Teacher(s)	Manish Kumar	Subject group and discipline	Design		
Unit title	Best Filtration Material	MYP year	1	Unit duration (hrs)	12

Inquiry: Establishing the purpose of the unit

Key concept	Related concept(s)	Global context
Communities	**Evaluation, Form**	**Fairness and Development**

Statement of inquiry

By carefully observing and evaluating the filtration properties available materials, we can help our community in developing their life standards

Inquiry questions

Factual— List the various types of impurities found in water.

Write down different types of water purification techniques available in the market.

Which form of carbon is used for water filtration?

What do you understand by primary research and secondary research?

What do you understand by the term aesthetic and ergonomics?

What are the main factors that influence the success of a new product in the market?

Explain design cycle.

What is the difference between design brief and design specification?s

Conceptual— How carbon helps in water purification?

Write down different factors that affect water filtration and explain how?

How surface to volume ratio is related to filtration?

Using an example explain all four stages of a design cycle.

With the help of an example explain design specification.

Why design brief is important?

What are the main points you will keep in mind when you will prepare your questionnaire?

Debatable— Does industrial development affects water pollution?

Objectives	**Summative assessment**	
A- Research and Analysis: Design research is the first step in product designing; it helps the students in understanding the needs, requirement and working process of the product. In research work students will cover the following points: I. Explains and justifies the need for a solution to a problem II. States and prioritizes the main points of research needed to develop a solution to the problem, with minimal guidance III. Describes the main features of an existing product that inspires a solution to the problem IV. Present the main findings of relevant research This will help students in developing their thinking skills, communication skills and research skills. **B- Developing Ideas:** In this objective	Outline of summative assessment task(s) including assessment criteria: In summative assessment student will first write a design brief followed by design specification for their solution and will submit their final solution in form of annotated design drawings. In this unit students will design an economical and sustainable water filter, so following points should be clear in their research report: - Need for a solution. - Factors affecting the solution. - Research on existing solutions. - Design specification - Success criteria - Sketches of all possible solutions - Final solution with annotated sketch and with	Relationship between summative assessment task(s) and statement of inquiry: Students will understand the importance of natural resources and will try to make an economical and sustainable water filter using the natural resources available in their surroundings. By doing so, students will help the people who can't afford costly water filters by providing them natural, economical and sustainable water filters and in this way, students will help the community

student will do brainstorming to develop a solution to the given problem and represent their solution with the help of detailed design drawings. There are four strands in this objective in which students first- Identify a problem that needs a solution, identify their clients/users and write a detail design specification by considering all design factors like aesthetic, ergonomics, cost and after this student will come up 3-4 possible design solutions and represent them with the help of drawings. Out of all their possible solutions finally students will select one final solution and justify. In final strand students have to represent their final solution with the help of detailed drawings.	proper justification.	

Approaches to learning (ATL)

Creative Thinking skills: While considering and prioritizing the factors that may affect the design solution students will build their critical and creative thinking skills.

Communication skills: During their research work students will interview the users/clients which will help them to build their communication skills. In this unit students will work in groups in a collaborative manner this will also build their communication skills while they will be sharing ideas in their groups.

Research skills: Research is the first and important step in design process in this unit students will do research on different materials to test their filtration property and on the existing solution so that they can identify how these solutions work get ideas from these existing solutions to design a better solution.

Action: Teaching and learning through inquiry

Content	Learning process
Students will know the following content: - Students will understand the importance of 'research' in designing a solution - Students will understand primary research and secondary research. - Students will understand the various factors which affect the designing of a solution like aesthetic, ergonomics, enviournmental conditions, cost, function etc. and how to prioritize these factors. - Students will learn how to prepare a design specification and which factors needs to be considers while designing a design brief. - Students will understand that how economical and sustainable product can be designed using natural and surrounding materials - Students will learn how case studies and existing solutions can inspire us to design a better solution through brainstorming Students will develop the following skills: - Students, with the help of some examples will be able to identify & define the 4 stages of design cycle. - Students will improve their drawing skills with an annotated analysis of their thoughts in the form of sketches and diagrams to refine an idea and in the process improve it further. - Students will also improve their research skills along with observation and analytical understanding while drawing conclusions. - Communication skills of the students will also develop	**Learning experiences and teaching strategies** Inquiry-Based Learning (IBL): Direct instruction with inquiry: Mind mapping possible project ideas and constraints in small groups; IBL: Guided inquiry into techniques that can be used to remove different impurities of water. IBL: Open inquiry into the different materials available in the lab. IBL: Structured inquiry around the research plan. Students identify research questions about the water impurities and filtration materials. - Small group/pair work - Power lecture/notes - Individual presentations - Group presentation **Formative assessment** Exercise 1 Criteria-A (Research and Analysis) – Most of the people in the world do not get pure water because they cannot afford costly water filters or RO system. To solve this problem student will do online and suggestive research {suggestions from seniors, guardians and teachers} to design an economical and sustainable water filter and represent their findings through a power point presentation. In this criteria student will cover the following strands: - Explains and justifies the need for a solution to a problem - States and prioritizes the main points of research needed to develop a solution to the problem, with minimal guidance - Describes the main features of an existing product that inspires a solution to the problem - Present the main findings of relevant research

during the research process, during interviewing the client and during their group work
- Students will become better thinkers, communicators and principled in their approach.

