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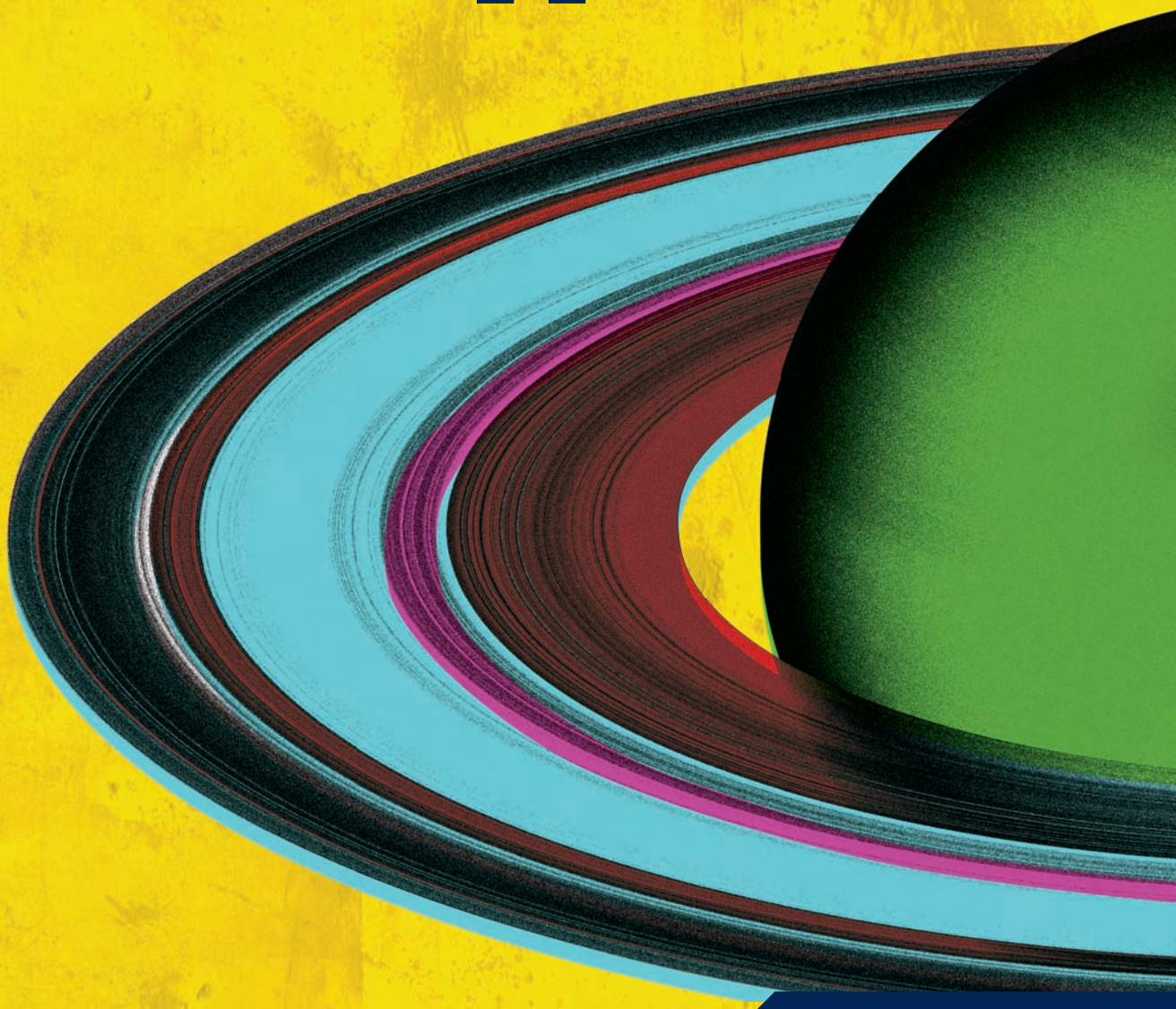
Edexcel GCSE in Astronomy

Controlled Assessment Teacher Support Book



A PEARSON COMPANY

Welcome to the GCSE 2009 Controlled Assessment Teacher Support Book

This Teacher Support Book has been designed to provide you with the answers to key questions that will arise during the teaching and assessment of Controlled Assessment Unit 2: Exploring the Universe.

The book is divided into 4 sections. It contains content which is applicable for all options and some content which is specific to your chosen option.

Inside you will find some fantastic content, including:

- A clear explanation of the levels of control involved in this important Unit
- Suggested resources to support your teaching
- Hints and advice for students preparing for and writing up the controlled assessment
- Exemplar student responses and moderator comments

Expert advice from the people who know

We hope you find this document useful and look forward to working with you on our new GCSE specifications. We are on hand to answer your questions so please feel free to get in touch.

Nigel Marshall
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We look forward to working with you.

Contents

Unit 2: Exploring the Universe 5AS02

What's new?

QCDA has required a change from coursework to controlled assessment. This will affect the GCSE 2009 Astronomy qualification from September 2009. The main changes are:

- The task titles are now set by Edexcel.
- Both tasks must be observational (the previous specification required one task to take the form of a chart or construction of an astronomical model).
- The work is now completed by students under three different levels of control – limited, medium and high.

What will students actually do?

The students will plan, carry out, analyse and evaluate two observational projects. One project involves unaided (naked eye) observations and the other project requires the use of a camera, pair of binoculars or a telescope (amateur or robotic). Other suitable aids to observation can also be used. The two observational projects carry equal marks and most of the project titles are very similar to those in the previous specification.

What are levels of control?

Controlled assessment is delivered under different levels of control – limited, medium and high. Different parts of the controlled assessment are carried out under different levels. The table shows what is meant by the levels of control.

