

68. (a) The longitudinal separation between Helsinki and the explosion site is $\Delta\theta = 102^\circ - 25^\circ = 77^\circ$. The spin of the earth is constant at

$$\omega = \frac{1 \text{ rev}}{1 \text{ day}} = \frac{360^\circ}{24 \text{ h}}$$

so that an angular displacement of $\Delta\theta$ corresponds to a time interval of

$$\Delta t = (77^\circ) \left(\frac{24 \text{ h}}{360^\circ} \right) = 5.1 \text{ h} .$$

- (b) Now $\Delta\theta = 102^\circ - (-20^\circ) = 122^\circ$ so the required time shift would be

$$\Delta t = (122^\circ) \left(\frac{24 \text{ h}}{360^\circ} \right) = 8.1 \text{ h} .$$