

GCSE Astronomy Coursework

B11 Drawings or Photos of Messier Objects

Use binoculars/telescope/robotic telescope to produce detailed drawings and/or photographs of at least three Messier/NGC objects.

Deep sky objects require good observing conditions so check the weather forecast and plan ahead and be prepared to grab your binoculars or telescope whenever there is a clear night. Aim for nights when the Moon is below the horizon and choose a dark location. If you are taking photos through binoculars or a telescope you may wish to take some practise shots first to determine the correct f-stop, ISO and exposure time settings.

Alternatively you can use the National Schools Observatory (NSO) website to submit a request for use of their 3 metre telescope in sunny La Palma. Think about using colour filters to bring out emission from different gases in the galaxies and nebulae you observe. You can combine your images to produce a colour image using the NSO LTImage software. Also you may want to obtain images of each object using different exposure times, this will allow you to select the best images.

Information about Messier objects can be found here:

<http://www.astroleague.org/al/obsclubs/messier/mess.html>

To locate Messier/NGC objects and the Moon use **www.stellarium.org** or alternatively download an app for your mobile:

http://downloads.bbc.co.uk/tv/guides/BBC_Stargazing_Live_2012_Mobile_App_guides.pdf

To find sunrise, sunset, moonrise and moonset times and the phase of the Moon use **www.timeanddate.com**

Check the weather forecast - **www.metoffice.gov.uk**

See our useful guides for help on how to carry out observations and take photographs of various objects: **www.rmg.co.uk/discover/astronomy-photographer-competition/how-to-guides**

Use the Liverpool robotic telescope in La Palma and select your objects via the 'GCSE Astronomy Projects' option on the NSO website:

<http://www.schoolsobservatory.org.uk/obs/go>

For examples of reports with moderator comments visit the Edexcel GCSE Astronomy website: <http://www.edexcel.com/quals/gcse/gcse09/astronomy/Pages/default.aspx>

Here you will find two documents that will help you write a report: Under 'Controlled assessment' download 'Controlled Assessment Teacher Support Book' and under 'Teacher Support Materials' download 'GCSE Astronomy Teachers Guide'.

Below is a checklist of points that you should include in your report. Remember to reference all sources of information and to label all images, diagrams and tables and refer to them in the text e.g. Table 1, Figure 1 etc.

Design (5 marks)

- > All equipment listed
- > All set-up details of binoculars/telescope/camera listed (colour filters, aperture size, magnification, field of view, ISO, f-stop, exposure time, focal length/zoom, tripod)
- > Astronomical terms explained
- > Rise and set times of the Moon
- > Phase of Moon and position of Moon taken into account (if above the horizon)
- > Limits of location noted
- > Alternative locations suggested
- > Minimum 3 Messier/NGC objects chosen
- > Explanation of why they were chosen
- > Explanation of how to find them
- > Mention of the weather forecast
- > Range of dates and times to observe & why (lunar phase, altitude, hour angle of Moon)

Edexcel marking guidelines:

0	No procedure designed.
1	Outline a simple procedure for the observations, using basic astronomical terminology.
2-3	Astronomical knowledge and understanding used to decide on the most appropriate site,time, equipment for observations.Spelling, punctuation and grammar used with reasonable accuracy. Limited use of astronomical terminology.
4-5	Detailed astronomical knowledge and understanding used to design the most appropriate observing programme with a range of sites, times and instruments evaluated. Spelling, punctuation and grammar used with considerable accuracy. Good range of astronomical terminology used correctly.

Observation (5 marks)

- > 3 objects drawn/photographed appropriate to location
- > **If camera used:** ISO setting, exposure time, f-stop, focal length
- > Description/observational details of each object
- > Limiting magnitude stated
- > Location stated (latitude & longitude)
- > Date and time stated
- > Weather
- > Seeing

Antoniadi scale

A five-point scale, devised by Eugène Antoniadi and used by amateur astronomers to indicate the quality of seeing:

I – perfect seeing, without a quiver

II – slight undulations, with moments of calm lasting several seconds

III – moderate seeing, with larger tremors

IV – poor seeing, with constant troublesome undulations

V – very bad seeing, scarcely allowing the making of a rough sketch.

- > Positions of objects stated
- > Proximity to meridian (hour angle/altitude)
- > Position and phase of Moon (if above horizon)
- > All figures labelled and referenced in text

Edexcel marking guidelines:

0	No observations completed.
1	Simple observations completed, providing some data. A few observational details included.
2-3	Sound observations completed and recorded, providing adequate data for the task. Clear and accurate observational details included.
4-5	Excellent programme of observations completed and recorded, providing conclusive data for the task. Full observational details included clearly and accurately.

Analysis (5 marks)

- > Software used to process images
- > Apparent magnitudes of objects stated and compared to limiting magnitude (of telescope)
- > Description & explanation of drawings or photographs

Edexcel marking guidelines:

0	No analysis on the observations.
1	Simple comments on what is shown by the observations, using basic astronomical terminology.
2-3	Conclusions or calculations derived from observational data used to address the task set. Spelling, punctuation and grammar used with reasonable accuracy. Limited use of astronomical terminology.
4-5	Full analysis of the observational data, resulting in clear conclusions related to the task set. Spelling, punctuation and grammar used with considerable accuracy. Good range of astronomical terminology used correctly.

Evaluation (5 marks)

- > Accuracy of drawings/quality of photos evaluated
- > Comparison with reference images e.g. Hubble Space Telescope
- > Limitations of project explored
- > Suggested improvements to project
- > Suggested extension to project

Edexcel marking guidelines:

0	No evaluation of the observation.
1	Simple comment on the accuracy of the observations, using basic astronomical terminology.
2-3	Supported statement of the accuracy of the observational data obtained. Feasible suggestions for improvements or extensions to the observations. Spelling, punctuation and grammar used with reasonable accuracy. Limited use of astronomical terminology.
4-5	Clearly reasoned quantitative assessment of the accuracy of the observational data obtained. Detailed suggestions for improvements or extensions to the observations. Spelling, punctuation and grammar used with considerable accuracy. Good range of astronomical terminology used correctly.