Level of control	Interpretation
Limited	The student can complete the work (including possible night-time observations) without being directly supervised by a teacher or other impartial adult. Students can work individually or in small groups.
Medium	Projects are assessed by teachers and moderated by Edexcel.
High	The work must be formally supervised and kept securely at all times. Students must not communicate with each other and work must be retained by the Centre. Students may use computers but teachers must ensure that work is secure.

Overview of assessment

There are 2 units in GCSE Astronomy, with the same assessment weighting as in the previous specification.

Unit 1: Understanding the Universe 75% weighting	Unit 2: Exploring the Universe 25% weighting
This included four topics that closely match the previous specification: Earth, Moon and Sun; Planetary Systems; Stars; Galazies and Cosmology. Unit 1 will be assessed by an externally-marked non-tiered 2-hour written examination paper consisting of 20 structured questions (objective-test questions; short-answer questions; data and graphical questions; short calculations and extended-answer questions).	This requires students to complete and submit two observational projects from lists provided by Edexcel; the two projects form the Controlled Assessment component of the examination. **These projects must not be chosen from the same row in the table**. Each task will be marked out of 20, with a total mark of 40 for the two tasks.

- **Controlled Assessment is weighted at 25% of the course.**
- **It's worth 40 marks.**
- **It can be completed at any time during the course and submitted in May prior to the written examination.**
- **Students are assessed internally by teachers. A sample of work will be requested by Edexcel for external moderation.**

Unit information
Prohibited combinations There are no prohibited combinations with any examined unit.

Lists of task titles (September 2009)

Unaided observations ***Choose one task from this list.***	**Aided observations** ***Choose one task from this list.***
A1 **Lunar Features** Produce a series of naked-eye drawings of three lunar surface features. Use them to show their changing appearance at different lunar phases.	B1 **Lunar Features** Produce a series of telescopic drawings and/or photographs of three lunar surface features. Use them to show their changing appearance at different lunar phases.
A2 **Meteor Shower** Observe a meteor shower. Record meteor trails on a drawing of the stellar background from sketches and estimate magnitudes of the meteors. Locate and show the position of the radiant.	B2 **Meteor Shower Photography** Use long-exposure photography to obtain photographs of a meteor shower. Estimate magnitudes of the meteors. Locate and show the position of the radiant.
A3 **Drawings of Lunar or Solar Eclipse** Using a suitable method of observation (lunar — direct, solar — pinhole projection), produce a series of drawings showing the progress of a lunar or solar eclipse.	B3 **Photographs of Lunar or Solar Eclipse** Using a suitable method of observation, produce a series of photographs showing the progress of a lunar or solar eclipse.
A4 **Constellation Drawings** Observe and make detailed drawings of three different constellations, recording dates, times, seeing and weather conditions and noting colours (if possible) and magnitudes by comparison with reference stars.	B4 **Constellation Photography** Produce photographs of three different constellations, recording dates, times, seeing and weather conditions. Use the photographs to identify colours and magnitudes by comparison with reference stars.
A5 **Drawings of a Celestial Event** Produce a series of drawings to record the passage of a suitable celestial event, for example a transit, occultation or comet.	B5 **Telescopic Drawings or Photographs of a Celestial Event** Produce a series of detailed telescopic drawings or photographs to record the passage of a suitable celestial event, for example a transit, occultation or comet.
A6 **Shadow Stick** Use a shadow stick to record the direction of the Sun at different times on at least two days and hence determine (a) the time of local noon and (b) the observer's longitude.	B6 **Sundial** On at least three widely-spaced dates, compare the time shown on a correctly-aligned sundial with local mean time. Use these data to determine the accuracy of the sundial used.
A7 **Levels of Light Pollution** Use repeated observations of the faintest stars observable to quantify the effect of light pollution at two different sites.	B7 **Photographic Measurement of Levels of Light Pollution** Use the magnitudes of the faintest stars visible in long exposure photographs to quantify the effect of light pollution at two different sites.

Unaided observations ***Choose one task from this list.***	**Aided observations** ***Choose one task from this list.***
A8 **Sunspots** Use a pinhole to **project** an image of the Sun onto a suitable background and observe and record sunspots over a sufficiently long period of time to determine the Sun's rotation period.	B8 **Sunspots** Use a small telescope to **project** an image of the Sun onto a suitable background and observe and record sunspots over a sufficiently long period of time to determine the Sun's rotation period.
A9 **Light Curve of a Variable Star** Use a series of naked-eye estimates of the magnitude of a suitable variable star over a sufficient period of time to determine the period of the star.	B9 **Light Curve of a Variable Star** Use a series of telescopic estimates of the magnitude of a suitable variable star over a sufficient period of time to determine the period of the star.
A10 **Estimating Stellar Density** By counting the numbers of visible stars within a certain area of sky, estimate and compare the density of stars in the sky, parallel with and perpendicular to the plane of the Milky Way.	B10 **Measuring Stellar Density** Use binocular/telescopic observations or original photographs to measure and compare the density of stars in the sky, parallel with and perpendicular to the plane of the Milky Way.
No title	B11 **Drawings of Messier Objects** Use binoculars/telescope/robotic telescope to produce detailed drawings and/or photographs of at least three Messier/NGC objects.
No title	B12 **Measuring the Sidereal Day** Take long-exposure photographs of the circumpolar stars around Polaris or the south celestial pole and use them to determine the length of the sidereal day.

Further guidance on level of control

Part A – Task Setting - High level of control

The tasks are set by Edexcel and are published in the specification; these will be reviewed every two years and may be amendments based on student performance and feedback.

Students wishing to retake the controlled assessment unit will need to use tasks appropriate for the year in which they are retaking.

Part B – Task Taking

(a) Research and Observations – Limited level of Control

Research to prepare for the observations can also be carried out under limited control, with notes brought into the classroom for writing-up under a high level of control.

Observations can be carried out by students unsupervised. Teachers should nevertheless monitor students' work to ensure that it is their own by benchmarking against previous work and expectations.

