NIWA



Information

for

Judges

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# **Greetings to our Science Fair judges**

**Welcome**

We extend a warm welcome to you as part of the judging panel at the NIWA North Harbour Science and Technology Fair.

We appreciate your time and hope that you will enjoy evaluating the work that our budding scientists have put into their science project/exhibit or investigations this year.

We must not forget the main purpose of our Fair is to provide a vehicle for our students to engage in the process of science through investigation, experiment, design and innovation.

Most of the judges are from our local schools. They are supported by judges from industry. We are often fortunate to have student teachers from Massey University

working alongside our more experienced judges. This is an opportunity of getting prospective teachers enthusiastic about the wonderful world of science and we hope will be advocates for the subject on the North Shore.

##### Your involvement in the fair helps us to foster the young student’s interest and enthusiasm in our sciences. We hope that you enjoy your experience with us at the Fair.

##### Our committee members will be wearing Hi-Vis vests so if there is anything we can help you with please feel free to discuss anything with them.

# **Programme for Friday 13th November 2020**

|  |  |
| --- | --- |
| 09:00 – 10:00 | Students arrive at Massey University.Kindly report to Sir Neil Waters Lecture Theatres. On arrival, students proceed to the relevant registration table. The tables are set to accommodate each of the Worlds – Physical, Material, Planet Earth and Beyond, Living, Technology and Consumer Science. At the registration table, the student will be given their marksheet. They will also receive a gummed label – the label is peeled off the backing sheets and is to be placed on **the top right-hand corner** of the project. Once registration has been completed student proceed to the set of display tables placed in their relevant World. They need to find the corresponding label which has been placed on one of the tables. Students set up their project display board and place the marksheet in front of their display board. Students must bear in mind that up to 6/8 projects need to be accommodated on each table.Once students have set their project up, they proceed to **Lecture Theatre 300** and settle in to one of the demonstration/talks that have been arranged for them while they wait to be called for their interview.Students must be alert and listen carefully when names are called for their interview.Once the interview is completed, students may leave the facility and go home/back to school if their parents are there to collect them. If they were transported to Massey by the school, they wait patiently and enjoy the presentations.**TOILETS**Students who require the toilet, will find these at the far end of the foyer – turn left as you leave LT300. Please proceed directly to the toilet and return once you have finished. At no stage are students allowed to mingle around the judges or projects on display. |
| 10:00 | Judges are please to meet in Lecture Theatre 100.There will be a welcome and briefing.Marksheets on clip boards will be distributed to judges.**Allocation of projects*** Judges will be paired up according to their preferences where possible. Student teachers may be allocated to work alongside an experienced staff member.
* If you are allocated a project from your school, kindly arrange a swop with another set of judges so no staff member/parent is assessing students from their own school. If there is a conflict of interest please mention this to one of the committee members or better still, the Chief Judge.
* Please discuss with your colleague the approach you will take when interviewing the student.
* PLEASE MAKE SURE YOU CONDUCT THE INTERVIEWS FISRT. Do not mark/assess the project until **all** your students have been interviewed. We hope to complete all interviews by 12:30.
 |
| +- 10.30 | **Morning tea:**After you have enjoyed a cup of tea/coffee please proceed to your projects. You will need to locate each of the projects assigned to you. Once you and your colleague have read through and discussed the project, you can begin the **Interview Process.** |
| +- 10.30 | **Interview process****a) Calling students:**When you require a student for the interview, please take the marksheet to one of the runners sitting outside LT300. You may wait outside LT300 for the student to arrive or you can return to the project and await the student’s arrival.The student will hand their marksheet to you so the interview process can begin.At the end of the interview, please let the student know if they have finished with you so they can leave Massey if their parents are there to collect. If student came to Massey with the school, they return to the lecture theatre and participate in the activity that has been arranged for them. **b) The interview:** Please make sure you have read the appropriate section in this Information Booklet about expectations during the interview process. |
|  | **PROJECT MARKING/ASSESSING**Once you have completed all the interviews, enjoy a light lunch, tea/coffee/juice and then begin the serious business of marking/assessing the project begins.Once you have completed marking/assessing all the projects and indicated the marks on the marksheet please bring the clipboard and marksheets to LT 100. Keep marksheets on the board. If you can arrange your results, highest to lowest marks on the clipboard that will be appreciated.Please place the clipboard on the Depending on the number of judges you may be asked to assist with another set of projects. If you have any questions/doubt/ you may speak to Colin, our Chief Judge.  |
| +- 12.30 | **Lunch.** A light lunch will be provided in the kitchenet /staff lounge. |
| 12.30 | **Moderation – please see p 11.**The chief judge, Colin will meet moderators to discuss the top projects from each group of judges. The top marksheets with be bundled and given to a set of moderators. |

