



## Johnston Heights Secondary



### Course outline

# Design 9

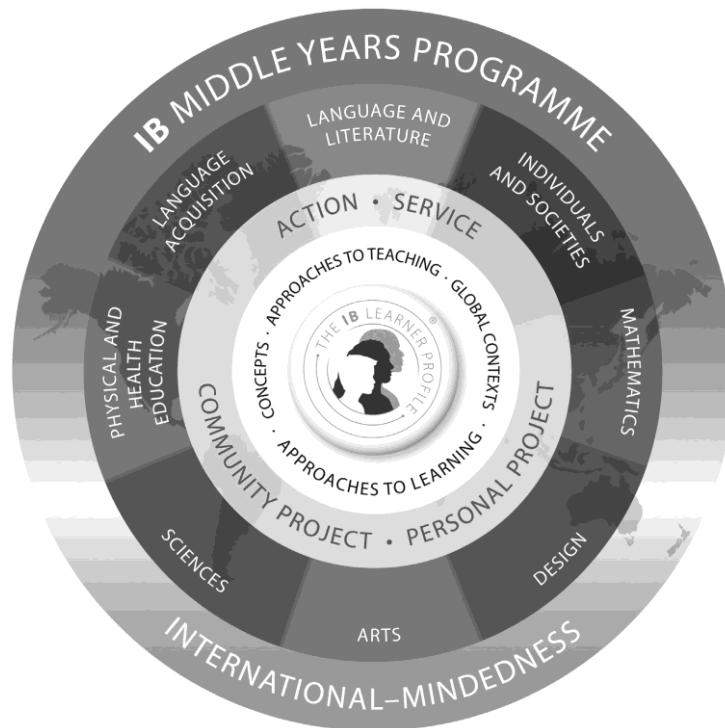
## **IB mission statement**

The International Baccalaureate aims to develop inquiring, knowledgeable and caring young people who help to create a better and more peaceful world through intercultural understanding and respect.

To this end the organization works with schools, governments and international organizations to develop challenging programmes of international education and rigorous assessment.

These programmes encourage students across the world to become active, compassionate and lifelong learners who understand that other people, with their differences, can also be right.

