Rotterdam International Secondary School

Foundation course Integrated Science

Foundation course IS skills expectations – Practical work

The skill list will be used to generate two criteria grid per grade, with the appropriate wording and level of complexity (design 6 – lab report 6 / design 7 – lab report 7 / design 8 – lab report 8), to be used by teachers to assess practical work.

Planning investigations:

* Suggest ideas that might be tested / generate and test theories.
* Outline plans to carry out investigations, considering the variables to control, change, or observe.
* Make predictions referring to previous scientific knowledge and understanding.
* Identify appropriate evidence to collect and suitable methods of collection.
* Choose appropriate apparatus.

Conducting experiments:

* Making careful observations including measurements.
* Presenting results in the form of tables, bar charts, line graphs.
* Making conclusions from collected data.
* Recognising data that do not fit into the pattern.
* Considering explanations for predictions using scientific knowledge and understanding and communicating the explanations.
* Critically analysing and evaluating evidence from observations and experiments.
* Using information from secondary sources / referencing sources.
* Being aware of safety, considering ethics and acknowledging/integrating roles of others.

Foundation course IS – Units outcomes in grade 6

Bio 1: Cells

Identify the seven characteristics of living things. Compare the structure of plant and animal cells using a microscope.

Bio 2: Organisms in their environment

Describe how organisms are adapted to their habitat, describe feeding relationship. Draw and model simple food chains, discuss human impact on the environment.

Bio 3: Variation and Classification

Understand what is meant by species. Investigate variation within a species. Classify animals and plants.

Chemistry 1: Acids and alkali

Use a pH scale, understand neutralization. Use indicators to distinguish acid and alkaline solutions.

Chemistry 2: Solid, liquid, gas

Show how the particle theory of matter can be used to explain properties of solids, liquids, gases .

Physics 1: Energy resources

Discuss a range of energy sources and distinguish between renewable and non-renewable.

Physics 2: Forces and their effects

Describe the effect of forces on motion. Describe the effect of gravity on object.

Physics 3: The solar system

Movement of Earth and day / night rhythm. Position of planets and sun, stars being the source of light and planet reflecting it. Discuss Copernicus discoveries.

Foundation course IS – Units outcomes in grade 7

Bio 1: Nutrition

Health issues relating to balanced / unbalanced diet. Specialised cells / tissues /organs working together to make nutrients available for cell respiration.

Bio 2: Micro-organisms

Role of micro-organisms in breaking down of organic matter, food production, diseases. Discuss discoveries of Louis Pasteur.

Chemistry 1: Solutions

Understand the concept of solute and solvent. Discuss human impact on clean fresh water availability.

Chemistry 2: Ores and metals, recycling and re-using.

Distinguish between metal and non-metal (table of elements). Describing everyday materials and their physical properties. Understanding the benefits of re-use, re-cycle.

Geology (Chemistry / Physics / Biology) : Minerals – rocks - Fossils

Observe and classify minerals and ores used in jewellery and industry. Examine fossils and research fossil record, discuss the record and the age of planet Earth. Discussing dinosaurs ‘extinction.

Physics 1: transfers of energy

Recognise different types of energy and energy transfer.

Physics 2: Light and sound

Understanding the travelling and perception of light waves / sound waves.

Foundation course IS – Units outcomes in grade 8

Bio 1: Reproduction and inheritance.

Relate the structure of the cells and their function. Discuss patterns of inheritance and Mendel’s discoveries. Describing and explaining medical / agricultural / industrial applications of genetics.

Bio 2: Fitness and Health.

Understanding the impact of diet / chemicals / exercise on the body.

Bio 3: Photosynthesis and agriculture.

Understanding the process of photosynthesis at different levels (cellular, organ, and organism) as well as its importance to feeding humans through agriculture. Discussing agricultural practises and their potential impact on the environment.

(Extra Bio: supplementary unit on Forensic may be used in the context of Science Fair and/or IMYC)

Chemistry 1: Reactions and reactivity

Understanding transfers and transformations of matter and energy.

Chemistry 2: Environmental and industrial chemistry

Understanding the use of chemistry knowledge at an industrial level. Discussing the impact of chemical industry on the environment.

