



QUESTION WORKBOOK

Star brightness and magnitude

Astrophysics · Year 13

AQA 3.9.2.1, 3.9.2.2

11 questions · 32 marks

NAVY SCREEN EDITION

SECTION A · Warm-up

A1 State which way the apparent magnitude scale runs, and the apparent magnitude of the dimmest stars visible to the naked eye. [2]

A2 Define the parsec, and state its relationship to the light year. [2]

A3 State the brightness ratio corresponding to one step of apparent magnitude, and to five steps, and explain why the scale is built from ratios rather than equal differences. [3]

SECTION B · Standard

B1 Star P has apparent magnitude 2.0 and star Q has apparent magnitude 7.0. Calculate how many times brighter P appears than Q. [3]

- B2** Sirius has apparent magnitude -1.5 and lies 2.64 pc from Earth. Calculate its absolute magnitude. [3]

- B3** A star has absolute magnitude $+0.6$ and lies 25 pc away. Calculate its apparent magnitude. [3]

- B4** A star's apparent magnitude is 8.5 and its absolute magnitude is 1.0 . Calculate its distance in parsecs. [4]

- B5** Two stars have the same absolute magnitude. One lies 5.0 pc away, the other 50 pc. Calculate the difference in their apparent magnitudes and the ratio of their apparent brightnesses. [3]

SECTION C · Stretch

- C1** A star lies 42 light years away and has apparent magnitude 5.0. Calculate its distance in parsecs and its absolute magnitude. [4]

- C2** The Sun's apparent magnitude is -26.7 and Sirius's is -1.5 . Estimate how many times brighter the Sun appears than Sirius. [3]

- C3** Explain why apparent magnitude alone cannot tell you how luminous a star really is, and what absolute magnitude does about the problem. [2]