# Middle Years Programme Model

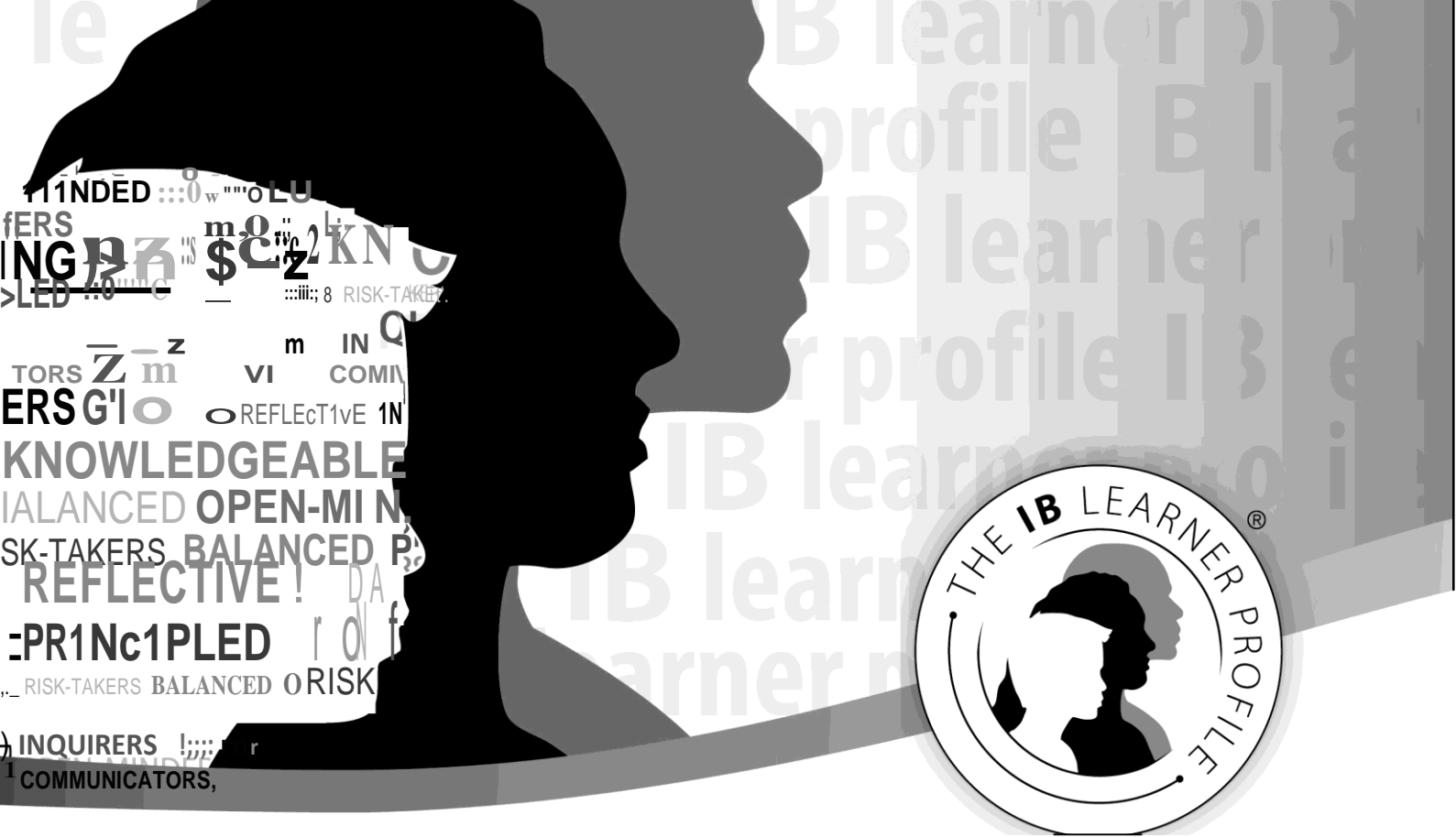


The MYP is designed for students aged 11 to 16. It provides a framework of learning that encourages students to become creative, critical and reflective thinkers. The MYP emphasizes intellectual challenge, encouraging students to make connections between their studies in traditional subjects and the real world. It fosters the development of skills for communication, intercultural understanding and global engagement—essential qualities for young people who are becoming global leaders.

## The MYP

- addresses holistically students' intellectual, social, emotional and physical **well-being**
- provides students opportunities to develop the **knowledge, attitudes** and **skills** they need in order to manage complexity and take responsible action for the future
- ensures breadth and depth of understanding through study in **eight subject groups**
- requires the study of at least **two languages** to support students in understanding their own cultures and those of others
- empowers students to participate in **service with the community**
- helps to prepare students for **further education**, the **workplace** and a **lifetime of**

**learning.**



The aim of all IB programmes is to develop internationally minded people who, recognizing their common humanity and shared guardianship of the planet, help to create a better and more peaceful world.

The IB learner profile represents 10 attributes valued by IB World Schools. We believe these attributes, and others like them, can help individuals and groups become responsible members of local, national and global communities.

### As IB learners we strive to be:

#### INQUIRERS

We nurture our curiosity, developing skills for inquiry and research. We know how to learn independently and with others. We learn with enthusiasm and sustain our love of learning throughout life.

#### KNOWLEDGEABLE

We develop and use conceptual understanding, exploring knowledge across a range of disciplines. We engage with issues and ideas that have local and global significance.

#### THINKERS

We use critical and creative thinking skills to analyse and take responsible action on complex problems. We exercise initiative in making reasoned, ethical decisions.

#### COMMUNICATORS

We express ourselves confidently and creatively in more than one language and in many ways. We collaborate effectively, listening carefully to the perspectives of other individuals and groups.

#### PRINCIPLED

We act with integrity and honesty, with a strong sense of fairness and justice, and with respect for the dignity and rights of people everywhere. We take responsibility for our actions and their consequences.