Physics 1: Forces / motion

Understanding motion and friction, discussing applications (cars, planes …). \*

Physics 2: Forces / pressure

Understanding pressure, discussing applications (dams, bridges, diving…). \*

\* The two units for Physics are additional units which come after the checkpoint exam. They will involve a “Challenge “project for which students will have to test the Motion or Pressure theory through building and testing a vehicle / bridge / model …

Foundation course IS – Units planner

|  |  |  |  |
| --- | --- | --- | --- |
| Grade | Term 1 | Term 2 | Term 3 |
| 6 | Bio 1  Bio 2  Bio 3 | Chemistry 1  Chemistry 2  Science Fair | Physics 1  Physics 2  Physics 3 |
| 7 | Bio 1  Bio 2  Chemistry 1 | Chemistry 2  Geology  Science Fair | Physics 1  Physics 2  Technopolis projects |
| 8 | Bio 1  Bio 2  Bio 3 | Chemistry 1  Chemistry 2  Science Fair | Checkpoint exam  Physics 1  Physics 2 |

Foundation course IS – Descriptive analysis of summative assessments

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Test | Knowledge | Understanding | Application | Analysis | Synthesis | Evaluation |
| 6 Bio1 | √ | √ |  |  |  |  |
| 6 Bio 2 + 3 | √ | √ |  |  |  |  |
| 6 Chem 1+2 | √ | √ | √ |  |  |  |
| 6 Phys 1+ 2 | √ | √ | √ |  |  |  |
| 6 LABS | √ | √ | √ | √ | √ | √ |
| 7 Bio1+2 | √ | √ | √ |  |  |  |
| 7 Chem 1+2 | √ | √ | √ |  |  |  |
| 7 Geology | √ | √ | √ | √ |  |  |
| 7 Phys 1+ 2 | √ | √ | √ | √ |  |  |
| 7 LABS | √ | √ | √ | √ | √ | √ |
| 8 Bio1 | √ | √ | √ | √ |  |  |
| 8 Bio 2+3 | √ | √ | √ | √ |  |  |
| 8 Chem 1+2 | √ | √ | √ | √ | √ |  |
| 8 Phys 1+ 2 | √ | √ | √ | √ | √ |  |
| 7 LABS | √ | √ | √ | √ | √ | √ |

Foundation course IS – Criteria grid Grade 6

Planning investigations:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Criteria | Description of what is expected | 0 | 1 | 2 |
| Research question | Phrase the title of your investigation as a question, you will try and answer that question in the experiment that you are planning. |  |  |  |
| Variables | Identify the variables of your experiment. Remember that what you will measure is your dependent variable; what varied from one test to another is the independent variable and what is kept constant is the controlled variables. |  |  |  |
| Hypothesis | Write the answer to the research question, this is the predicted result of your experiment. Remember that you have to justify your answer using the information that is in your notes or in your book. |  |  |  |
| Procedure | Write a proposal of experiment; present it in a step by step recipe so that anybody reading it could understand it even if they have no knowledge of the subject. Remember to include the list of apparatus you intend to use and draw a diagram of the apparatus as you want it to be set for the experiment. |  |  |  |
| Table of results | Prepare a table so that, if you do the experiment, it is ready to be filled with the recorded data (what you intend to measure). Remember that a good experiment has a sufficient number of tests, and that for each test you need at least 5 repeats. |  |  |  |

Levels awarded: (2) completely done (1) partially done (0) not done

A template of a Planning and a template of a full lab report should be given to students at the beginning of the year and the criteria will be used in class by the student each time a planning or a report has to be written.

Depending on the time available, the template will be printed beforehand or written as a group

Foundation course IS – Criteria grid Grade 6

Writing a lab report:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Criteria | Description of what is expected | 0 | 1 | 2 |
| Data collection | Write down all results during the experiment on a “Raw data “paper. Keep it as proofs of your work, then draw a table where you can copy your results, make sure that the heading of the table has the relevant title / units for your data. |  |  |  |
| Data processing | Make calculation that you think are helping to understand your results. Calculation will include: average and rate.  Make sure to write down the formula that you are using, when not sure ask your teacher to confirm. Give at least one example of your working. Present results of calculations in a separate table and make sure to include the heading / units. |  |  |  |
| Data presentation | Draw a graph to present the processed data (the result of your calculation) or the raw data if there was no calculation to do. Remember to give each axis a title (key) and units. Remember also that the horizontal axis (x) is the one for your independent variable while the vertical axis (y) is the one for your dependent variable (what you have measured during the experiment). You can draw a line graph only if your independent variable can be placed on a scale (pH, concentration, size, mass …), if you cannot place your independent variable on a scale because it is composed of distinct groups (student A,B,C …) then draw a bar chart. |  |  |  |
| Discussion | You have to describe what you see on the graph, increases / decreases, and also make comparison between different points, quoting numbers. If one or several points seem at odd position compared to the others, you have to write it in your discussion. |  |  |  |
| Conclusion | State if your results match with the prediction you have made in your hypothesis. Explain why you think it does match or does not match. Copy from your textbook and/or notebook a few sentences that are confirming your results. |  |  |  |
| Evaluation | Find in the procedure the step(s) that you want to change to make your experiment a better one (will get you better / more results). It can be using better equipment, using more time, doing more repeats … |  |  |  |