(b) Design, Analysis and Evaluation – High level of control

The written report, including any analysis and evaluation, will take place in the classroom under the supervision of teachers. Students must not take away any information from the classroom to complete elsewhere. Students may bring in any notes diagrams, photographs etc. that they have made during their observational work, any data that they have collected and any research that they have carried out prior to making their observations.

Teachers should monitor students in the classroom to ensure that they complete the tasks themselves. Teachers may answer questions but cannot guide students along a particular path or advise on how they should approach the task.

Writing-up of the tasks should be supervised rather than invigilated. This is not a formal examination and there is no need to maintain absolute silence – the key requirement is that students are supervised at all times to ensure that all aspects of the work are their own.

Part C – Task Marking – Medium level of control

This aspect of the controlled assessment is similar to the arrangement in the previous specification.

Teachers will mark the tasks following the assessment criteria published by Edexcel. For each student, teachers will complete a controlled assessment recored sheet showing where marks have been awarded.

Edexcel will ask for a sample of work from the centre, this sample will be indicated on your optems with an astrickes of by a tick if you are entering youe centre mark via Edexcel online. The work of the highest and lowest scoring candidates should be included in the sample too. Edexcel will moderate the work and centres will receive a Centres feedback report on the day of results.

Edexcel are particularly keen that teachers receive training in marking the work of students and will provide training courses and on-line support.

FAQs: Preparing to teach controlled assessment

Before teachers can plan to advise students on the controlled assessment, they will need to have an idea of how the controlled assessment is to be assessed and what students have to do. We'll start with some important answers to your questions about controlled assessment.

When will I see the task?

"These are published in the GCSE Astronomy specification and will be readily available prior to teaching the course."

When will students see the task?

"In order to make their choices, students should see the list of tasks as early in their course as possible."

Will there be any choice?

"Yes. Students must choose for the lists set by Edexcel, one task from List A (Unaided Observations) and one from List B (Aided Observations).

The tasks must not be chosen from the same row (e.g. students must **not** choose both A6 and B6)"

When can I offer the controlled assessment unit?

"The controlled assessment may be carried out at any time during the course. The tasks are closely related to the content of Unit 1 and so it would be sensible for students to have studied a topic before preparing and completing tasks based on the subject matter.

It is always a good idea to encourage students to plan and carry out their tasks in plenty time to complete them. In recent years, many students have failed to complete both tasks and this has had a detrimental effect on their final result."

How long should students take over each task?

> The recommended time to plan, carry out and write up a project is about 6 hours, but carrying out some observations will require considerably longer than this.

What happens with resits?

> Students wishing to retake the controlled assessment unit will need to use tasks appropriate for the year in which they are retaking. If a student does with to resit the controlled assessment task, they will also need to resit the examination in order to resit the 40% terminal rule set by QCA.

Supporting your students

What sort of research will students need to do?

Students will need to consider:

- the astronomical object(s) that they want to observe;
- from where they are going to carry out their observations;
- what equipment they will need;
- the date(s) and time(s) when they plan to observe.

What help is available for students to carry out their research?

Having decided what they want to observe, students will need to find out when and where in the sky their chosen target will be visible. Let's say that a student intends to observe and draw the Galilean moons as they orbit Jupiter (as part of Task B5 – Telescopic Drawings of a Celestial Event). Because of the continuously-changing position in its orbit with respect to the Earth, Jupiter is not always visible in the night sky - it is best observed when it is close to opposition. Students will therefore need to use a star chart such as those published monthly in newspapers, *Astronomy Now* and *Sky at Night Magazine,* or planetarium software such as *Stellarium* to find suitable dates.

What sort of equipment will students need?

The choice of equipment will largely depend on the task that students are designing. They might like to list a number of items of equipment and then write down some of the reasons for choosing particular articles. For example, they might have access to two pairs of binoculars, say 12 x 50 and 10 x 60. It would be a good idea to report why they chose the pair with the larger diameter lenses (10 x 60) over the ones with the higher magnification (12 x 50).

Can students plan to use robotic telescopes?

The availability of world-class robotic telescopes can allow students to extend dramatically the range of observations they can make. Although they are relatively small in size compared with some of the large professional telescopes such as Keck and Gemini, they are situated at high altitudes around the world where the 'seeing' conditions are much more reliable than in the UK.

There are currently three main robotic telescope facilities, all of which are available free of charge to UK schools and colleges. They are ideal for producing images of 'extended objects' such as planets and their moons, galaxies, nebulae, comets and close-up images of the Moon.

- The Bradford Robotic Telescope is located on Tenerife and operated by the University of Bradford. Students don't need to book an actual time slot for observing and a number of different cameras (with different fields of view) are available. Visit www.telescope.org for more information and guidance.

- The Faulkes Telescope Project operates two 2-metre telescopes, one in Hawaii and the other in Australia. They allow night-time observations to be carried out in real time during class-time in the UK. Observing time slots can be booked and students have direct control of one of the telescopes via their computer. Further details can be obtained at www.faulkes-telescope.com

- The National Schools Observatory (NSO) is operated by Liverpool John Moores University and situated on La Palma in the Canary Isles. Like the Bradford Telescope, students don't need to book an actual observing session – simply request an observation and the NSO will do the rest! A visit to www.schoolsobservatory.org.uk will give you lots more information.

How many observations will students need to make?

The actual observations form a major part of the controlled assessment since without them students will not be able to proceed to analyse them or have much to evaluate! Clearly, it is important that they are well-planned and fit the requirements of the project titles. For example, if a student intends to carry out task A4 or B4 (that instruct you to observe three different constellations), they should do just that - *three* constellations!

Students will be assessed on both the quality and quantity of their data so it is better to make more observations rather than fewer!

Actual sketches, photographs, tables of data and/or digital images will form the major part of a student's observations. It is a good idea to keep all rough sketches and drawings – these might enhance the quality of a project, especially if a student doesn't quite manage to produce a large number of final observations.