#### OPEN-MINDED

We critically appreciate our own cultures and personal histories, as well as the values and traditions of others. We seek and evaluate a range of points of view, and we are willing to grow from the experience.

#### CARING

We show empathy, compassion and respect. We have a commitment to service, and we act to make a positive difference in the lives of others and in the world around us.

#### RISK-TAKERS

We approach uncertainty with forethought and determination; we work independently and cooperatively to explore new ideas and innovative strategies. We are resourceful and resilient in the face of challenges and change.

#### BALANCED

We understand the importance of balancing different aspects of our lives-intellectual, physical, and emotional-to achieve well-being for ourselves and others. We recognize our interdependence with other people and with the world in which we live.

#### REFLECTIVE

We thoughtfully consider the world and our own ideas and experience. We work to understand our strengths and weaknesses in order to support our learning and personal development.

# Design 9

## Aims

The aims of all MYP subjects state what a teacher may expect to teach and what a student may expect to experience and learn. These aims suggest how the student may be changed by the learning experience.

The aims of MYP design are to encourage and enable students to:

- enjoy the design process, develop an appreciation of its elegance and power
- develop knowledge, understanding and skills from different disciplines to design and create solutions to problems using the design cycle
- use and apply technology effectively as a means to access, process and communicate information, model and create solutions, and to solve problems
- develop an appreciation of the impact of design innovations for life, global society and environments
- appreciate past, present and emerging design within cultural, political, social, historical and environmental contexts
- develop respect for others' viewpoints and appreciate alternative solutions to problems
- act with integrity and honesty, and take responsibility for their own actions developing effective working practices.

## Objectives

The objectives of any MYP subject state the specific targets that are set for learning in the subject. They define what the student will be able to accomplish as a result of studying the subject.

The objectives of MYP design encompass the factual, conceptual, procedural and metacognitive dimensions of knowledge.

Each objective is elaborated by a number of **strands**; a strand is an aspect or indicator of the learning expectation.

Subject groups **must** address **all** strands of **all** four objectives **at least twice** in each year of the MYP.

The objectives for years 3 and 5 of the programme are provided in the guide and their use is mandatory. These objectives relate directly to the assessment criteria found in the "Assessed curriculum" section of this guide. Together these objectives reflect the knowledge, skills and attitudes that students need in order to engage with and solve complex, real-life problems in both familiar and unfamiliar contexts; they represent essential aspects of design methodology.

## **A Inquiring and analysing**

Students are presented with a design situation, from which they identify a problem that needs to be solved. They analyse the need for a solution and conduct an inquiry into the nature of the problem.

In order to reach the aims of design, students should be able to:

- i. explain and justify the need for a solution to a problem for a specified client/target audience
- ii. identify and prioritize the primary and secondary research needed to develop a solution to the problem
- iii. analyse a range of existing products that inspire a solution to the problem
- iv. develop a detailed design brief which summarizes the analysis of relevant research.

## **B Developing ideas**

Students write a detailed specification, which drives the development of a solution. They present the solution.

In order to reach the aims of design, students should be able to:

- i. develop a design specification which clearly states the success criteria for the design of a solution
- ii. develop a range of feasible design ideas which can be correctly interpreted by others
- iii. present the final chosen design and justify its selection
- iv. develop accurate and detailed planning drawings/diagrams and outline the requirements for the creation of the chosen solution.

## **C Creating the solution**

Students plan the creation of the chosen solution and follow the plan to create a prototype sufficient for testing and evaluation.

In order to reach the aims of design, students should be able to:

- i. construct a logical plan, which describes the efficient use of time and resources, sufficient for peers to be able to follow to create the solution
- ii. demonstrate excellent technical skills when making the solution
- iii. follow the plan to create the solution, which functions as intended
- iv. fully justify changes made to the chosen design and plan when making the solution
- v. present the solution as a whole, either:
  - a. in electronic form, or
  - b. through photographs of the solution from different angles, showing details.

## D Evaluating

Students design tests to evaluate the solution, carry out those tests and objectively evaluate its success. Students identify areas where the solution could be improved and explain how their solution will impact on the client or target audience.

