ARMOURERS AND BRASIERS TATA SIXTH FORM MATERIALS PRIZE

Notes for teachers

Prepared by Dr Diane Aston, IOM3
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WELCOME

Thank you for registering to take part in the Armourers and Brasiers Tata Sixth Form Materials Prize competition. You should have received your registration number, and all the course materials you will need to run the competition by email.

The Prize has been created to encourage students to develop a sustained interest in STEM careers and in particular to explore the constantly changing material world in which we live. The prize is a standalone project which should be carried out in year 12, ideally spread across the whole school year but the modules have been designed so that you can do them at your own pace and in a time frame to suit your needs.

If at any point you require clarification or assistance please do not hesitate to contact me by email (diane.aston@iom3.org) or telephone (01476 513882) and I will do my best to help.

I hope that you and your students have a thoroughly enjoyable time over the coming months and I look forward to working with you and seeing the results of your efforts.

Best wishes,

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INTRODUCTION

• These notes have been put together to help you to guide your students through the two compulsory and two option modules. The Prize has been designed so that the sessions can be led by either a science (physics or chemistry), design technology or engineering specialist, though in an ideal world it would be a combination of these as materials science is such a multidisciplinary subject. Alternatively your students may wish to work through the modules independently with support only if needed.

• The notes are not extensive as we do not wish to insult your intelligence! The Prize structure is such that there is scope for your individual style and areas of expertise to shine through.

• The competition is open to year 12 students studying at least one post-16 course in a STEM subject. These students must commit to engaging with the project for a minimum of 12 hours spread out across the year and therefore so must you!

• We appreciate that your students are already under a great deal of pressure from their formal studies but encouragement should be given to extend their knowledge and understanding of materials beyond the one hour sessions to allow them to develop their Portfolio into a useful ‘materials reference collection’.

• The modules have been designed so that as the competition progresses the emphasis of the sessions changes from mainly ‘chalk-and-talk’ to individual or group research. The amount of content in the modules also decreases through the competition as we appreciate that during the spring/summer terms coursework and exam revision must take precedence.

• If you decide to continue with the project in future years you could invite year 11 students to listen to the presentations given by the Prize participants as part of the final module.

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WHY SHOULD MY SCHOOL PARTICIPATE?

- We would like you to see this competition in the same way that you would view Duke of Edinburgh Award. Participation in the Prize gives you and your students a chance to work together in a less formal setting towards a shared goal.
- You are not constricted by the requirements of your specification and you have scope to go off on a tangent on a topic that is of interest to you and your group.
- You will benefit as it demonstrates your commitment to the school community and ethos.
- The course content will help to enrich your day-to-day teaching by giving you a broader and deeper understanding of materials and examples of contexts that you can use to teach the concepts in the curriculum, not just in the sixth form but throughout the school.
- The less formal approach taken during the extra-curricula sessions allows you to build stronger relationships with your students, opening channels of communication and therefore fostering a healthy teaching and learning dialogue.
- Your department will benefit as you will be seen to be adding something extra and therefore may attract extra students to take up your subject. It will raise the profile of your department within school.
- Taking part in a national competition raises the profile of your school.
- You will receive a certificate for your school recognising the commitment you have made to run the Prize from the Armourers and Brasiers Company.
- Your school will benefit from having a structured cross-curricular dimension to STEM subjects.
- Participation in the Prize could lead to better exam performance (always handy for the league tables!)
- You have the potential to win £500 and an IOM3 school visit for your department.
- You will have some fun!

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WHY SHOULD MY STUDENTS PARTICIPATE?

• Your students will be able to make better informed decisions about their university courses and future careers in STEM based on a deeper understanding of materials science and the materials used in the world around them.

• All students taking part will receive a certificate recognising their efforts from the Armourers and Brasiers Company. Those that go on to the national competition and those that are shortlisted as finalists will receive certificates showing the level they have reached.

• Participation in the competition is a great way for your students to show their interest in expanding their knowledge of STEM in the Personal Statement on their UCAS application form.

• All students will be encouraged to develop key functional skills which will be of benefit in their future career, such ability to research independently, ability to participate in group debates, presentation skills (both written and verbal), ability to sort through information and pick out key points and then apply these to a broader context. This produces more well-rounded students that are able to take a synoptic approach to their studies.