Small sketches or images do not reveal much detail. Students should try to make drawings or produce images that are large and clear.

What other information do students need to include?

> Students should make sure that they include a clear list of the observational details of your sessions in their report; marks are awarded for these. Dates, times, location, weather, seeing conditions and the equipment that was used are all essential.

What is involved in the Analysis?

> The analysis of some projects will inevitably take place during observing session(s). For example, in Project A2 (naked-eye observations of a meteor shower), ystudents will need to estimate the magnitudes of meteors as they are observed and record them (they will need to know the magnitudes of nearby bright reference stars to do this). For others, students will need to complete the analysis once data are collated or graphs have been drawn (for example shadow stick projects or those involving the light curve of a binary star).
>
> In some of the more descriptive projects, for example Project A3 involving sketching the progress of a lunar or solar eclipse, a student's analysis might include a commentary of what was observed or descriptions of what can be seen in the images.

...and the Evaluation?

> This part of the project invites students to comment on the accuracy of their observations (and deductions that thay have made), make suggestions on how the observations could be improved and in what ways the project could be extended. Students should try to be quantitative, i.e. include numbers wherever possible, when discussing accuracy.
>
> If a student's project involves determining some quantity such as the Earth's rotation period (task B12), they could compare their calculated value with the accepted value. In the more descriptive tasks, students might like to compare their sketches or photographs with those taken by the professionals.
>
> Some students may find that they don't have sufficient observations to complete the task to their satisfaction. This needs pointing out and suggestions for future observations made (similar to those in your original design) with dates, times etc.

Alternatively, some observations may not be of sufficient quality and students might think about using different optical instruments (or robotic telescopes), giving reasons for ytheir choice.

Sensible suggestions for extending students' projects are also credit-worthy; again, these don't actually need to be carried out. Suggestions should be practical and relate to the original task. For example, if a project involves using a simple shadow stick (task A6), students could propose to determine latitude as well as longitude. Alternatively, they could suggest extending light curve projects A9 or B9 to study a different type of variable star from the one that was originally studied.

Administering the controlled assessment

How do I conduct the controlled assessment?

- Arrangements can be decided by the Centre.
- Controlled assessment can take place in normal lesson time, supervised by teachers.
- When there is more than one teaching group, they can complete the controlled Assessment at different times, and indeed, stages in the course.
- Students can have plans and notes. The pages will be strictly limited to aid teacher checking.
- Teachers should check that the materials contain only plans and notes and not a draft answer before they are taken into the controlled environment. These plans and notes should be retained with the students' responses in a secure place and will be required as part of the sample for moderation (there is no requirement to send in the complete folder of the whole unit from a student as in previous specifications).
- Students who are absent may complete the assignment another time. There are no restrictions on communication between students who have and who haven't completed the assessment, as there would be in a live examination. All students will know the task in advance.

Can students do the task on their computer?

“ Yes, the assignment write-up can be word processed, provided the computer is checked prior to use for any saved information and provided it does not connect to the internet or intranet. Spell-check may be used by students.

When work in a write-up session is completed this must be saved onto portable media and retained securely by the centre. The controlled assessment response must be printed out for marking and formal moderation. ”

What about students who qualify for extra time in examinations?

“ There is suggested timings for the controlled assessment tasks, but these are only sugguested timings. Student who qualifly for extra time in the written exam should be given sufficient time in order to complete their controlled assessment tasks. ”

Submitting the controlled assessment

When does controlled assessment need to be submitted?

> Controlled assessment must be submitted in the summer series (May deadline). However, teachers can offer the unit earlier in the year, retain the controlled assessment securely, and submit it in the summer series, for example you could teach the controlled assessment in the Autumn term, students could write the response in January, you could retain the responses securely and submit these in summer.

How do I ensure that I meet the terminal assessment rule?

> You need to ensure that students are assessed for 40% of their GCSE in the terminal (last) examination series. In practice this means that two units in the GCSE should be taken/submitted in the final summer series. Controlled assessment written earlier in the year can be submitted as terminal assessment. Students will also be required to take another examined unit in the final summer series to ensure they satisfy the 40% requirement

Suggested resources to support teachers and students

Before you can advise students on their choices of controlled assessment tasks, you will need to have an idea of available resources to support your teaching of the course.

The following is a provisional list of resources which may be updated as publishers begin to produce new resources to this support controlled assessment topic.

To help you and your students to plan observing sessions, select equipment and discover what astronomical objects make good observational targets, David Haworth's Observational Astronomy site is extremely helpful.

A good introduction to stars and constellations, including maps and useful links to Nine Planets, APOD etc. is: http://www.astro.wisc.edu/~dolan/constellations/. In addition, Richard Dibbon-Smith's Constellations website lets you view all the constellations and gives detailed historical (mythical) and astronomical information about each.

The Messier Catalogue – ideal for helping you to choose nebulae, clusters and/or galaxies to observe.

If you are planning to do some observing, the Met Office will not only give you the latest weather forecasts for the days (and nights) ahead, but advise you of the times of sunrise and sunset in your location.

If you don't have access to star charts in newspapers or magazines, there are numerous ones available on free download - try the University of Bristol's Monthly Skyguide from where you can obtain basic and full charts, with observing notes.

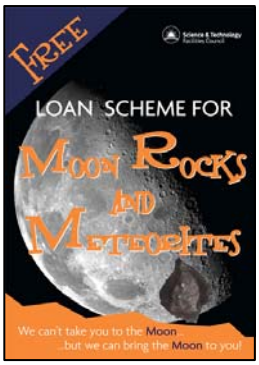
Spaceweather.com gives you all the latest information on forthcoming meteor showers, sunspot activity and visiting comets. In addition to providing lots of information about sunspot activity, solar flares, eclipses, Near-Earth Asteroids, fireballs and comets, it is possible to register yourself (and your students) to receive alarm calls should aurorae be visible where you live! 10/10

Direct links to the home pages of the three major robotic telescopes that you and your students can use free of charge are:

www.telescope.org – the Bradford Telescope
www.faulkes-telescope.com – the Faulkes Telescopes
www.schoolsobservatory.org.uk – the NSO's Liverpool Telescope

Concerned about light pollution? The BAA's Campaign for Dark Skies is on your side!