In order to reach the aims of design, students should be able to:

- i. design detailed and relevant testing methods, which generate data, to measure the success of the solution
- ii. critically evaluate the success of the solution against the design specification
- iii. explain how the solution could be improved
- iv. explain the impact of the solution on the client/target audience.

## Conceptual understanding

A concept is a “big idea”—a principle or notion that is enduring, the significance of which goes beyond particular origins, subject matter or place in time. Concepts represent the vehicle for students’ inquiry into the issues and ideas of personal, local and global significance, providing the means by which they can explore the essence of design.

Concepts have an important place in the structure of knowledge that requires students and teachers to think with increasing complexity as they organize and relate facts and topics.

Concepts express understanding that students take with them into lifelong adventures of learning. They help students to develop principles, generalizations and theories. Students use conceptual understanding as they solve problems, analyse issues, and evaluate decisions that can have an impact on themselves, their communities and the wider world.

In the MYP, conceptual understanding is framed by prescribed key and related concepts. Teachers must use these concepts to develop the curriculum. Schools may identify and develop additional concepts to meet local circumstances and curriculum requirements.

## Key concepts

Key concepts promote the development of a broad curriculum. They represent big ideas that are both relevant within and across disciplines and subjects. Inquiry into key concepts can facilitate connections between and among:

- courses within the design subject group (intra-disciplinary learning)
- other subject groups (interdisciplinary learning).

**Communication** is the exchange or transfer of signals, facts, ideas and symbols. It requires a sender, a message and an intended receiver. Communication involves the activity of conveying information or meaning. Effective communication requires a common “language” (which may be written, spoken or non-verbal).

While exploring the concept of communication, students develop an awareness and understanding of how, why and when we need to ensure that clear messages are given and received throughout the design process. It ensures that ideas can be communicated clearly and each person involved in the development of an idea from conception to use has a common and consistent understanding of the solution and its function. Communication drives invention to become innovation.

When inquiring and analysing, students need to communicate with clients and target markets to identify the design need. When developing ideas, students engage in internal dialogue, using design sketches and models to think through the feasibility of their ideas. When creating the solution, students need to develop clear plans that can be followed easily. The final product must also clearly communicate its intent and how a user interacts with it.

**Communities** are groups that exist in proximity defined by space, time or relationship. Communities include, for example, groups of people sharing particular characteristics, beliefs or values, as well as groups of interdependent organisms living together in a specific habitat.

Through MYP design, students will develop an understanding that a solution to a problem for one community will create problems for another, some on a small or even personal scale, while others may be far-reaching, affecting communities thousands of miles away or the global community.

When establishing the need and developing the design brief, the student always considers the community, whether this is a community that affects the design (target audience) or one that is affected by it. When developing ideas, engagement with the target audience and client drives the development to ensure it is fit-for-purpose, and the student must engage with the communities that effect and are affected by the solution when evaluating its effectiveness in solving the problem.

**Development** is the act or process of growth, progress or evolution, sometimes through iterative improvements.

All ideas need refinement, through development, to become successful, appropriate and feasible. The development of solutions allows problems to be solved with greater success.

Even though the name suggests that the main focus of development would be found in developing ideas, students have to develop research plans as and when they realize that there is further information they need in order to solve the problem. Students constantly adapt and change their plans when creating the solution, dependent on the thoroughness of their planning and, when evaluating, students develop testing methods to assess the success of the solution.



**Systems** are sets of interacting or interdependent components. Systems provide structure and order in human, natural and built environments. Systems can be static or dynamic, simple or complex.

While exploring the concept of systems, students develop an awareness and understanding that everything is connected to a single system or multiple systems. Products and solutions are systems of components combined to carry out a specific function. Systems also structure processes: the design cycle is an example of a system. Open loop systems have an input, process and output. Closed loop systems have an input, process, output and mechanism for feedback.

## Related concepts

Related concepts promote deep learning. They are grounded in specific disciplines and are useful for exploring key concepts in greater detail. Inquiry into related concepts helps students develop more complex and sophisticated conceptual understanding. Related concepts may arise from the subject matter of a unit or the craft of a subject—its features and processes.