# **Some guidelines for judging**

# **Before you begin**

The **NIWA North Harbour Science & Technology Fair** is an annual event for many of our schools on the North Shore. The Fair is organized by a committee made up from staff of the local schools.

The Fair is not only a competition but serves as an opportunity to encourage our buddying young sciences from our local schools on the North Shore and keep up and foster their interests in the science and technology fields.

We want to provide each student with a wonderful opportunity to show you the depth of their investigative and experimental interests and look forward to you being an inspiration and motivation to them.

**Please remember**: You may have seen this project/investigation many a time before but for the young buddying scientist this is their first opportunity to investigate and present their findings. We do not want to destroy any enthusiasm.

# **Organisation of the Fair**

Student projects are arranged in categories or Worlds. These Worlds or categories follow the strands in the NZ Curriculum. In addition to these we have Consumer Science and Technology. Under the Technology umbrella we have additional categories:

* Living World
* Physical World
* Material World
* Planet Earth and Beyond
* Consumer Science
* Technology
* Software
* Hardware Engineering
* Enviro technology /product design

**PLEASE NOTE**:

Should you come across a project that you believe has been entered into the ‘wrong’ category, please **DO NOT** arrange the move to a new category. Any change of category needs to be done in consultation with the Chief Judge – any such move involves a new marksheet, issued by one of the co-convenors. This prevents any confusion at the end of the day when moderation and awarding of prizes is undertaken.

## Characteristics of a Science project

A science investigation/exhibit is one in which the student has:

* established a planned scientific experiment/investigation and completed this over a over a period of time
* had some measurable aims and the subject of the investigation was clearly described
* collected background research with some relevance to the subject of investigation
* proposed a relevant hypothesis
* demonstrated an understanding of the science concepts used in the investigation
* gathers data to support or refute a hypothesis or to further investigate an aim or seek answers to questions
* show evidence of an appreciation for accuracy, observation, measurement, presentation of data and reporting
* included a logbook detailing the investigative process, from brainstorming, through data collection, to the final conclusion

**Scientific thought and understanding**

* Exhibit demonstrates clear scientific thought and an understanding of the underlying or related scientific principles embraced within the project.
* the application of appropriate scientific methods,
* Questions / cause & effect are identified.
* Prediction stated.
* Experiments are devised & include methods, accuracy, variables, results, data.
* Appreciation of need for accuracy in observation, measurement, data collection and reporting.
* Records show analysis and are presented accurately.
* Conclusions drawn and suitable discussion recorded.

**Originality**

In the selection of a topic or statement there is:

* Uniqueness of approach.
* Resourcefulness in obtaining, handling and
* interpreting data.
* Ingenious use of equipment and materials.
* Creative displays or use of illustrative materials.
* Inventive apparatus and or suitable technology
* Insightful conclusions.
* Inspired applications of the principle,
* process or product.

**Thoroughness**

* All reasonable aspects have been

investigated.

* Previous work in this area has been

investigated.

* Records are suitably detailed
* Evidence of analysis in depth and sufficient detail.
* There is evidence of repetition of the experiments and its illustrative items, written material and other displays.
* Any assistance has been documented.

**Technical and graphical Skills**

The student’s project**:**

* Is well designed and constructed.
* Demonstrates skill and dexterity in construction
* There is reliability of operation.
* Demonstrates the use of instruments/tools.
* Living plants and animals are well catered for.
* The whole project is well planned and neatly finished
* graphic materials have been carefully prepared and presented

**Presentation**

The exhibit/project:

* is well designed and developed to be attractive
* visually interesting and informative on all aspects of the investigation
* well- illustrated with photographs, models, specimens or samples
* has wide public appeal.

