

Exercise walk-through

8.3

Red-shift – physics only (4.8.2)

AQA · GCSE · Physics

Exercises 2.1·2.3

2.1 State what red-shift is. [2]

2.2 State the link between a galaxy's distance and its receding speed. [1]

2.3 What do observations since 1998 suggest about distant galaxies? [1]

Exercises 2.1·2.3

2.1 State what red-shift is. [2]

2.1 An increase in the wavelength of light from most distant galaxies; the spectral lines shift towards the red end.

2.2 State the link between a galaxy's distance and its receding speed. [1]

2.2 The further away the galaxy, the faster it is receding.

2.3 What do observations since 1998 suggest about distant galaxies? [1]

2.3 Distant galaxies are receding ever faster – accelerating expansion.

Exercises 3.1·3.2

3.1 Explain how red-shift provides evidence for the Big Bang theory. [4]

3.2 Light from galaxy A shows a larger red-shift than light from galaxy B.

(a) State which galaxy is moving faster away from us. [1]

(b) State which galaxy is probably further away. [1]

(c) A third galaxy shows no red-shift at all. State what this suggests about its motion. [1]

Exercises 3.1·3.2

3.1 Explain how red-shift provides evidence for the Big Bang theory. [4]

3.1 Light from most distant galaxies shows an increase in wavelength (red-shift); this shows the galaxies are moving away from us – receding; the further the galaxy, the faster it recedes, so the whole universe is expanding; traced backwards, the expansion began from a very small, extremely hot and dense region – the Big Bang.

3.2 Light from galaxy A shows a larger red-shift than light from galaxy B.

(a) State which galaxy is moving faster away from us. [1]

(b) State which galaxy is probably further away. [1]

(c) A third galaxy shows no red-shift at all. State what this suggests about its motion. [1]

3.2 (a) Galaxy A. (b) Galaxy A. (c) It is not receding – stationary relative to us (or moving sideways); accept “not moving away”.

Exercise 3.3

3.3 “Scientists are sure the Big Bang is complete.” Evaluate this statement using the evidence and the open questions. [4]

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3.3 Supporting evidence: red-shift of distant galaxies matches an expanding universe, and the 1998 supernova observations extend the picture with accelerating recession. But the theory is incomplete: observations cannot yet explain dark matter and dark energy, which the universe seems mostly made of – so “complete” is not justified; it is the best-supported current model.