Related concepts in design		
Adaptation	Collaboration	Ergonomics
Evaluation	Form	Function
Innovation	Invention	Markets and trends
Perspective	Resources	Sustainability

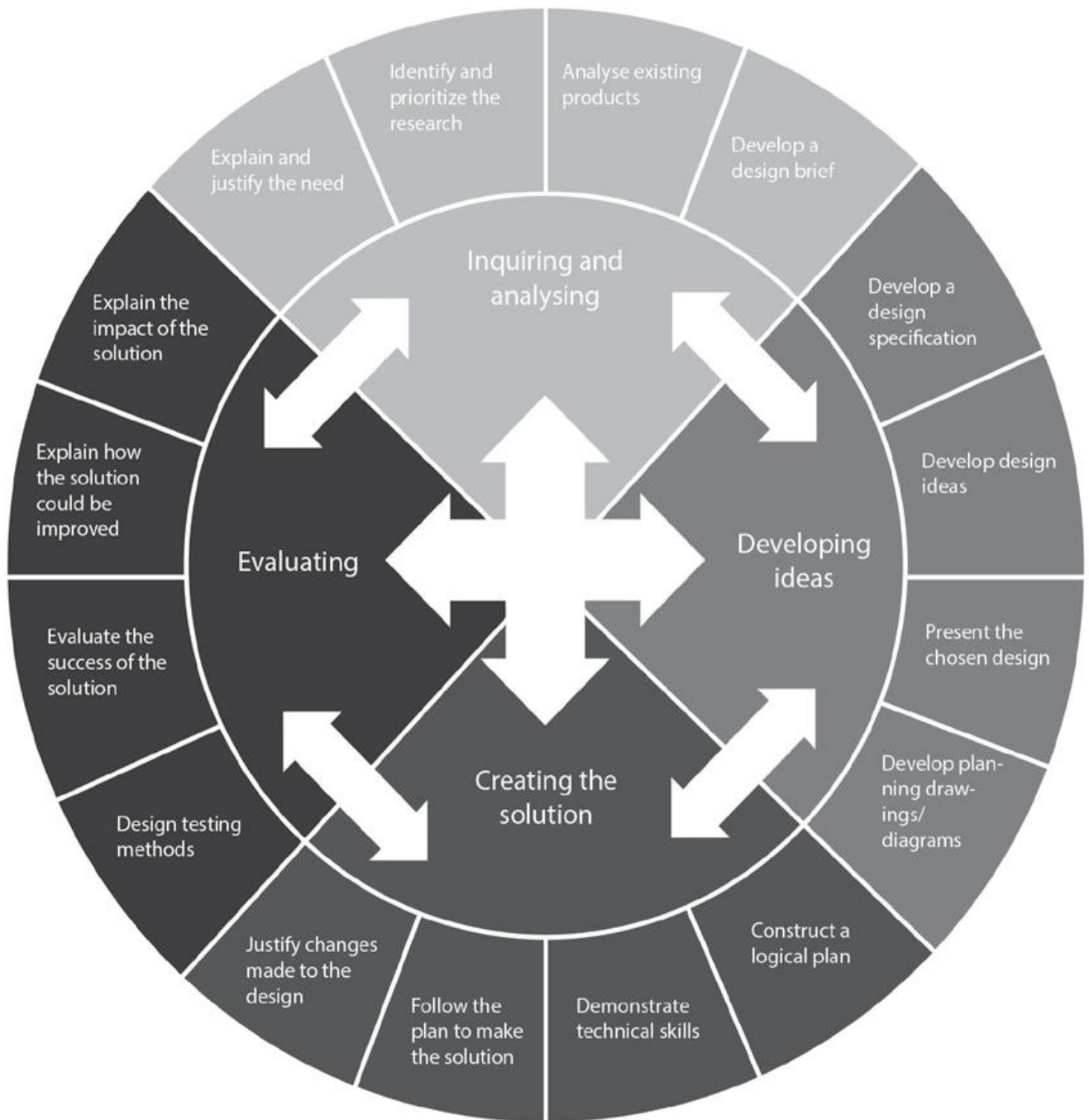
## Global contexts for teaching and learning