You can borrow samples of Moon rocks and meteorites from the Science & Technology Facilities Council (STFC). An informative website allows you to download a PDF that tells shows you how easy this is.



There is an online e-textbook available on subscription:
www.starlearner.com

Sample task

GCSE Astronomy Controlled Assessment
A4 Constellation Drawings

DESIGN 2/2/10

For this piece of Coursework I plan to observe and make sketches of three different constellations. I will try to note down colours of the brightest stars and estimate their magnitudes by comparing with reference stars of known magnitude how bright the stars appear to be.

I will now explain some important terms:

Magnitude – this describes how bright a star appears to be. The scale begins at 1 for the brightest stars and goes on to 6 for the dimmest (although the scale extends beyond these values for really bright stars and those that can only be seen with binoculars or telescopes.

Colour – the 'surfaces' of stars are different colour depending on the temperature, blue/white being the hottest stars and red being the coolest. Colours can only be seen for the very brightest stars because the cones (colour cells) in the eye's retina are not activated in dim light (only the rods are).

I plan to carry out my observations from a field about ¼ mile from my house in Ambleside, Cumbria in the Lake District. Here the skies will be dark because there is almost no light pollution. This will be better than observing from my garden or the centre of our town because the security lights from neighbours' houses and street lights will stop me from seeing the fainter stars (this is called 'skyglow').

I will plan to observe and sketch during February because the skies will be darker for a long time (before the clocks go forward) and there are some interesting winter constellations in the sky.

I will need to find out when the Moon is new so that I can carry out my observations close to that date – the light from the Moon will not obscure my observing.

Once I have found out some suitable dates, I will try to obtain a weather forecast to help to decide the exact date when I will observe.

I will use the star chart from the middle pages of *Sky at Night* magazine and *Stellarium* software on my computer to help me to choose constellations that have enough interesting bright stars and that will be high enough in the sky to be visible (and make the stars appear brighter, giving me a better chance of determining colour).

I will use the Naked-eye Observing Planning Sheet in the *Pupil Toolkit for GCSE Astronomy* to list the equipment I will need and write down the three constellations that I have selected.

DETAILED PLANNIN G 9/2/10

I have found out from *Sky at Night* magazine that the New Moon occurs on February 14th. Possible dates for observation are:

Day	Date	Possible Observing?	Favourable weather?
Thursday	11 Feb	yes	cloudy
Friday	12	yes	cloudy
Saturday	13	no	-
Sunday (NEW MOON)	14	no	-
Monday	15	yes	clear and cold
Tuesday	16	no	-
Wednesday	17	yes	clear and cold

From the Met Office long-range weather forecast and BBC1 teletext page 400, I have found out the weather forecasts for the possible observing dates and added them to the table.

I will aim to observe on Monday 15th February and Wednesday 17th February (if the first night has bad weather).

From *Stellarium* and *Sky at Night* magazine, I have a list of possible constellations:

Orion;
Gemini;
Taurus;
Auriga;
Leo;
Ursa Major;
Ursa Minor;
Cassiopeia;

Cancer.

From these, I have chosen to observe:

Orion – my favourite constellation that contains lots of bright stars and many fainter ones; I shall try to observe stars in Orion's 'Shield'.

Taurus – I will use the pointer stars in Orion's Belt to locate and observe Taurus (which well be high in the sky)

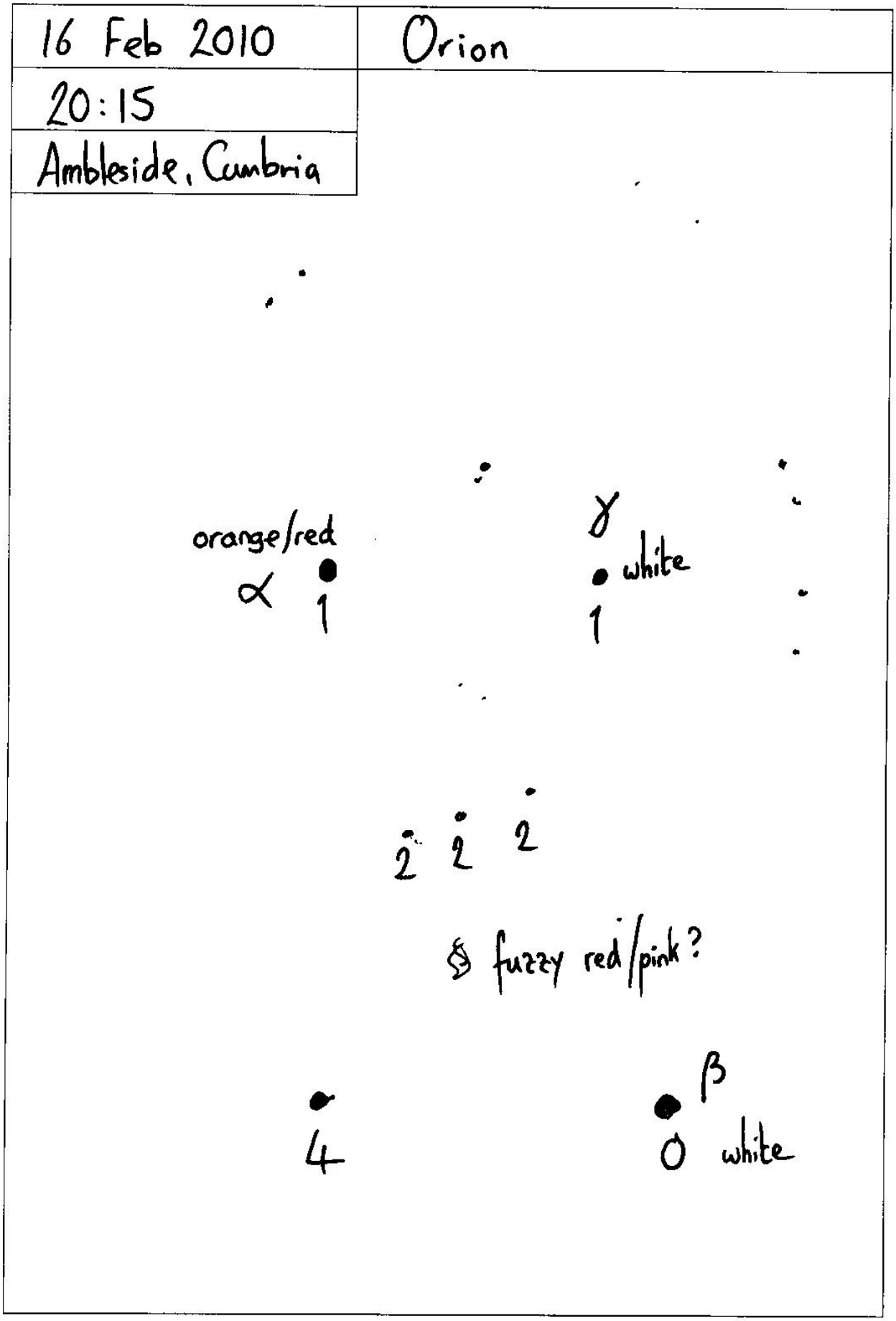
Leo – with a larger RA, Leo will be higher in the sky later and I will observe this constellation last of all.