## Characteristics of Technology projects

**A technology exhibit is one in which a student**:

* focuses on developing an invention, device, product or process which was a response to a need or problem, different from existing devices
* gathers data for the purpose of determining the characteristics, design, and conﬁguration or operating parameters for optimum performance
* It is expected that the product, system or environment that was developed should work!
* performed relevant background research and looked for similar products already on the market
* had a good understanding of the technological concepts related to the innovation
* demonstrated some creative aspects
* had shown skill in the safe construction of the invention or innovative device
* tested the invention or innovative device and it worked consistently
* included a logbook or portfolio detailing the different stages of the design process
* acknowledged any assistance given
* included clear operational instructions to assist the audience

**Criteria**

**Each project should contain the following elements**:

* What is to be done?
* Why should it be done?
* The specifications are defined.
* The end users are described, and their needs identified.
* Ideas to meet the need are described

**Planning for Practice**

* Planning stages are identified.
* Milestones are described.
* Evidence of reflection and forward planning is presented.

**Possible Solutions**

* Mock-ups, models or prototypes are shown.
* Is it fit for the purpose?
* Does it meet the brief?
* Does it meet the needs of the end users?
* Does it meet the specifications?
* Any future opportunities are identified.

**Innovation and Originality**

* Evidence of originality or innovation is shown.

**Technical Skills**

* It is well designed and constructed.
* It is reliable in operation.
* It shows skilful use of tools and instruments.
* It is well planned and neatly finished.

**Presentation**

* Steps are recorded with detail.
* The text and diagrams are clear.
* Assistance is acknowledged
* included a logbook or portfolio detailing the different stages of the design process
* acknowledged any assistance given
* included clear operational instructions to assist the audience

## Characteristics of Technology - Software projects

Computer science fair projects for students gives ambitious learners the chance to gain some serious insight into a technology we often take for granted. Students can learn to build websites for eg, test the effectiveness of different search engines, and explore the effect that computer technology has on our daily lives. Taken from Science and Technology Fair Parent Evening – Howick Intermediate School – 2018.

## Characteristics of Technology - Hardware Engineering projects

## Characteristics of Technology - Enviro technology /product design projects

**INTERVIEW GUIDE**

The interview gives the student the opportunity to present his/her research/design/investigation. The interview is one of the most important parts of the fair and provides each student with an opportunity to describe their work and to discuss it with the judges.

It also provides you with insights into the exhibitor’s design, development and especially their understanding of the project itself. It also allows the student to clear up unanswered questions, suggest shortcomings, discuss alternatives, and provide encouragement for further research.

###### **When you and student/s arrive at their project:**

* Introduce yourself and your colleague. Explain who you are and where you are from school/institution. What is your job?
* The interview process is an anxious time in most cases, so please do your best to put the student/s at ease.
* Be friendly and accessible. Get down to their level and speak to them in language they will understand – the idea is to encourage rather than intimidate.
* A smile and eye contact will go a long way to facilitate the interview process.
* Set them at ease by starting with easy warm-up questions.
* Once rapport is established and student appears to be relaxed, then begin more complicated questions.
* If it appears the student has reached the limit of their knowledge, discontinue the interview.
* Think at the student’s level. It’s an opportunity for intermediate and high school students to show you what they’ve done and what knowledge they have gained.
* Look for evidence of original work, not just research, reproductions or product tests.
* Work towards probing the depth of their knowledge and gently challenging points that you think might be a bit shaky (“I see that you did the experiment only once. Why was that?”).
* In fairness, give the students the full allotted time for judging each project.
* Finish your interview by thanking the student for their effort and encourage the student by identifying one or two aspects of their project you found interesting or different.
* Encourage the student to further their interest in the sciences.
* Let them know they may either leave the Fair if their parents are here to collect them or they must return to the Student’s Lecture Theatre.
* **Please be discreet when discussing your results with fellow judges** when other students, teachers and/or other judges may be in the vicinity.