Global contexts direct learning towards independent and shared inquiry into our common humanity and shared guardianship of the planet. Using the world as the broadest context for learning, MYP mathematics can develop meaningful explorations of:

- identities and relationships  
**Who I am? Who are we?**
- orientation in space and time  
**What is the meaning of ‘when’ and ‘where’?**
- personal and cultural expression  
**What is the nature and purpose of creative expression?**
- scientific and technical innovation  
**How do we understand the world in which we live?**
- globalization and sustainability  
**How is everything connected?**
- fairness and development  
**What are the consequences of our common humanity?**

## Course Content and MYP Units

(See attachments)



**Design Cycle**

# Criterion A: Inquiring and analyzing Year 3

Maximum: 8

At the end of year 3, students should be able to:

- i. explain and justify the need for a solution to a problem
- ii. construct a research plan, which states and prioritizes the primary and secondary research needed to develop a solution to the problem
- iii. analyse a group of similar products that inspire a solution to the problem
- iv. develop a design brief, which presents the analysis of relevant research.

Achievement level	Level descriptor
0	The student does not reach a standard described by any of the descriptors below.
1–2	The student: <ul style="list-style-type: none"> <li>i. <b>states</b> the need for a solution to a problem</li> <li>ii. <b>states some of</b> the main findings of relevant research.</li> </ul>
3–4	The student: <ul style="list-style-type: none"> <li>i. <b>outlines</b> the need for a solution to a problem</li> <li>ii. <b>states</b> the research needed to <b>develop</b> a solution to the problem, <b>with some guidance</b></li> <li>iii. <b>outlines one existing</b> product that inspires a solution to the problem</li> <li>iv. <b>develops</b> a <b>basic</b> design brief, which <b>outlines some of</b> relevant research.</li> </ul>
5–6	The student: <ul style="list-style-type: none"> <li>i. <b>explains</b> the need for a solution to a problem</li> <li>ii. <b>constructs</b> a research plan, which <b>states</b> and <b>prioritizes</b> the primary and secondary research needed to <b>develop</b> a solution to the problem, <b>with some guidance</b></li> <li>iii. <b>describes</b> a group of similar products that inspire a solution to the problem</li> <li>iv. <b>develops</b> a design brief, which <b>outlines</b> the <b>findings</b> of relevant research.</li> </ul>
7–8	The student: <ul style="list-style-type: none"> <li>i. <b>explains</b> and <b>justifies</b> the need for a solution to a problem</li> <li>ii. <b>constructs</b> a research plan, which <b>states</b> and <b>prioritizes</b> the primary and secondary research needed to <b>develop</b> a solution to the problem <b>independently</b></li> <li>iii. <b>analyses</b> a group of similar products that inspire a solution to the problem</li> <li>iv. <b>develops</b> a design brief, which <b>presents</b> the <b>analysis</b> of relevant research.</li> </ul>

## Criterion B: Developing ideas Year 3

Maximum: 8

At the end of year 3, students should be able to:

- i. develop a design specification which outlines the success criteria for the design of a solution based on the data collected
- ii. present a range of feasible design ideas, which can be correctly interpreted by others
- iii. present the chosen design and outline the reasons for its selection
- iv. develop accurate planning drawings/diagrams and outline requirements for the creation of the chosen solution.