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## HOW IT WORKS – AN OVERVIEW

| Month/Activity                                      | J | A | S | O | N | D | J | F | M | A | M | J | J | A | S | O | N | D |
| Register to take part                              |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Get course materials                               |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Recruit students                                    |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Module 1 (compulsory)*                              |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Module 2 (option)*                                  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Module 3 (option)*                                  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Module 4 (compulsory)*                              |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Select top 5 candidates and submit entries          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Judging                                             |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Certificates posted                                 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Finalist notified                                   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Practice presentations                              |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Final and award presentation                        |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |

* Each module is designed to take about three hours.

The modules are flexible and you are welcome to work through them at whatever pace best suits your needs. The deadline for submitting your entries is early July but you can send them in before this if you have completed all the work.
SUPPORT FOR YOU

- We are keen to support you at every step of the way as you and your students progress through the Competition.
- If you have a question or comment on any part of the competition please get in touch! We are happy to help if we can! You can get in touch with Diane Aston at any time on 01476 513882 or by emailing diane.aston@iom3.org
- The idea for this Competition came from a project submitted for the Rolls Royce Science Prize in 2012. Mark Rogers from King Edward VI School in Lichfield is the Head of Design Technology and was instrumental in setting up the project for the Rolls Royce Science Prize nomination. His students have been working on a project similar to this competition as an extra curricula activity for two years and he has extensive experience of setting up and running an after school club to run a competition such as this.
- Mark has offered to mentor you in setting up and running this project in your school and can help suggest ways to get support from your senior management and encourage your students to participate. You can contact Mark by emailing ArmourersMaterialsPrize@gmail.com
THE MODULES

• The themes of the modules have been chosen to give participants an insight into many different aspects of materials from the fundamental science to the application of modern materials.

• The subject matter will extend aspects of the knowledge of those studying A-levels in Physics, Chemistry and Design Technology but it is not necessary for participants to be studying all three of these as the baseline for the modules is GCSE level.

• Each module has designed to last about three hours. This will give your students a broad overview of the topic but you should encourage them to find out more in their own time to add to their Portfolio of Experiences.

• During the sessions you can use the Power Point presentation provided to introduce the theme.

• It has been envisaged that the presentation might be followed by group practical activities and discussions or individual computer or library-based research. Suggestions for such activities have been provided in the presentation.

• Part of the first module looks at careers in materials to encourage participants to investigate their future options at a time when they will be starting to decide what to do after school. We hope that participating in the competition will help students in completing their personal statements if they are applying to university or in job applications.

• If you have come up with any activities that have worked well please suggest your ideas so that we can include them for others in future years.
IDEAS FOR GROUP AND EXTENSION ACTIVITIES

• Each module guide gives ideas for an activity that can take up part or all of the session.
• As much as possible these have been designed to make use of equipment and resources that you will already have in school or everyday materials that are cheaply and readily available (sources have been provided where appropriate).
• Many of the activities are not designed to have a right or wrong answer or indeed an end point. They have been chosen to encourage students to develop investigation skills such as researching, note taking and deciphering relevant information.
• If you have any ideas for demonstrations, experiments or resources that you think would work well please do share them with us as we would like to build up a growing collection of ideas for future years.
• It may be that you are able to take your group on an external visit as part of this competition or as part of the students’ formal studies that is relevant to this competition. This could be to the engineering (or if you are really lucky materials) department at your local university or to a company in your area that uses materials.
• Useful links page gives links to website and resources that we think might be useful.
• Please do give us your feedback (positive or negative) on these resources or any others that you have come across, or any visits that you have been on so that we can share this information in future years.
THE PORTFOLIO OF EXPERIENCES

• The Portfolio of Experiences is your students’ diary, their record of everything that they have done through out the project.

• In order to allow students to be creative in developing their Portfolio the only stipulation that we have is that it is no bigger than A3.

• In it your students should record their notes from the one hour sessions, any results from experimentation they have carried out, perhaps photographs of activities, copies of articles they have read with accompanying notes on their importance or meaning and reports of any visits they have been on.

• The Portfolio is the primary method by which you should select your final candidates for entry into the national competition and you should use the Standard Judging Form to assist you in doing this.

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THE PRESENTATION

• The final module of the competition aims to bring together everything that the students have learned as they research and then present on a material of their choice.

• Students should be given a slot of fifteen minutes allowing for a ten minute presentation and five minutes of questions.

