

TMA 04

General instructions

Covering: Topic 4 (Birth and life), and the activity related to this topic. All references to exercises, figures or tables relate to Topic 4, unless stated otherwise in the question.

Make sure you know when and how to complete and submit your TMA: detailed instructions are given in the [Assessment](#) section of *What is S284, and how to study it*, and in the OU's [Assessment Handbook](#) (which can be found from the [Student policies and regulations website](#)).

It is important to answer questions in your own words, rather than copy text from other sources. Your TMA submission will be passed through automatic plagiarism detection software and you risk losing marks, or incurring more serious penalties, if you are found to have plagiarised others.

Your solutions should be your own work and should not therefore contain downloaded text or diagrams from the internet or material copied from paper sources, unless you are directed to do so in the question. Where you do include such material, be certain to reference it clearly and appropriately (see the [Plagiarism and referencing](#) section of *What is S284, and how to study it*.)

All questions are linked to specific learning outcomes as identified in the rubric for each question. Please refer to the [Learning outcomes](#) section of *What is S284, and how to study it* for an explanation of the abbreviations (such as KU1) that are used for the learning outcomes.

In all calculations:

- show all details of your working (unless the question specifies that you may do otherwise)
- include units with all physical quantities
- work to an appropriate number of significant figures
- include numbers and captions for any figures or tables you create
- make sure any images are legible at the size presented.

The overall mark you obtain for TMA 04 will contribute a maximum of 8% towards the marks required to pass this module. See the [Your module result](#) section of *What is S284, and how to study it* for details of how the module is assessed.

Question 1 (8 marks)

This question relates specifically to the following module learning outcomes: KU1, CS2, KS1, KS3 and PPS3.

- a. Optical images of two star clusters of very different ages are shown in Figure 1.

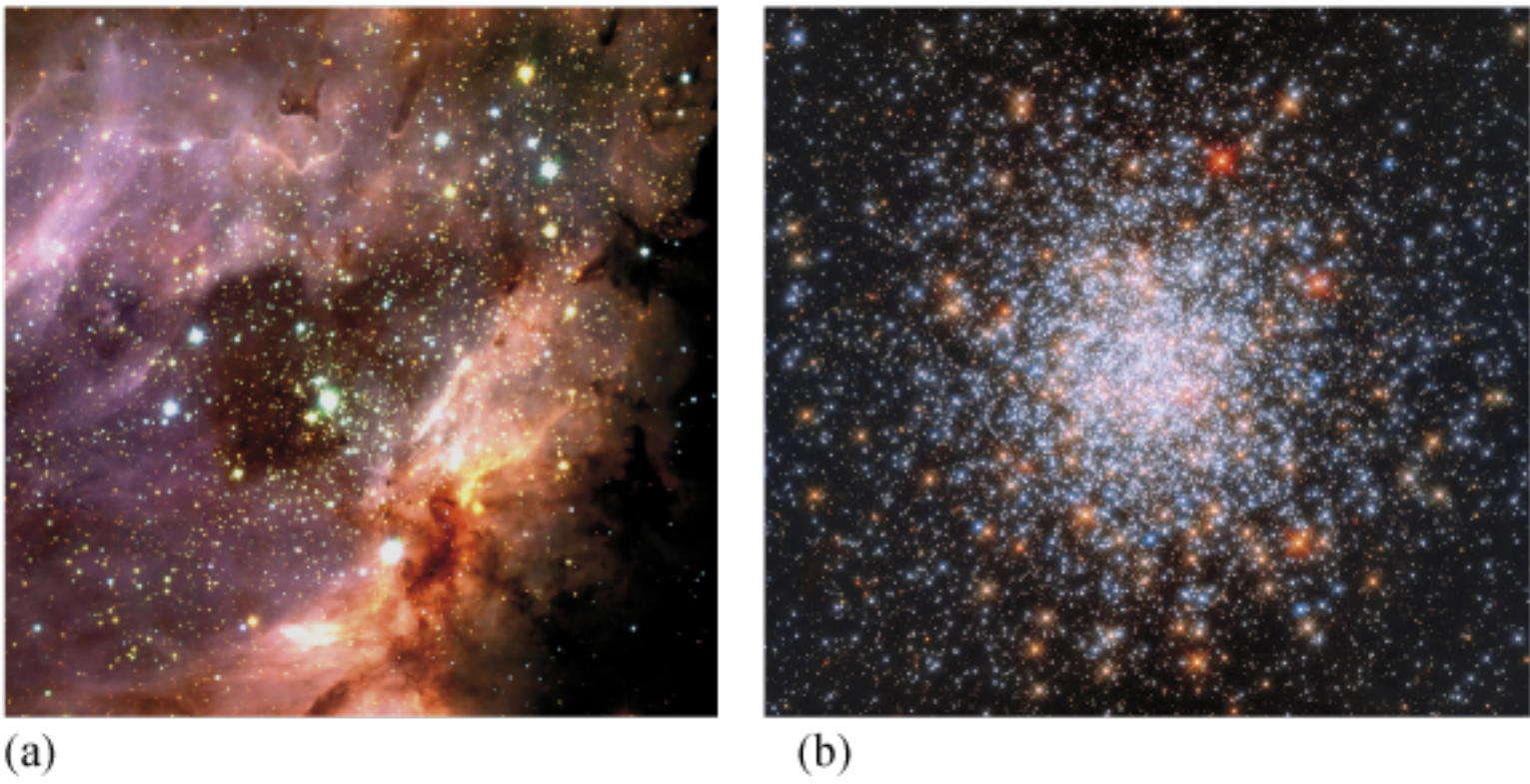


Figure 1 Images of two star clusters, (a) and (b), for you to analyse.

By examining the images in a similar way to [Exercise 1.3](#), identify which cluster is younger and which is older via their morphological features. Explain your reasoning via a brief bullet-point description of these diagnostics.

(4 marks)

- b. In [Question 2.1](#) you investigated how the internal temperature of the Sun can be estimated based on its mass and radius.

Now consider a star with a mean internal temperature of 1.7×10^7 K and radius of $2.3 R_{\odot}$. Calculate the estimated mass of this star in units of M_{\odot} , and state which hydrogen burning reaction pathway is likely to be operating in the star's core.

(4 marks)

Question 2 (24 marks)

This question relates specifically to the following module learning outcomes: KU1, KS1, KS3, PPS3.

- a. Write up and present your news story about the work described in the research paper introduced in Task 2 of the [Topic 4 Activity](#). Be sure to heed all the instructions and advice that you were given.

Your story must not exceed 350 words including the headline. State the word count at the end of your article.

Marks will be awarded for:

- a suitable headline (1 mark),
 - factual content (9 marks),
 - appropriate structure and language (8 marks),
 - word count stated and in the range 300 – 350 words (2 marks).
- b. An important part of this exercise was to use your knowledge gained from S284 to interpret the science for non-specialist readers.
- (i) Give one example of a term or concept in the research paper that you judged could be too difficult for your readers. What did you do to get around this problem?
- (ii) Give one example of where you introduced background information that was not in the research paper to explain the context or significance of the discovery. Which sections of the S284 material did you draw upon?

(4 marks)