Achievement level	Level descriptor
0	The student does not reach a standard described by any of the descriptors below.
1–2	The student: <ol style="list-style-type: none"> <li>i. <b>lists</b> a few basic success criteria for the design of a solution</li> <li>ii. <b>presents</b> one design idea, which can be interpreted by others</li> <li>iii. <b>creates</b> incomplete planning drawings/diagrams.</li> </ol>
3–4	The student: <ol style="list-style-type: none"> <li>i. <b>constructs</b> a list of the success criteria for the design of a solution</li> <li>ii. <b>presents a few</b> feasible design ideas, using an appropriate medium(s) <b>or explains</b> key features, which can be interpreted by others</li> <li>iii. <b>outlines</b> the <b>main</b> reasons for choosing the design with reference to the design specification</li> <li>iv. <b>creates</b> planning drawings/diagrams or <b>lists</b> requirements for the chosen solution.</li> </ol>
5–6	The student: <ol style="list-style-type: none"> <li>i. <b>develops</b> design specifications, which <b>identify</b> the success criteria for the design of a solution</li> <li>ii. <b>presents a range of</b> feasible design ideas, using an appropriate medium(s) <b>and explains</b> key features, which can be interpreted by others</li> <li>iii. <b>presents</b> the chosen design and <b>outlines</b> the <b>main</b> reasons for its selection with reference to the design specification</li> <li>iv. <b>develops</b> accurate planning drawings/diagrams and <b>lists</b> requirements for the creation of the chosen solution.</li> </ol>
7–8	The student: <ol style="list-style-type: none"> <li>i. <b>develops</b> a design specification which <b>outlines</b> the success criteria for the design of a solution based on the data collected</li> <li>ii. <b>presents</b> a range of feasible design ideas, using an appropriate medium(s) <b>and annotation</b>, which can be correctly interpreted by others</li> <li>iii. <b>presents</b> the chosen design and <b>outlines</b> the reasons for its selection with reference to the design specification</li> <li>iv. <b>develops</b> accurate planning drawings/diagrams and <b>outlines</b> requirements for the creation of the chosen solution.</li> </ol>

# Criterion C: Creating the solution      Year 3

Maximum: 8

At the end of year 3, students should be able to:

- i. construct a logical plan, which outlines the efficient use of time and resources, sufficient for peers to be able to follow to create the solution
- ii. demonstrate excellent technical skills when making the solution
- iii. follow the plan to create the solution, which functions as intended explain changes made to the chosen design and the plan when making the solution.
- iv. present the solution as a whole

Achievement level	Level descriptor
0	The student does not reach a standard described by any of the descriptors below.
1–2	The student: <ul style="list-style-type: none"> <li>i. <b>demonstrates minimal</b> technical skills when making the solution</li> <li>ii. <b>creates</b> the solution, which functions <b>poorly</b> and is presented <b>in an incomplete form</b>.</li> </ul>
3–4	The student: <ul style="list-style-type: none"> <li>i. <b>outlines</b> each step in a plan that contains some details, resulting in peers having difficulty following the plan to create the solution</li> <li>ii. <b>demonstrates satisfactory</b> technical skills when making the solution</li> <li>iii. <b>creates</b> the solution, which <b>partially</b> functions and is <b>adequately</b> presented</li> <li>iv. <b>outlines</b> changes made to the chosen design <b>or</b> plan when making the solution.</li> </ul>
5–6	The student: <ul style="list-style-type: none"> <li>i. <b>constructs</b> a plan, which <b>considers</b> time and resources, sufficient for peers to be able to follow to create the solution</li> <li>ii. <b>demonstrates competent</b> technical skills when making the solution</li> <li>iii. <b>creates</b> the solution, which functions <b>as intended</b> and is presented <b>appropriately</b></li> <li>iv. <b>outlines</b> changes made to the chosen design <b>and</b> plan when making the solution.</li> </ul>
7–8	The student: <ul style="list-style-type: none"> <li>i. <b>constructs</b> a <b>logical</b> plan, which <b>outlines</b> the efficient use of time and resources, sufficient for peers to be able to follow to create the solution</li> <li>ii. <b>demonstrates excellent</b> technical skills when making the solution</li> <li>iii. follows the plan to <b>create</b> the solution, which functions <b>as intended</b> and is presented <b>appropriately</b></li> <li>iv. <b>explains</b> changes made to the chosen design and plan when making the solution.</li> </ul>