Naked Eye (Unaided) Observations
Planning Sheet

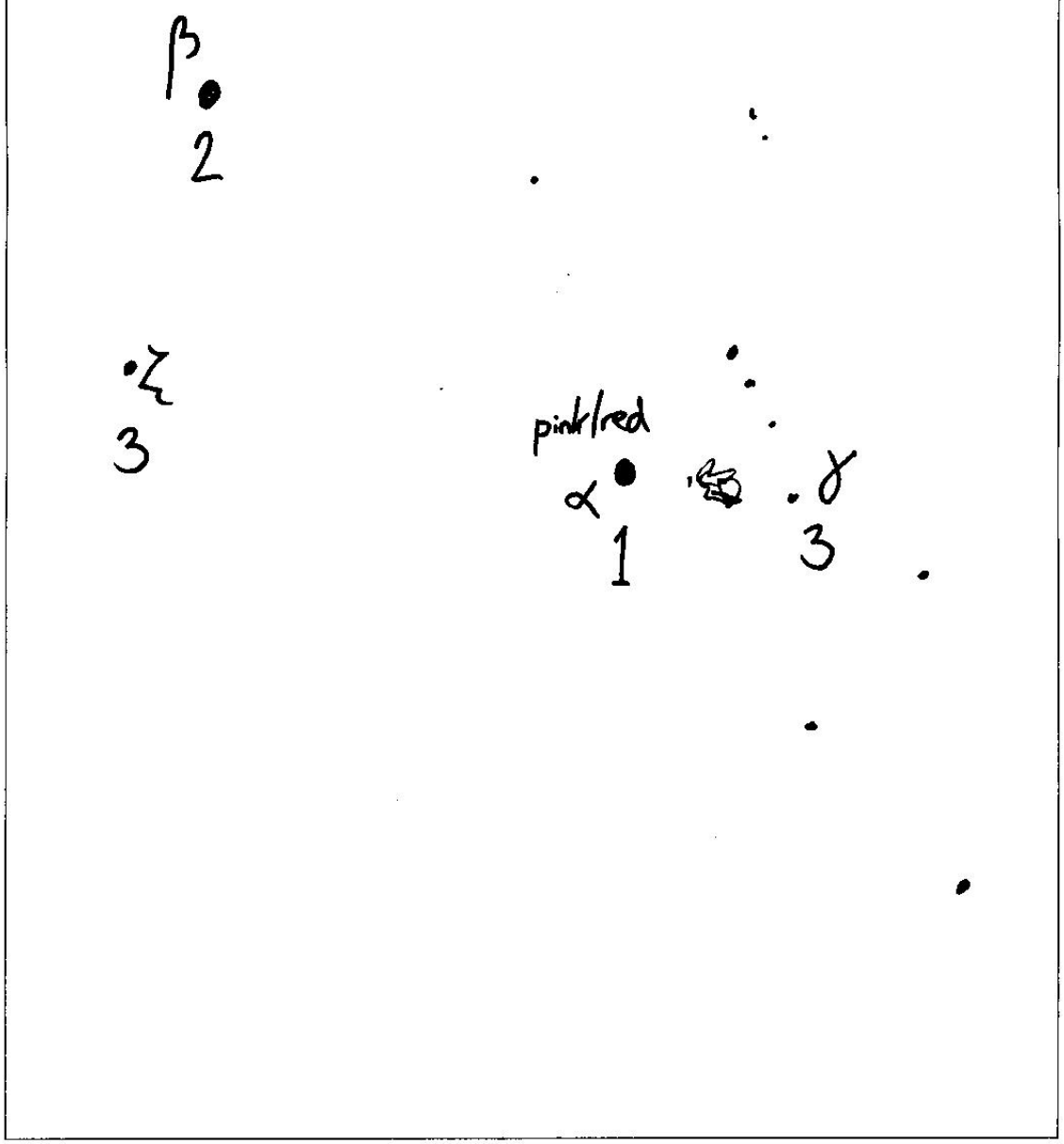
Project Title: A4 CONSTELLATION DRAWINGS		
Date: 2010 FEB 16TH	**Start time:** 20:00	**Duration:** 2 HOURS
Phase of Moon: NEW / SLIGHT CRESCENT	**Location:** AMBLESIDE, CUMBRIA	
Weather forecast: CLEAR SKIES, NO FROST, -5 DEGREES CELSIUS		