**Getting started**

The following are some starter questions to help get you started:

|  |  |
| --- | --- |
| **Science** | **Technology** |
| **Getting started** |
| What **observations/interest** made you choose this project?’ | What **identified needs** made you choose this project?’ |
| How did you come to be interested in this topic?’  | How did you come to be interested in this specific topic?’  |
| ‘Where did you get the idea for this project?’ | ‘Where did you get the idea for this project?’ |
| So, what did your project/investigation discover?  | So, what did you decide to do with your technology project?  |
| **Thought and understanding** |
| Tell me what you are trying to do here?’ | Tell me what you are trying to do here?’ |
| What can you tell me about your experiments, survey, observations, equipment and outcomes?  | What can you tell me about the development of your project/model, equipment, some of your tests/trials and your observations?  |
| Please explain briefly some of the results you obtained | Please explain briefly some of the development steps you followed |
| Did you identify/consider any possible areas where errors could occur and what were some of these?  | Did you identify/consider any possible areas where errors could occur and what were some of these?  |
| How do you know that your data is reliable?’ ‘How do you know your results are significant?’ | How did you decide what best met the need / opportunity you had identified?’ |
| Did you encounter any problem areas during your investigations/trials? What were these?  | What were the major problems in developing your idea? What were some of these problems? |
| If you had more time, what else would you have done?’ | If you had more time, what else would you have done?’ |
| What were the tricky bits of this project?’ | What were the tricky bits of this project?’ |
| Can you explain for me what would happen if ...?’ | Can you explain for me what would happen if ...?’ |
| **Originality and Innovation** |
| Did you have some help in designing the experiments / surveys / development steps ... you have used here?’ | Did you have some help in designing the experiments / surveys / development steps ... you have used here?’ |
| Have you seen this process, method, equipment ... used in other ways? | What made you decide existing solutions weren’t appropriate? What helped youcome up with this solution? |
| Where did your equipment, material and or display items come from?Did you have help in setting it up?’ | If you were going to take this project further what would you do?’ |
| Do you do anything on this topic at school? | **Development** |
| If you were going to take this project further what would you do?’ | What problems did you have?’ ‘How did you recognize them?’ |
|  | Is the information in your log an account of all you did?’ ‘What else did you do?’ |
|  | What performance criteria were most important?’ ‘How did you measure them?’ |
|  | Do you think there is an application in industry for your model/design?  |
|  | What tests / measurements did you do to see if your development was on the right track?’ |
|  | If it was to be mass produced, what further development do you think needs doing?’ |
| **Thoroughness** |
| When did you start working on this?’ | When did you start working on this?’ |
| How many trials/experiments/surveys/ design cycles did you carry out?’ | How many trials/models/design cycles did you carry out until your final model?’ |
| How many times did you repeat [science] your experiment to get the method right to check if the outcome would help you reach your aim/prove your hypothesis? | How many times did you repeat [science] your development steps to check if the outcome would meet the needs of end-users?’ |
| What sort of errors/problems did you encounter? | Have you measured or estimated technological aspects such as: efficiency, optimization, reliability (and/or mean time between failure), cost-effectiveness , appropriate materials, safety, ergonomics, aesthetics ...?’ |
| Did you receive any help/assistance with your project? Who provided it? | Did you receive any help/assistance with your project? Who provided it? |
| Have you researched/investigated your chosen topic to see what others have done? | Have you researched/investigated your chosen topic to see what others have done? |
| What records did you keep while doing this project?’ | What records did you keep while doing this project?’ |
| **Technical skill** |
| Briefly explain model/samples/equipment /display were made? | Briefly explain model/samples/equipment /display were made? |
| Did you encounter any problems?  | Did you encounter any problems? |
| Did you do all the production work on this project? | Did you do all the production work on this project? |
| Please explain a little about your items on display, plants/animals/models and their relevance to your project. | Did you have any problems with your equipment during the process of development? |
| Did you do this typing/word processing/ illustrating/painting/layout for your project? | Did you do this typing/word processing/ illustrating/painting/layout for your project? |
|  | Do you have a workshop at home? Who assisted you with any difficult work or did you do all the work yourself?  |
|  | Did you devise/modify the computer program/peripherals yourself?’ |
| **Presentation** |
| Are you pleased with the way it looks today? |
| Why did you arrange it this way?’ |
|  |

## After you complete your judging

Once you have completed the assigned projects/exhibits, please discuss with your fellow judges the relative merits of the various projects/exhibits. Please add up the allocated marks and place the marksheets in numerical order, the top project/exhibit on top. Should you have identified any project/exhibit with **outstanding logbook** or outstanding use of **statistical methods**, please make a note at the bottom of the relevant marksheet.

If you feel that a particular project/exhibit could be considered for a **special award**, bring this to the attention of the convener.