Students will grasp the following concepts:

- Design cycle
- Primery and secondary research
- Design brief
- Design specification
- Filtration property of materials.
- Different types of impurities present in water.
- Various separation techniques like vapourization, sedimentation, and filtration.
- One point perspective drawings
- Two point perspective drawings
- Isometric drawings
- Shading
- Design specification

Exercise 2 Criteria –B (Developing Ideas)–Students will prepare a design specification based on their research work and develop ideas through brainstorming to solve the given problem. Students will present their idea through annotated sketches and finally explains the manufacturing process of the one final design. At the end students will prepare a power point presentation in which they will represent the design specification, annotated sketches, and justify the final chosen design.

In this criteria student will cover the following strands: -

- develop a list of success criteria for the solution
- present feasible design ideas, which can be correctly interpreted by others
- present the chosen design
- create a planning drawing/diagram which outlines the main details for making the chosen solution.

Differentiation

ESL: There is no need for this, besides breaking down the requirements of the solution and the project into simpler language where required and giving more clear instructions throughout the stages of the project.

Extended Learning: The end product will depend on the technical skills of the student. For example, making the water filter students will have to use different tools and machines.

Resources

Examples of products, sketching materials,

http://www.ruthtrumpold.id.au/destech/

https://sswm.info/sswm-university-course/module-6-disaster-situations-planning-and-preparedness/further-resources-0/biosand-filter

https://www.thebetterindia.com/13532/biosand-filters-providing-clean-drinking-water-remotest-areas-india/

https://aosts.com/what-are-impurities-in-water-common/

Reflection: Considering the planning, process and impact of the inquiry

Prior to teaching the unit	During teaching	After teaching the unit
Why do we think this unit will be interesting? This unit integrates science and design and provides freedom to students to apply their knowledge of science in design to solve common daily life problems related to filtration. Students will try to help community by providing an economical and sustainable water filter. What do the students already know? What can they do? Students know that taint water is a major problem, most of the poor people have no choice other than to drink polluted water. Student will do their research to find the cause and do brain storming to come up with an economical and sustainable solution. What does my experience tell me to expect? I think students would really enjoy this unit, they will get chance to solve a major community problem, students will do experiments on different materials and design a new filtration product. I think students will be able to design a simple and sustainable filter. What attributes of the learner profile do I expect the students to develop? Through this unit students will build their Research skills, thinking skills and communication skills. While students will research on different materials they will develop their research skills and become researchers. When they will think to develop a better solution they will act as thinkers. When students will communicate withtheir clients to understand their	During teaching of the unit, I observed that students were really enjoying the activities. Students were able to connect their previous understanding to new concepts. I received constant feedback from students on the effectiveness of the unit and how it is meeting their needs. The best part of the unit was when students learnt about new filtration techniques and to test them, they created their own water filters using PVC pipes, foam, charcoal and gravels. Students tested their filter on various impurities like sand, dust, colours etc. They came to know that to remove micro and nano impurity particles we use RO system. What skills need more practice? I think students need more practice on secondary research. Although they did a great job in this unit. The primary research work (research/reflection papers) helped students communicate their thoughts and ideas more confidently.	What were the learning outcomes of this unit? Students came to know what design cycle is. They learnt the importance of research and analysing things before start making new things. They came to know the importance of water filtration and different purifying techniques. Was it complex enough to allow students to reach the highest levels? Students tested their water filter with water containing different types of impurities, so it was challenging for them to present an idea which can remove both soluble and insoluble impurities using low cost and eco-friendly materials. What will we do differently next time? Next time I will more focus on integrating hands on activities in the research work to make it more interesting and engaging. What will students take with them from this unit? Students understood design cycle, importance of research in designing and most important objectives of IB and importance of global contexts.

problems they will act as communicators. What are potential interdisciplinary connections? This unit integrate the science with design; in science students learn the concept of filtration, here in design students can apply this knowledge to build a new product and to solve community problems. Are there opportunities for meaningful service learning? Yes, through this unit students can provide better alternatives of costly purification techniques to poor people who can not afford these costly solutions. Students will develop ideas to build their solutions using economical and localy available materials. What in the unit might inspire community/personal projects? In this unit students will learn about filtration, and work with different materials like charcoal, foam, fine sand and cotton. Students can use this knowledge to develop a simple water filter, that will be very helpful for the community.		

Teacher(s)	Manish Kumar	Subject group and discipline	Design		
Unit title	Desktop Organizer	MYP year	1	Unit duration (hrs)	12

Inquiry: Establishing the purpose of the unit

Key concept	Related concept(s)	Global context
Systems	Resources	Personal and Cultural Expression (add exploration)

Statement of inquiry

Aesthetically pleasing products can be designed by including the personal and cultural expressions in the systems and resources of a company.

Inquiry questions

Factual— What do you understand by the term flow chart?

List the various materials you need to create your product?