Equipment needed: TORCH, RED FILTER, PENCIL, CLIPBOARD, WARM CLOTHS, BOB HAT, GLOVES, FLASK OF TEA, WHITE ART PAPER, SKY AT NIGHT MAP
Risk Assessment: AVOID LOSS OF DARK ADAPTION BY USING RED FILTER ON TORCH, DON'T GET TOO COLD

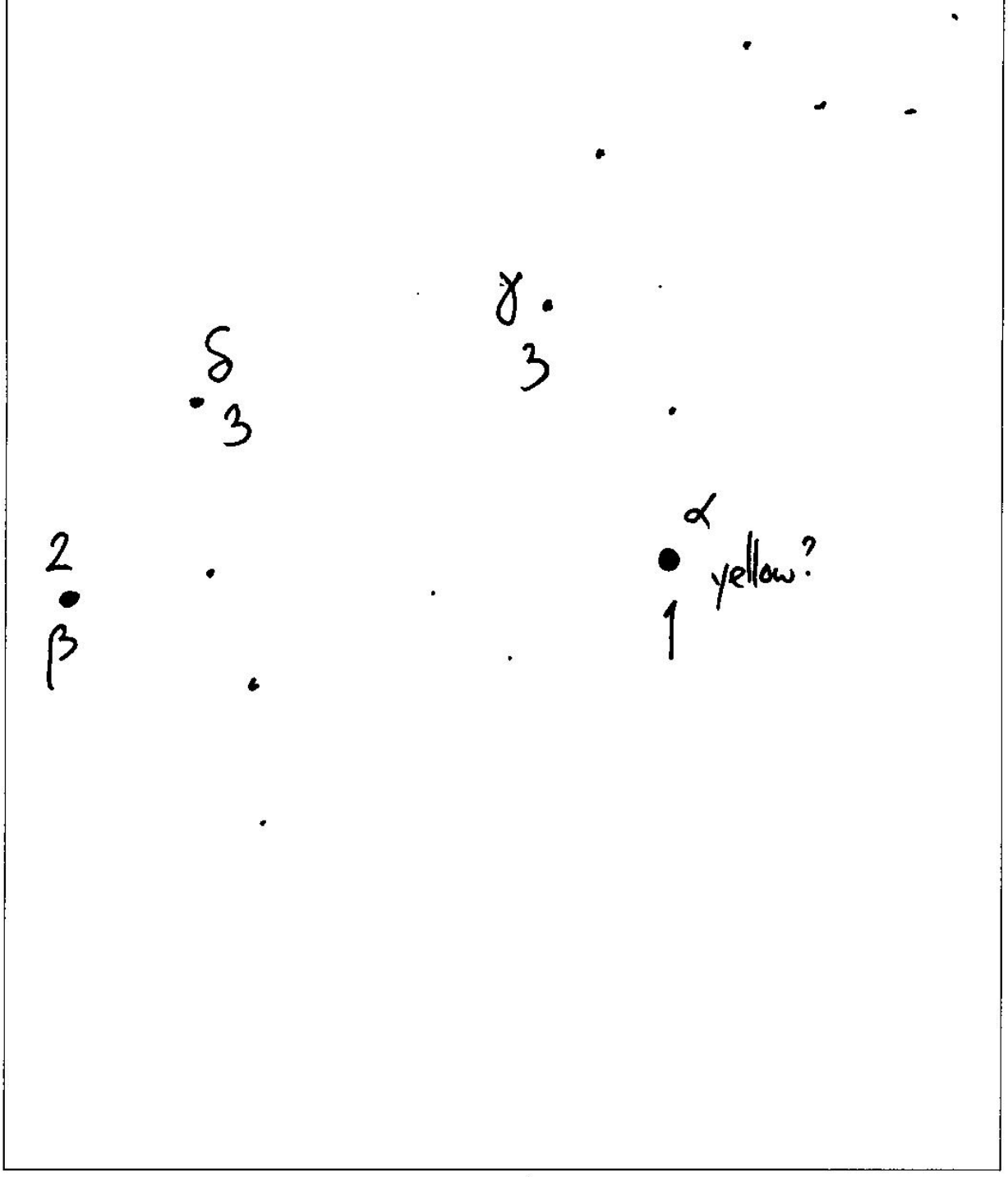
Proposed object/object type		To be observed? Y / N	Priority (HIGH / MED / LOW)
Moon / Sun (delete as required)			
Constellations:	**1** ORION	YES	HIGH
	2 TAURUS	YES	HIGH
	3 LEO	YES	HIGH
Nebulae and clusters:	**1**		
	2		
	3		


16 Feb 2010
Orion
20:15
Ambleside, Cumbria
orange/red
α
1
γ
white
1
2
2
2
fuzzy red/pink?
4
β
0
white

16 Feb 2010	Taurus
20:35	
Ambleside. Cumbria	



16 Feb 2010	Leo
20:55	
Ambleside, Cumbria	



ANALYSIS 18/2/10

I observed and sketched Orion, Taurus and Leo. The weather was clear but cold and the stars were high enough above the southern horizon to be able to estimate magnitudes to the nearest whole number. I used 'comparison stars' in the same general region of sky to do this:

reference star	magnitude
Procyon	0.3
Castor	1.6
β Aur	1.9
ζ Aur	3.8

The tables show my estimated magnitudes and the 'official' magnitudes from Collins *Stars and Planets Guide.* I have also listed the colour where I could observe it.

