

G FALSE – The pore spaces in micrometeorites might have been ice-filled, but the ice is lost (during ejection from comets, and/or passage through the Earth's atmosphere). See Book 2 Subsection 8.6.3 and ITQ 8.12.

The *true* statements about Solar System ices occur in Book 2 as follows: A and B, Subsection 3.5.3; C, Subsection 6.5.5; E, Subsection 6.5.5; F, Subsections 1.3.2, 8.6.1.

#### **Q6 The correct (FALSE) responses are A and F.**

References are to Book 2.

A FALSE – The effective temperature is a way of representing the total power radiated by a planet (Equation 6.2). It is roughly equal to the mean temperature in the lower troposphere only when the greenhouse effect is negligible (Subsection 6.4.1).

B TRUE – Subsection 6.4.2.

C TRUE – Subsection 6.4.2.

D TRUE – Subsection 6.4.2.

E TRUE – Subsection 6.4.1.

F FALSE – ITQ 6.2 shows that heat flow from the Earth's interior is a far smaller atmospheric heat source than solar radiation. In the comment on the ITQ answer it is stated that the flow from the interior is insignificant.

#### **Q7 The correct responses are A and E.**

Subsection 1.3.3 in Book 3 states explicitly that spiral arms stand out because they contain HII regions and luminous O and B stars, as a result of star formation in spiral arms. The other objects/types of matter in the key are not concentrated in the spiral arms, or at least do not delineate them.

#### **Q8 The correct (TRUE) responses are B and E.**

References are to Book 4.

A FALSE – Subsection 1.4.3 makes it clear that expansion in the Einstein-de Sitter model comes to a halt only at an infinite time in the future.

B TRUE – These two effects together can resolve Olber's paradox (Section 1.5).

C FALSE – It is the dipole asymmetry that betrays the Earth's motion with respect to the cosmological expansion (Subsection 1.6.2).

D FALSE – The cosmological redshift arises because of the expansion of space (Subsections 1.3.1 and 2.2.1).

E TRUE – The point that the Universe remains in its closed/open state is made explicitly at the end of Subsection 2.5.4 (and implicitly elsewhere).

F FALSE – As time passes, the speed of light outstrips the speed of expansion at the edge of the observable Universe, and so the observable Universe does encompass more and more matter (Section 1.5 and Subsection 2.5.3).

G FALSE – The high isotropy of the background radiation tells us nothing about the form of matter present at decoupling. (This can be inferred from a careful reading of Sections 1.6 – 1.8.)