• The idea of this is to help the candidates to develop their communication skills and improve their confidence in presenting to a group.

• You should judge the presentation on the quality of the slides and the oral presentation using the Standard Judging Form.
GUIDANCE ON JUDGING

- You may nominate a maximum of five candidates to go forward to the national competition and you should make your choice on the basis of their general conduct, Portfolio of Experiences and the presentation given as part of Module Four.

- A Standard Judging Form has been provided to assist you in selecting your finalists. The marks are heavily weighted towards the Portfolio of Experiences as this is the students’ record of their interaction with the project and it should act as a reference guide for them in the future.

- The form and indeed the Competition has not been designed to measure the academic ability of your students. This project is all about encouraging your students to find out more about materials and although this does involve acquiring new knowledge, its primary aim is to get your students to engage with a new subject and develop some of the transferrable skills that will be invaluable to them as they progress through their career.
SUBMITTING YOUR ENTRIES

- Once you have selected a maximum of five candidates to go on to the National Competition you should send their Portfolios, each accompanied by an Official Entry Form to the address given by the closing date.

- As part of the Official Entry Form you will need to submit the Standard Judging Form for each candidate. Your students will need to complete a short statement about why they decided to take part in the project and you will also need to compile a short statement for each nominee.

- You will be notified of the safe arrival of your entries by email and we will return Portfolios to you once judging is completed.

- The closing date for the submission of entries is early July. Any entries received after this date will not be included.
THE NATIONAL COMPETITION

• Once all entries have been received four finalists will be selected.
• The four finalists will be notified (via their teacher) by the end of October at the latest.
• The successful candidates will be invited to attend the final at Armourers Hall, London in December (date tbc). At this event they will be asked to give their presentation to the panel of judges at a specific time.
• The judges will select an overall winner on the basis of the Portfolio and presentation. There will be a prize for the best Portfolio and the two runners up will also be acknowledged.
• Prizes will be presented at a short ceremony alongside other Armourers and Brasiers Prize winners and this will be followed by lunch in the Hall. This is a fantastic showcase event where they will receive their awards alongside other Armourers and Brasiers award winners and its a chance to have a tour of a Livery Hall which is not open to the public.
• The judges decision is final and a list of the finalists and winners will appear on the Prize website following the presentation.
ABOUT US

The Worshipful Company of Armourers and Brasiers
You may wonder how one of the original 100 Livery Companies of the City of London can possibly relate to education today being as there is no longer much call for armour! Despite roots dating back to 1322, when the Guild of St George of the Armourers was established, the Armourers and Brasiers Company is a forward looking charitable organisation that now supports Materials Science at all levels from primary schools up to new business ventures in the materials field. Within the schools sector the Company offers equipment grants for both primary and secondary schools and supports a range of CPD courses for teachers run by organisations such as the Institute of Materials, Minerals and Mining, the Institute of Physics and the Royal Society of Chemistry. It is the largest private funder of materials support, giving grants each year totalling in excess of £250,000. The Company has formed long-standing partnerships with Tata, Rolls-Royce and AWE in order to increase the scope of its support for materials science. An award from the Company is recognised as a great accolade and holds high regard from universities and companies alike.

Tata Steel
Tata Steel is a top ten global steel maker and the world’s second most geographically diversified steel producer. Tata Steel was founded in India in 1907. Since 2004 the Company has expanded globally, acquiring Asian steel producers NatSteel and Millennium Steel (now called Tata Steel Thailand) as well as Europe’s second largest steel producer Corus (now called Tata Steel Europe Limited). Tata Steel is part of the Tata Group, India’s largest industrial conglomerate. Both Tata and Tata Steel have a long history of charitable donations and social responsibility, with Tata spending approximately 4% of the Company’s profit after tax on corporate social responsibility initiatives.

The Institute of Materials, Minerals and Mining (IOM3)
IOM3 is one of the UK’s 36 professional engineering institutions whose activities encompass the whole materials cycle, from exploration and extraction, through characterisation, processing, forming, finishing and application, to product recycling and land reuse. It exists to promote and develop all aspects of materials science and engineering, as a leading authority in the worldwide materials and mining community. The Institute has a long and successful history of working with UK schools to support the teaching of the materials topics and promote careers in these areas, primarily through the Schools Affiliate Scheme.

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