

between X and the Earth, but otherwise it would be blue-shifted.

- E Galaxy X would appear to Y to be neither blue-shifted nor red-shifted.

Q11 Which two of the cosmological problems in the key can be resolved by postulating that there was a period of inflation during the early development of the Universe? Pencil across *two* cells in row 11.

KEY for Q11

- A Olber's paradox as to why the night sky is dark
B Why the average density of the Universe is close to the critical value
C Why approximately 25%, by mass, of the matter created in the Big Bang was in the form of helium
D Why the radiation from the hot Big Bang has cooled to 2.7 K today
E Why so much of the matter in the Universe is in the form of dark matter
F Why the Universe provides conditions suitable for the development of life

G Why it is thought that there was not time before the Big Bang

- H Why the cosmological microwave radiation is very nearly uniform

Q12 An astronaut flies to a distant planet. According to them, the journey distance is l_a , the time taken is t_a , the separation of their departure and arrival events in four-dimensional spacetime is s_a , and the relative speed of the spacecraft and Earth is v_a . For the mission controller on Earth, the corresponding quantities are l_c , t_c , s_c and v_c . Which combination listed in the key gives the true relationship between the quantities involved? Pencil across *one* cell in row 12.

KEY for Q12

- | | | | | |
|---|-------------|-------------|-------------|-------------|
| A | $l_a = l_c$ | $t_a = t_c$ | $s_a = s_c$ | $v_a = v_c$ |
| B | $l_a < l_c$ | $t_a < t_c$ | $s_a < s_c$ | $v_a < v_c$ |
| C | $l_a < l_c$ | $t_a < t_c$ | $s_a < s_c$ | $v_a = v_c$ |
| D | $l_a < l_c$ | $t_a < t_c$ | $s_a = s_c$ | $v_a = v_c$ |
| E | $l_a > l_c$ | $t_a > t_c$ | $s_a = s_c$ | $v_a = v_c$ |
| F | $l_a > l_c$ | $t_a > t_c$ | $s_a > s_c$ | $v_a > v_c$ |
| G | $l_a > l_c$ | $t_a > t_c$ | $s_a > s_c$ | $v_a = v_c$ |

PART B: FEEDBACK QUESTIONS — BLOCK 4

(Not assessed)

This Part contains questions designed to help the S281 Course Team evaluate the course. They do not carry any marks for this assignment, but if you can spare a few minutes to answer the following questions, we would be very grateful. The information you provide will help us to improve the course for future years.

Q13 and Q14 The following questions refer to Book 4. Each question refers to the individual chapters of Book 4, and asks about the length of time you took to study them and how interesting you found them.

Q13 Please estimate your total study time for Chapter 1 (including any assignment questions and audioband 4) and select *one* answer from A–E in the key for Q13 and Q14. What was your overall impression of the Chapter? Was it interesting? Select *one* answer from F–H in the key. Pencil across *two* cells in row 13.

KEY for Q13 and Q14

- A Less than 4 hours
B 4–8 hours
C 8–12 hours
D 12–15 hours
E Over 15 hours
F Very interesting
G Fairly interesting
H Not very interesting

Q14 Please estimate your total study time for Chapter 2 (including any assignment questions, TV programme 8 and video sequences 13 and 14) and select *one* answer from A–E in the key for Q13 and Q14. What was your overall impression of the chapter? Was it interesting?

Select *one* answer from F–H in the key. Pencil across *two* cells in row 14.

Q15 and Q16 These questions ask about the level of difficulty of Chapters 1 and 2. For each question, select *one* response from the key according to how difficult you found the relevant chapter.

KEY for Q15 and Q16

- A ... too easy because there were insufficient challenging concepts.
B ... too easy because the chapter took less than a reasonable amount of time.
C ... about right in level.
D ... too difficult to understand in a reasonable amount of time.
E ... too difficult to understand even using more than a reasonable amount of time.

Q15 I found Chapter 1 ...

Q16 I found Chapter 2 ...

Q17 to Q22 These questions are covered by an array; we would like to know your views on the video sequences related to Block 4. For each question choose up to two responses: one that estimates how long you spent watching each video sequence, reading the notes and doing any tasks required, and one that best describes how useful you found the video sequence.

Q17 and Q18 Video sequence 13. Pencil across up to *two* cells in rows 17 and 18.

Q19 and Q20 Video sequence 14. Pencil across up to *two* cells in rows 19 and 20.

Q21 and Q22 Video sequence 15. Pencil across up to *two* cells in rows 21 and 22.