

Mathematics Arts Integration



This assessment aims to assess your ability to use mathematics to solve a real-world problem.

Names :		()	Class :	
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		()	Part 1 Group Submission (2D Floorplan):	23 Mar, 5pm
		()	Part 2 Group Submission (3D model + group report)	29 Jun, 5pm
		()	Part 3 Individual Submission (Individual reflection + Peer evaluation forms)	29 Jun, 5pm

Key Understandings

Students will understand that

- ratios and proportions are mathematical ideas used to model structures, buildings and design in the real world situations.
- mathematical models can be represented in 2- or 3-dimensions to facilitate analysis of space and proportion.

Overview

HDB Launches My Nice Home Gallery to Help Flat Buyers Realise Their Dream Homes

Published Date: 28 Jan 2015 (Extracted)

The Housing & Development Board (HDB) launched the My Nice Home Gallery(温馨 我家) at HDB Hub on 28 Jan 2015. The launch was officiated by Minister for National Development, Mr Khaw Boon Wan.

To showcase the latest in HDB flat designs, interior design ideas and renovation tips, HDB has revamped its previous showflat space, formerly known as The Habitat Forum, into a brand new My Nice Home Gallery (温馨 我家), featuring five fully furnished HDB showflats – Studio Apartment (SA), 2-, 3-, 4-, and 5-room units. This is the first time that showflats are available for all five flat types. Eco-friendly features and elderly-friendly fittings have also been included in the new flats for the first time.

In support of My Nice Home Gallery, SOTA launched a “My Nice Home Design Contest” for students to design a studio apartment for senior citizens.

Each group has to submit the following in an **A4 file**:

1) Part 1 Group Submission

- two-dimensional (2-D) floor plan of the studio apartment, using a scale of 1:40.

The area of the floorplan of a studio apartment is capped at 45m². (eg. 9m x 4m or 7m x 6m, etc..)

2) Part 2 Group Submission

- three-dimensional (3-D) model of a studio apartment
- one group report

3) Part 3 Individual Submission & Peer evaluation forms

- one individual reflection
- peer evaluation forms

Tasks

(Working in groups of 4 or 5)

Tasks	Deadline	What to do	References
Part 1 Group Submission: 2D Floorplan	23 Mar, 5pm	<p>Design 2-D Floor Plan Using a scale of 1:40, design a 2-D plan of</p> <ul style="list-style-type: none"> • Maximum Area : 45 m² • Consists of the following: bedroom, kitchen, bathroom and living room <p>Requirement: Present and submit the site plans on a piece of A3 paper with all appropriate measurements labelled clearly.</p>	<p>You may want to use the template in Appendix A as a reference.</p>
Part 2 Group Submission: 3D Model & Group report	29 Jun, 5pm	<p>Construct a 3-D Model of Studio Apartment Using an appropriate scale, build a 3-D model of the studio apartment design based on the 2D floorplan. You need to show clearly the height of the apartment, the height of living person and the height of furniture.</p>	<p>Requirement: You may build the 3-D model using any medium. (Plasticine, clay, computer-aided design, LEGO, etc)</p>
		<p>Group Report Compile a two page typed-written report explaining the adopted design for studio apartment, considering</p> <ul style="list-style-type: none"> • the need for studio apartments in Singapore. • the mathematical pre-requisite knowledge your group will require when designing the studio apartments. • the design elements in studio apartments for senior citizens. <p><i>Note: Costing of furniture and materials are not required.</i></p>	<p>Requirement: The research report should be two-pages long on A4 size paper. Use Times New Roman Font, with font size 12 and single line spacing.</p> <p>Report should include citation of references in MLA format. (Refer to website http://www.citationmachine.net/mla/cite-a-book)</p> <p>Refer to Appendix B on guidelines for group report</p> <p>References http://www.hdb.gov.sg/cs/infoweb/pres-s-releases/hdb-launches-my-nice-home-gallery-to-help-flat-buyers-realise http://www.c3a.org.sg/Benefits_details.do?id=127 http://www.channelnewsasia.com/news/singapore/elderly-get-more-options/2060420.html</p>

<p>Part 3 Individual Submission:</p> <p>Individual reflection & Peer evaluation forms</p>	<p>29 Jun, 5pm</p>	<p><u>Individual Reflection</u> (not exceeding 500 words) Write a half to one-page reflection. Answer the following:</p> <ul style="list-style-type: none"> • How did completing the project allow you to see Art & Design in Mathematics? • List 2 things that you have learnt from this project. • What were the challenges and learning points you and your group have learnt through this project? • How you would have done better or different in the design of the studio apartment as an individual and explain why. 	
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Timeline

