM / x^2$ **and** G = gravitational constant
3(b)(ii)	arrow drawn at P pointing directly towards the point mass
3(b)(iii)	fields are in opposite directions
	field strength at Q is four times the field strength at P
3(c)	line starting at $(R, -g_0)$ and ending at $(L - R, +g_0)$
	line passing through $(L / 2, 0)$
	curve becoming shallower from R to $(L / 2)$ and then steeper from $(L / 2)$ to $(L - R)$

1(a)	work done per unit mass
	work (done in) moving mass from infinity (to the point)
1(b)(i)	evidence of addition of 3.4×10^6 to 1.7×10^6 **or** 6.8×10^6
	$GM \times 122 / (5.1 \times 10^6)$ **or** $GM \times 122 / (10.2 \times 10^6)$
	$6.67 \times 10^{-11} \times M \times 122 \times [(5.1 \times 10^6)^{-1} - (10.2 \times 10^6)^{-1}] = 5.1 \times 10^8$ leading to $M = 6.4 \times 10^{23}$ kg
1(b)(ii)	$\phi = (-) (6.67 \times 10^{-11} \times 6.4 \times 10^{23}) / (3.4 \times 10^6)$
	$= -1.3 \times 10^7$ J kg^{-1}
1(c)(i)	Mars takes (just under) 25 hours to rotate once on its axis
1(c)(ii)	orbit is equatorial **or** orbit is in same direction as direction of rotation of Mars

1(a)	force per unit mass
1(b)(i)	radial
	towards (centre of) planet
1(b)(ii)	(changes in) height (very) much smaller than radius
	$(\text{radius} + \text{height})^2 \approx \text{radius}^2$ **or** field lines are approximately parallel
1(c)(i)	$9.81 \times R^2 = 3.99 \times 10^{14}$
	$R = 6.38 \times 10^6$ m
1(c)(ii)	gravitational potential $= -(GM / R)$ $= -(3.99 \times 10^{14}) / (6.38 \times 10^6)$
	$= -6.25 \times 10^7$ J kg^{-1}
1(d)	potential (energy) zero at infinite separation
	(gravitational) force is attractive