List the various tools you need to create your solution?

Draw three types of wood joints.

What do you understand by filing and finishing?

Write various types of glue.

Which file would you use for the finishing of your product and why?

What factors affect the strength of a wooden joint?

Conceptual— How sequencing affects the building process of a product?

How personal and cultural expression can be included in the process of designing the product?

How can you make your product aesthetically pleasing?

How flow chart understanding helps in creating the construction plan?

Debatable— Should cultural expressions have an effect on product design? Justify.

Objectives	Summative assessment	
C- Creating the Solution: In this objective student will plan the creation of the given design and follow the plan to create a prototype sufficient for testing and evaluation. In order to reach the aims of this objective student will cover following points: i. Outline a plan, which considers the use of resources and time, 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. List the changes made to the chosen design and plan when making the solution v. Present the solution as a whole. This will help students in developing their thinking skills, communication skills and research skills.	Outline of summative assessment task(s) including assessment criteria: In this unit students will know and understand various hand tools and materials by creating a product desktop manager. Initially students will outline a construction plan for a desktop manager, this construction plan includes all the resources that student needs to build their product and time require to create the product. After this student will start creating their product using various tools and techniques. To create their solution student will follow their construction plan and list the changes they need to make to build their final solution. In the end students will present their solution and submit it as their summative assessment. In the presentation students will include the construction plan, building process and the changes they made.	Relationship between summative assessment task(s) and statement of inquiry: In this unit students are building an aesthetically and ergonomically designed desktop organizer, this will keep the desktops clean and will help in increasing the working efficiency of employees of an organization.

Approaches to learning (ATL)

Creative thinking skills: Students will build their creative thinking skills when they will be building the construction plan for the desktop organizer based on strand-I.

Social skills: In this, students will work in groups to build their desktop organizer in a collaborative manner this will help in building their social skills while they will be sharing ideas in their groups.

Action: Teaching and learning through inquiry

Content	Learning process
Students will know the following content: - Introduction to workshop procedures and workshop safety. - Students will understand the importance of 'planning' in designing a solution - Develop skills and understanding in working with Paper, MDF, Cardboards, and Paper cutter, Glue, Filer, Hacksaw and Sand Paper. - Students will understand the concept of sequencing and flowchart. - Students will learn different cutting and joining techniques. Students will develop the following skills: - Thinking skills when planning the product before creating - Product finishing - Working with hand tools like cutting of paper and carboard using paper cutter; cutting of MDF using hacksaw. - Communication skills of the students will also develop during the presentation of their product. Do: Based on the theme of "Organising", students will plan, design and create a desktop organiser for work space.	**Learning experiences and teaching strategies** IBL: Guided inquiry into efficient and proper use of hand tools and materials. IBL: Open inquiry into the different materials available in the lab. IBL: Structured inquiry around the building plan of the solution. By proper demonstration and illustration in the workshop students will be introduced to the workshop safety and efficient use of tools and equipment. To build the product, tools and materials will be provided to students; through experiential learning students will start creating their product and list the changes they need to make in their construction plan to build the final product. Through power point presentation and group discussion students will understand the concept of sequencing and flowchart to build their construction plan. The students will watch videos and images to understand the building process of different wood joints **Formative assessment** Exercise 1 – This FA would be based on Criteria-**C (Creating the solution)** strand-1 which is **outline a plan, which considers the use of resources and time, sufficient for peers to be able to follow to create the solution.** Objective of this FA is to test and improve student's thinking skills and their understanding of creating a construction plan using various planning and presentation techniques like flowchart and algorithms. The task for this FA would be to create a construction plan to make a photo frame of 20cmx15cm. Exercise 2 {Group assignment} –This FA would be based on the **Criteria-C (Creating the solution)** and the strands which students are going to cover in this FA will be strand-ii, strand-iii and strand-iv. Which are: - ii. **demonstrate excellent technical skills when making the solution** **iii. follow the plan to create the solution, which functions as intended list the**

	changes made to the chosen design and plan when making the solution **iv. Present the solution as a whole.** Objective of this assessment is to test and improve student's technical skills, communication skills and presentation skills. Task for this FA is to create a photo frame of 20cmx15cm.
	Differentiation ESL: There is no need for this, besides breaking down the requirements of the solution and the project into simpler language where required and giving more clear instructions throughout the stages of the project. Extended Learning: The end product will depend on the technical skills of the student.

Resources
https://www.youtube.com/watch?v=oqTCL2Xz7Bg - to understand sequencing for construction plan. https://www.youtube.com/watch?v=mjI2YzpAj9s - to understand the use of tools and equipments, helps to understand the building process of a desktop organizer https://www.youtube.com/watch?v=BM8gZuLr0CE – to understand the various techniques of filing. http://www.ruthtrumpold.id.au/destech/ - to understand desing process and criteria-C

Reflection: Considering the planning, process and impact of the inquiry

Prior to teaching the unit	During teaching	After teaching the unit
Check students' prior knowledge of hand tools and materials. Arrange all media content I believe the students will find this unit interesting as this include a lot of hands-on activities and students will get a chance to learn the use of new tools and will explore new materials.		