Once you have completed a set of projects/exhibits, kindly return the marksheets on the clipboard to the **Judge’s Room**.

Depending at the number of entries, you may be asked to judge additional projects/exhibits.

**Moderation**

At the end of the judging process, students have departed for school and all marksheets have been returned, the moderation process begins.

The Chief Judge/Convener will review all the entries in a particular ‘World’ and will arrange all the ‘top’ entries from each clipboard and allocate these to one of the moderators.

You may be asked to assist with the moderation process – if you can assist, this will be appreciated.

It is the duty of the moderator to view each of the ‘top’ projects/exhibits in a category and see if the allocated marks by the previous judges are a true reflection are of what the student has presented. The moderator is at liberty to add his/her evaluation under the ‘**moderator**’ column.

Once the moderation process has been completed the final placements will be discussed with the Chief Judge/Convener for a final decision on the top projects/exhibits in that particular ‘World’.

During the moderation process the Chief Judge/Convener will identify winning projects/exhibits in the **Special Prizes** category:

* Bill Wiggle Memorial Cup for Outstanding Logbook
* The Standley Jober Cup
* NIWA Award
* David Peace Award for Investigating Alternative Energy
* Baking Industry Research Award
* New Zealand Society of Soil Science Award
* NZ Statistical Association and Statistical New Zealand certificates
* Conveners Special Prizes

The Chief Judge will determine which of the projects/exhibits will receive the NIWA Premier Award and the Massey University Award, Second Place.

If at any stage there is no consensus for an award, the final decision will be at the discretion of the Chief Judge.

**Conflict of interests**

A potential conﬂict of interest arises in situations where a judge may be personally acquainted to a student they are judging (e.g., family member, a student they have taught or mentored, etc.). If you ﬁnd yourself in this position, please let the Chief Judge/Convener know at the earliest possible time so that you can be reallocated new projects.

## Parental involvement

We are aware that in many cases there has been parent help during the progress of the project/exhibit.

During the interview process if the student/s can respond to all the questions on their project/exhibit and is confident discussing and describing what they did, why they did the projects/exhibits and what they found out, then we can accept that they understand their project/exhibit.

## Individual *vs* groupprojects

Where projects/exhibits are undertaken by one or more students, the criteria for judging does not change. There must be some evidence that the group members have both worked together and both show a comprehensive understanding of the project. Both students may be present during the Interview process, but this is not a requirement. With additional students working on the project/exhibit it is fair to have a higher expectation regarding the overall level of eﬀort involved during the investigation.

# **The judging process**

**1. Student interviews**

1. It is a good idea to begin this ﬁrst stage by taking a quick walk around and identify where all allocated exhibits are located. A quick look at these projects will give you an overall impression of the quality of exhibits.

2. Having gained an overall impression, it’s time to for you to begin the interview process. The interview should last 5-10 minutes with each student/group.

3. Calling the student. Please take the marksheet of your first project to one of the runners. The runner will collect the student from the ‘Student Lecture Theatre’ and bring the student to you. Together with the student return to their project and begin the interview process.

**PLEASE COMPLETE ALL YOUR INTERVIEWS BEFORE YOU AND YOUR COLLEAGUE BEGIN THE MARKING PROCESS OF INDIVIDAUL PROJECTS**. We would like all students to complete their interview and be ready to return to school by 12:30 at the latest.

Also please keep a note of any projects you think might be suitable for any of the special awards.

**2. Marking the projects**

Once you have completed **all your student** interviews, it is time for you and your colleague to mark your allocated projects.

Begin with the **Scientific thought and Understanding**.

As you read through the information presented on the display board, take a critical look at the various headings as per the marksheet.

* Is the **Purpose** clear and testable?
* Does the student follow acceptable scientific processes and thinking?
* Is the **Method** clear?
* Does it set out clearly what will be investigated to confirm/refute their hypothesis? Does it follow a logical scientific process?
* Are the variables identified?
* **Data**
* Does the project display relevant data?
* Is there evidence of a scientific analysis of the data?
* Has the analysed data been used in the interpretation of investigations results?
* **Results, Conclusion and discussion**
* Are the results clearly explained and the conclusion/s a logical outcome of the experimental investigation and are they relevant to the project.
* Is the discussion of the results clear and based on their experimental outcomes?
* Does the student refer to any data or data analysis?
* Has the student proposed or offered suggestions for extending their project?
* Have they discussed or identified an errors that may have surfaced during their investigation/experimentation?
* Is there a demonstration of the understanding of scientific principles/method involved?
* Has the student demonstrated their project/investigation was a learning experience?

