

Question			Answers / Explanatory notes	Marks available
3	(a)		<p>[Increasing] mass increases cooking time (1) because it requires more energy [$E = mc\Delta T$] (1)</p> <p>[Increasing] surface area decreases cooking time (1) because more heat can be transferred [to it] $\left[\frac{\Delta Q}{\Delta t} \propto A\right]$ (1)</p> <p>Increasing thickness increases cooking time (1) because heat must travel further / temperature gradient smaller (1)</p>	6
	(b)		“per unit mass” missing	1
	(c)		$22 \times 1.26 = 27.7 \text{ cm}$ [accept 25% larger $\rightarrow 27.5 \text{ cm}$]	1
	(d)		$0.46 \div 1.59 = 0.29 \text{ m}^2$ [accept 50% larger for big turkey $\rightarrow 0.306 \text{ m}^2$]	1
	(e)	(i)	$E = mc\Delta T$ (1) $= 9 \times 3200 \times 90 = 2.59 \text{ MJ}$ (1)	2
		(ii)	$P = \frac{E}{t}$ [or by impl.] (1) $t = \frac{2590000}{2200} = 1200 \text{ s}$ (1)	2
		(iv)	Heat is lost (1) Vast majority lost / chemical (endothermic) reactions / change of state of water (1) [accept statement of where heat is lost to]	2
	(f)	(i)	$\frac{\Delta Q}{\Delta t} = 0.6 \times 0.46(1) \times \frac{140}{0.14} (1) = 280 \text{ W ((unit))}$ (1)	3
		(ii)	$t = \frac{E}{P} = \frac{2590000}{280} = 9300 \text{ s} (1) \approx 2.6 \text{ hours} (1)$	2
				[20]