Foundation course IS – Criteria grid Grade 7

Planning investigations:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Criteria | Description of what is expected | 0 | 1 | 2 |
| Research question | Phrase the title of your investigation as a question; remember that both dependent and independent variables should appear in the question. |  |  |  |
| Variables | Identify the variables of your experiment. Remember that what you will measure is your dependent variable; what varied from one test to another is the independent variable and what is kept constant is the controlled variables. |  |  |  |
| Hypothesis | Write the answer to the research question, this is the predicted result of your experiment. Justify. |  |  |  |
| Procedure | Write a proposal of experiment; present it in a step by step protocol. Remember to include the list of apparatus and draw a diagram of the apparatus as you want it to be set for the experiment. |  |  |  |
| Table of results | Prepare a table to be filled with the recorded data. Remember that a good experiment has a sufficient number of tests, and that for each test you need at least 5 repeats. |  |  |  |

Levels awarded: (2) completely done (1) partially done (0) not done

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Foundation course IS – Criteria grid Grade 7

Writing a lab report:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Criteria | Description of what is expected | 0 | 1 | 2 |
| Data collection | Result table; make sure you write the heading / units for your data. |  |  |  |
| Data processing | Make calculation that you think are helping to understand your results. Calculation will include: average and rate.  Include the formula that you are using. Give at least one example of your working. Present results of calculations in a separate with heading / units. |  |  |  |
| Data presentation | Draw a graph to present the processed data (the result of your calculation) or the raw data if there was no calculation to do. Remember to give each axis a title (key) and units. Remember also that the horizontal axis (x) is the one for your independent variable while the vertical axis (y) is the one for your dependent variable (what you have measured during the experiment). You can draw a line graph only if your independent variable can be placed on a scale (pH, concentration, size, mass …), if you cannot place your independent variable on a scale because it is composed of distinct groups (student A,B,C …) then draw a bar chart. |  |  |  |
| Discussion | Identify trend (increase / decrease / plateau …) in graph and quote numerical values to back up your statements. Identify data that stands out of the trend. |  |  |  |
| Conclusion | State if your results match with the prediction you have made in your hypothesis. Quote notes / book to support your conclusion. |  |  |  |
| Evaluation | Find in the procedure the step(s) that you want to change to make your experiment a better one (will get you better / more results). It can be using better equipment, using more time, doing more repeats … |  |  |  |

Foundation course IS – Criteria grid Grade 8

Planning investigations:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Criteria | Description of what is expected | 0 | 1 | 2 |
| Research question | Phrase the title of your investigation as a question; remember that both dependent and independent variables should appear in the question. |  |  |  |
| Variables | Identify the variables of your experiment. Dependent variable, Independent and controlled variables. |  |  |  |
| Hypothesis | Write the answer to the research question, this is the predicted result of your experiment. Justify. |  |  |  |
| Procedure | Write a proposal of experiment; present it in a step by step protocol. Remember to include the list of apparatus and draw a diagram of the apparatus as you want it to be set for the experiment. |  |  |  |
| Table of results | Prepare a table to be filled with the recorded data. Remember that a good experiment has a sufficient number of tests, and that for each test you need at least 5 repeats. |  |  |  |

Levels awarded: (2) completely done (1) partially done (0) not done

A template of a Planning and a template of a full lab report should be given to students at the beginning of the year and the criteria will be used in class by the student each time a planning or a report has to be written.

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Foundation course IS – Criteria grid Grade 8

Writing a lab report:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Criteria | Description of what is expected | 0 | 1 | 2 |
| Data collection | Result table with relevant heading / units. |  |  |  |
| Data processing | Calculation that are helping to understand your results. Calculation will include: average and rate.  Include the formula that you are using. Give at least one example of your working. Present results of calculations in a separate with heading / units. |  |  |  |
| Data presentation | Draw a graph to present the processed data (the result of your calculation) or the raw data if there was no calculation to do. Remember to give each axis a title (key) and units. Remember also that the horizontal axis (x) is the one for your independent variable while the vertical axis (y) is the one for your dependent variable (what you have measured during the experiment). You can draw a line graph only if your independent variable can be placed on a scale (pH, concentration, size, mass …), if you cannot place your independent variable on a scale because it is composed of distinct groups (student A,B,C …) then draw a bar chart. |  |  |  |
| Discussion | Identify trend (increase / decrease / plateau …) in graph and quote numerical values to back up your statements. Identify data that stands out of the trend. |  |  |  |
| Conclusion | State if your results match with the prediction you have made in your hypothesis. Quote notes / book to support your conclusion. |  |  |  |
| Evaluation | Find in the procedure the step(s) that you want to change to make your experiment a better one (will get you better / more results). It can be using better equipment, using more time, doing more repeats … |  |  |  |