

GCSE Astronomy Coursework

A2 & B2 Meteor Shower

Observe a meteor shower. Record meteor trails on a drawing of the stellar background from sketches (A2) or use long-exposure photography to obtain photographs of a meteor shower (B2) and estimate magnitudes of the meteors. Locate and show the position of the radiant.

Meteor showers occur when the Earth enters cometary debris in its orbit around the Sun. Spotting meteor streaks requires patience and in most cases leaving the city. Take warm clothes and blankets and keep scanning the sky. Meteors are harder to spot if the Moon is up as it is a form of natural light pollution. This should be mentioned in your observing log. Choose reference stars for your magnitude estimates, you can compare the brightness of the meteors with these stars if you know their apparent magnitudes. Also remember to carry a red light in order to maintain your night vision.

You will need a DSLR camera for B2 and you may need to spend some time adjusting the settings to get the best images. Be aware that light pollution will swamp the CCD within a 4-5 minute exposure.

For a list of upcoming meteor showers go to <http://earthsky.org/astronomy-essentials/earthskys-meteor-shower-guide>

To locate constellations 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

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
- > **B2 only:** All set-up details of camera listed (field of view, ISO, f-stop, exposure time, focal length/zoom, tripod)
- > Astronomical terms explained
- > Rise and set times of the Moon
- > Phase and position of Moon taken into account
- > Reference stars chosen for meteor magnitude estimates
- > Explanation of why they were chosen
- > Explanation of how to find them
- > Limits of location noted
- > Alternative locations suggested
- > Mention of the weather forecast
- > Range of dates and times to observe & why
- > Predicted zenith hourly rate

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)

- > Number of meteors recorded on appropriate date
- > **B2 only:** All camera settings listed
- > Location stated (latitude & longitude)
- > Date and time stated
- > Night vision acquired & maintained (red light used)
- > Weather
- > Seeing

Antoniadi scale

A five-point scale 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.

- > Limiting magnitude stated (faintest star visible)
- > Position and phase of Moon and its apparent magnitude
- > Altitude and hour angle of radiant (constellation)
- > Estimated magnitudes of meteors noted
- > 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)

- > Meteors drawn on stellar background
- > **B2 only:** Meteors photographed against stellar background
- > Estimated magnitudes for all meteors observed (using reference stars)
- > Suitable precision of estimates for magnitudes
- > Position of radiant located and uncertainty stated

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 evaluated
- > **B2 only:** Quality of photos evaluated
- > Accuracy of measurements evaluated
- > 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.