# Criterion D: Evaluating Year 3

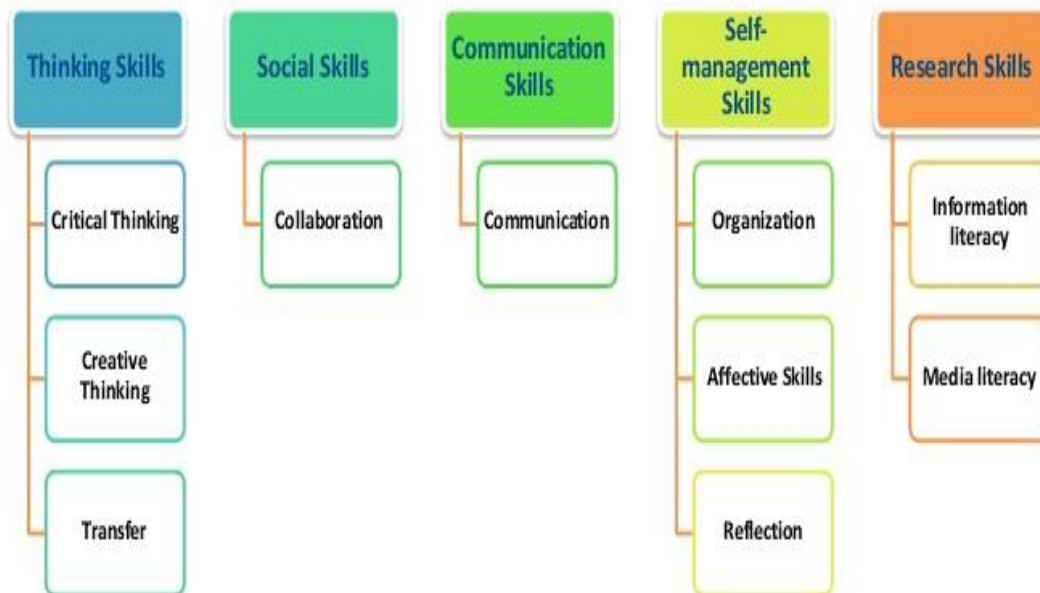
Maximum: 8

At the end of year 3, students should be able to:

- i. describe detailed and relevant testing methods, which generate accurate data, to measure the success of the solution
- ii. explain the success of the solution against the design specification
- iii. describe how the solution could be improved
- iv. describe the impact of the solution on the client/target audience.

Achievement level	Level descriptor
0	The student does not reach a standard described by any of the descriptors below.
1–2	The student: <ol style="list-style-type: none"> <li>i. <b>describes a</b> testing <b>method</b>, which is used to measure the success of the solution</li> <li>ii. <b>states</b> the success of the solution.</li> </ol>
3–4	The student: <ol style="list-style-type: none"> <li>i. <b>describes a relevant</b> testing <b>method</b>, which generates data, to measure the success of the solution</li> <li>ii. <b>outlines</b> the success of the solution against the design specification based on relevant product testing</li> <li>iii. <b>lists</b> the ways in which the solution could be improved</li> <li>iv. <b>outlines</b> the impact of the solution on the client/target audience.</li> </ol>
5–6	The student: <ol style="list-style-type: none"> <li>i. <b>describes relevant</b> testing <b>methods</b>, which generate data, to measure the success of the solution</li> <li>ii. <b>describes</b> the success of the solution against the design specification based on <b>relevant</b> product testing</li> <li>iii. <b>outlines</b> how the solution could be improved</li> <li>iv. <b>describes</b> the impact of the solution on the client/target audience, <b>with guidance</b>.</li> </ol>
7–8	The student: <ol style="list-style-type: none"> <li>i. <b>describes detailed and relevant</b> testing <b>methods</b>, which generate <b>accurate</b> data, to measure the success of the solution</li> <li>ii. <b>explains</b> the success of the solution against the design specification based on <b>authentic</b> product testing</li> <li>iii. <b>describes</b> how the solution could be improved</li> <li>iv. <b>describes</b> the impact of the solution on the client/target audience.</li> </ol>

# Learning Skills in the MYP – ATL Skills



Think about how the framework above might develop all aspects of skills needed by the 21<sup>st</sup> century learner!