**Visual Presentation:**

* Does the display tell the story of the project/investigation in a logical sequence or progression?
* Are the various headings clear, bold and eye-catching?
* Is information presented using appropriate methods?

**Logbook/Journal**

* Every project must include a logbook/journal. This is a complete and permanent record of how the student undertook their experiment/investigation. It should show sequentially the steps undertaken to complete the project.
* The logbook should be of such a nature that it will allow someone replicate the project.
* All materials, data, experimental trials, research should be mentioned or acknowledged.
* The Logbook/Journal provides a detailed documentation of the scientific process followed from start to finish.

**Oral Presentation:**

* The student needs to demonstrate their understanding of their work.
* The presentation and question time should be kept to 5 – 10 minutes.
* Answers to any questions should show sound knowledge of the scientific process and all aspects of their investigation/project.

# **Judging criteria**

**Criteria for Judging Science Projects**

Judges will evaluate your strengths and weaknesses in these areas

**Scientific approach**: (scientific thought and understanding)

* Evidence of links to curriculum area / scientific knowledge
* Statements of purpose / predictions / questions
* Data collection / observation record uses a range of scientific symbols, conventions, and vocabulary.
* Thoroughness / statistics / replication
* Awareness of a bigger picture / links to other elements of scientific research

**Originality**

* Evidence of own work / ownership
* Development of interpretation / conclusions
* Acknowledgement of sources / support
* Standout features evident

**Skill** (technical skill)

* Expertise appropriate for year level
* Evidence of progression of learning / value of outcome
* Appropriate use of equipment
* Safety issues considered and adhered to

**Organisation**

* Relevance identified / link made to learning
* Is there logic/creativity apparent in presentation of material
* Is there evidence in report/logbook of direction/development/time
* evidence of care /ethics / environmental awareness
* evaluate the suitability of the investigative methods chosen.

**Criteria for Judging Technology Projects**

**Brief Development**

* What is to be done?
* Why should it be done?
* The specifications are defined.
* The end users are described, and their needs identified.
* Ideas to meet the need are described

**Planning for Practice**

* Planning stages are identified.
* Milestones are described.
* Evidence of reflection and forward planning is presented.

**Possible Solutions**

* Mock-ups, models or prototypes are shown.
* Is it fit for the purpose?
* Does it meet the brief?
* Does it meet the needs of the end users?
* Does it meet the specifications?
* Any future opportunities are identified.

**Innovation and Originality**

* Evidence of originality or innovation is shown.

**Technical Skills**

* It is well designed and constructed.
* It is reliable in operation.
* It shows skilful use of tools and instruments.
* It is well planned and neatly finished.

**Presentation**

* Steps are recorded with detail.
* The text and diagrams are clear.
* Assistance is acknowledged

**Judging criteria for Technology projects**

**Research problem:**

* Need and/or opportunity has been clearly deﬁned
* Existing solutions have been researched
* Identiﬁcation of solution

**Design and methodology**

* Plans and prototypes are presented
* Scientiﬁc principles incorporated and understood
* Development has been documented
* Evidence of action taken based on feedback

**Construction and Testing**

* Prototype has been tested in multiple conditions/trials
* Appropriate technological aspects have been assessed (E.g., ease of use, appropriate use of materials, safety, environmental soundness, ease of use, reliability)
* Prototype demonstrates engineering skill and completeness
* Product meets performance goals and needs of user
* Potential for production

**Innovation and originality**

* Users’ needs are met in a creative and innovative way
* Shows advantages to existing systems

**Presentation**

**Display Board**

* + Logical organisation of material
	+ Eye catching, has public appeal
	+ Supporting material displayed and any assistance has been documented
	+ Potential marketing/packaging strategies explored
	+ Logbook present showing records of development

**Interview**

* + Clear, concise and thoughtful responses to questions
	+ Understanding of basic science relevant to project
	+ Degree of independence in conducting the project
	+ Quality of ideas for further research

For team projects, show contributions and understanding from both students

**Mark sheets**

Kindly refer to the Downloads on our website