ORION

star	estimated magnitude	official magnitude	colour (where observed
α	0	0.6 mean	orange/red
β	1	0.1	white
γ	1	1.6	white

TAURUS

star	estimated magnitude	official magnitude	colour (where observed
α	1	0.8 mean	pink/red
β	2	1.7	
γ	3	?	
ζ	3	3	

LEO

star	estimated magnitude	official magnitude	colour (where observed
α	1	1.4	yellow
β	2	2.1	
γ	3	2.7 mean	
δ	3	3.6	

EVALUATION 18/2/10

Looking at the three tables in the Analysis, I feel that my estimates of magnitude are good. I could only estimate to the nearest magnitude, but most are in agreement with the official magnitudes to the nearest whole number.

My sketches look fairly accurate – I compared mine with constellations on *Stellarium*.

I could only distinguish colour in the brightest stars – the others just twinkled white! Looking at star charts and the *Stars and Planets Guide*, the colours are quite close to those described in the text. The only exception was α Leo that I thought looked yellow and it is in fact blue/white.

I could improve my piece of coursework by observing on more than one night and practicing drawing the constellations; with practice I think my sketches would be more accurate. I could also use colour and a scale of different sized 'blobs' to represent stars of different magnitudes.

Moderator Comments

Marking strand: Design 5/5

The student has used detail astronomical knowledge and understanding to design an observing programme. Terminology is well-explained and the student has selected the constellations to observe and given reasons. The student has also made good use of various sources of information. Although no real consideration for alternative observing sites is given, it would seem harsh to penalise the student for this.

Marking strand: Observations 3/5

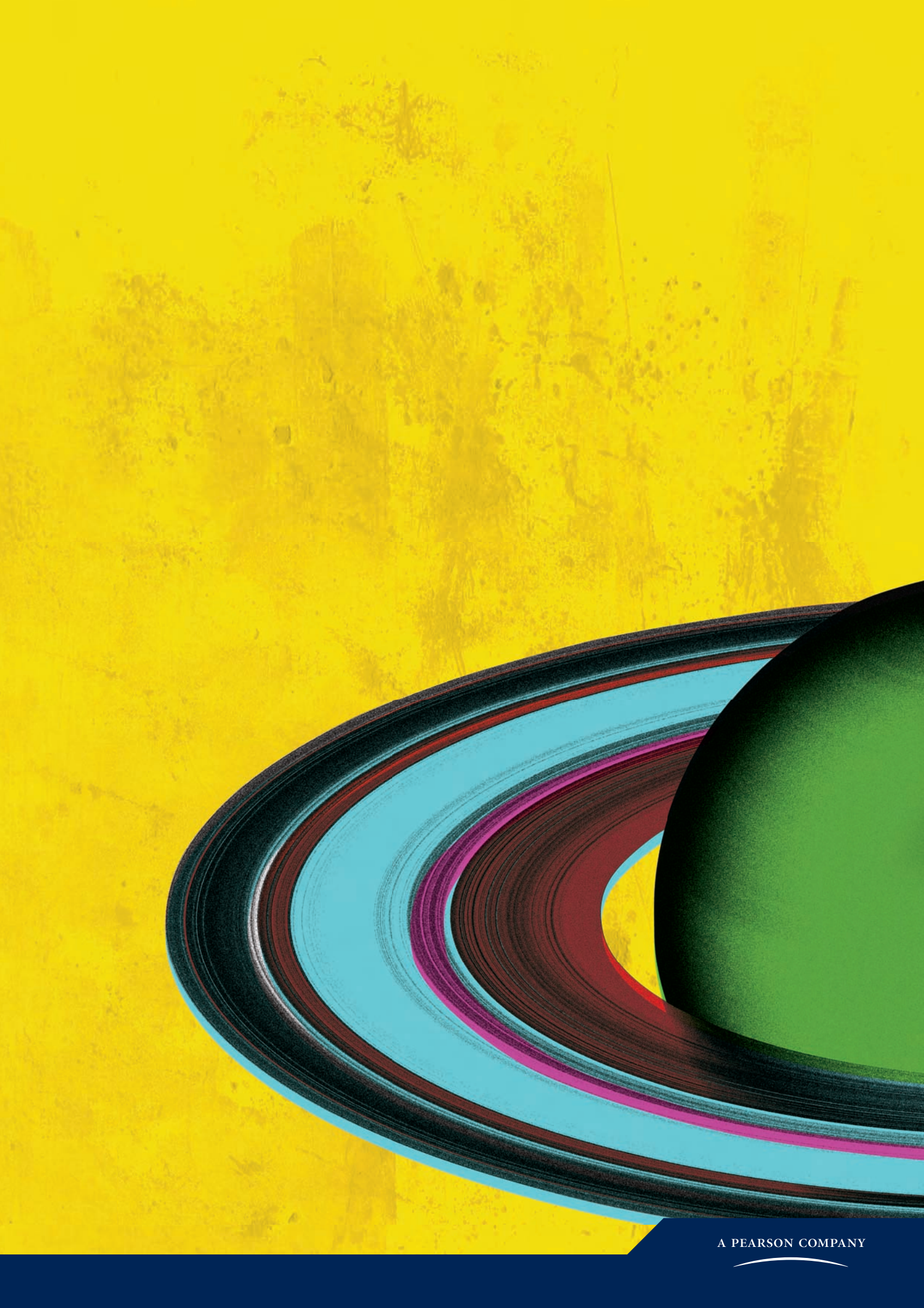
The observations themselves are a little 'rough' and could be better presented. The student has included clear and accurate observational details, but the project could have benefited from better presentation.

Marking strand: Analysis 5/5

Despite the disappointing quality of the observations, the student has attempted to note down colours and estimate magnitudes (to a sensible degree of precision). The terminology and grammar are used with considerable accuracy.

Marking strand: Evaluation 3/5

The student's evaluation seems a little brief as if the coursework deadline date is approaching rapidly! There are a few mentions of the accuracy of observations, but this is a little thin. There are some feasible suggestions for improvements and extensions, but no detail.



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