

Q6 Which *two* of the statements in the key about planetary atmospheres are TRUE? Pencil across *two* cells in row 6.

KEY for Q6

- A Carbon dioxide, CO_2 , cools the thermospheres of Venus and Mars by radiating energy to space. ✓
- B Venus, the Earth, and Mars all have similar total masses of CO_2 in their atmospheres. ✗
- C Photodissociation of CO_2 in the atmosphere of Venus leads to a high abundance of carbon monoxide, CO . ?
- D Photosynthesis releases oxygen into the Earth's atmosphere. ✓
- E The carbon-containing molecule that accounts for most of the carbon in the atmospheres of the giant planets is CO_2 . ✗
- F CO_2 has not been detected in the atmospheres of the giant planets because it does not have a vibrational spectrum. ✗
- G The effective temperature of Jupiter is higher than that expected from its distance from the Sun mainly because of the greenhouse effect. ✗

Q7 Which *one* of the statements in the key about the Milky Way is FALSE? Pencil across *one* cell in row 7.

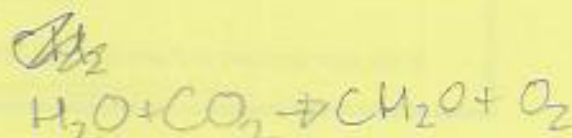
KEY for Q7

- A M stars are the most abundant type of star in the Milky Way as a whole. ✓
- B The whole Galaxy rotates with the same orbital period everywhere. ✗
- C The Galaxy contains approximately $10^{11} M_\odot$ in stars, $10^{10} M_\odot$ in gas, $10^8 M_\odot$ in dust and perhaps $10^{12} M_\odot$ in dark matter. ✓
- D Population II stars are seen in the vicinity of the Sun as high velocity stars. ✓
- E The spiral arms stand out partly because they contain exceptionally bright stars, rather than because they contain an exceptionally large number of stars. ✓
- F Intermediate Population I stars, such as the Sun, are not confined to the spiral arms but are found throughout the disc. ✓
- G The oldest stars in the Galaxy tend to be the ones that move in highly elliptical orbits about the centre of the Galaxy. ✓

Q8 Some observed features of the Universe are listed in the key. Which *two* of them each indicate that there was a Big Bang and that it was hot? Pencil across *two* cells in row 8.

KEY for Q8

- A The existence of stars and hot interstellar gas ✗
- B That the expansion is described by Hubble's law ✓
- C The cosmic background radiation ✓
- D That the sky is dark at night (Olbers' paradox) ✗
- E That luminous plus dark matter gives an average density of the Universe that is not much less than the critical density ✗
- F The relative abundances of hydrogen (^1H), deuterium (D), and helium (^4He) ✓
- G The clustering of galaxies



$$M = \frac{4\pi^2 a^3}{G t^2}$$

$$t^2 \propto a^3$$