	Dates	Objectives	Task
(T1W10)	5 Mar (Mon)	<ul style="list-style-type: none"> - Briefing by teacher on overview, expectations and objectives of this performance task. - Form groups 	Students need to plan and design 2D floor plan of the studio apartment.
	6 Mar (Tues)	<ul style="list-style-type: none"> - Pre-test Chp 1: Map Scale 	
	7 Mar (Wed)	<ul style="list-style-type: none"> - Art sharing on 3D modelling 	
(T2W1)	<u>Deadline of Part 1 Group Submission</u> 23 Mar, 5pm to respective Math mentor.	<ul style="list-style-type: none"> - Submission of 2D floorplan 	
(T2W5)		<ul style="list-style-type: none"> - Return 2D floorplan to groups and give feedback 	The feedback of proposal will be given.
June Holidays	<u>Deadline of Part 1,2 & 3 Submission</u> : 29 Jun, 5pm	<ul style="list-style-type: none"> - Completion of 2D floorplan - Completion of 3D model - Completion of Group Report - Completion of Individual Reflection - Completion of Peer evaluation forms 	<p>Submission should include the following:</p> <ul style="list-style-type: none"> (a) 2D floorplan (b) 3D model (c) A group report in hardcopy (2 pages) (d) An individual reflection (half to 1 page, not more than 500 words) (e) Peer evaluation forms <p>Please collate all of the above including <u>all peer evaluation forms</u> in a <u>A4 file</u> before submission.</p>

Rubrics

Part 1 Group Submission: 2D Floorplan (4marks)

SCORE	4	3	2	1
Assessment Criteria	Exemplary	Proficient	Developing	Emerging
Application of Mathematical Knowledge (2-D Site Plan)	Shows detailed evidence of transfer of understanding into 2D site plan.	Shows substantive evidence of transfer of understanding into 2D site plan.	Shows some evidence of transfer of understanding into 2D site plan.	Shows limited evidence of transfer of understanding into 2D site plan.

Part 2 Group Submission: 3-D Model & Group Report (20marks)

SCORE	4	3	2	1
Assessment Criteria	Exemplary	Proficient	Developing	Emerging
Research through Art and Design Process	Gathers and presents extensive information on relevant Math & Art topics.	Gathers and presents substantial information on relevant Math & Art topics.	Gathers appropriate information on relevant Math & Art topics.	Gathers some information on Math and Art topics that may or may not be relevant.
	Design captures purpose and exceptional attention to details.	Design captures purpose and sufficient attention to details.	Design captures purpose and shows some attention to details.	Design captures purpose and limited attention to details.
Research & Communication of processes and findings.	Research is comprehensive and extensive. Documentation and report is detailed, well-organised and coherent.	Research is competent. Documentation and report is detailed, organised and coherent.	Research is sufficient. Documentation and report shows some organisation and coherence.	Research is limited. Documentation and report is somewhat incoherent and/or clichéd.
	Uses correct mathematical notations and design terminology throughout.	Uses nearly correct mathematical notations and design terminology.	Uses some correct mathematical notations and design terminology.	Uses few mathematical notations and design terminology.
Application of Mathematical Knowledge	Shows detailed evidence of transfer of understanding into 3D model.	Shows substantive evidence of transfer of understanding into 3D model.	Shows some evidence of transfer of understanding into 3D model.	Shows limited evidence of transfer of understanding into 3D model.

Part 3 Individual Submission: Individual Reflection & Peer evaluation forms (12marks)

Assessment Criteria (Individual Report)	Exemplary	Proficient	Developing	Emerging
SCORE	4	3	2	1
Reflection & Communication	Suggests reasonable and feasible ways to improve site plan and model.	Suggests reasonable ways to improve site plan and/or model.	Suggests somewhat reasonable ways to improve site plan and/or model.	Suggests some ways to improve site plan and/or model, but may not be feasible.
	Uses clear and relevant example(s) to support answer, where appropriate.	Uses relevant example(s) to support answer, where appropriate.	Uses somewhat relevant example(s) to support answer, where appropriate.	Uses some example(s) but may not be always appropriate.
Collaboration	Makes every effort to carry out assigned duties on time.	Makes considerable effort to carry out assigned duties on time.	Makes some effort to carry out assigned duties.	Makes little effort to carry out assigned duties.

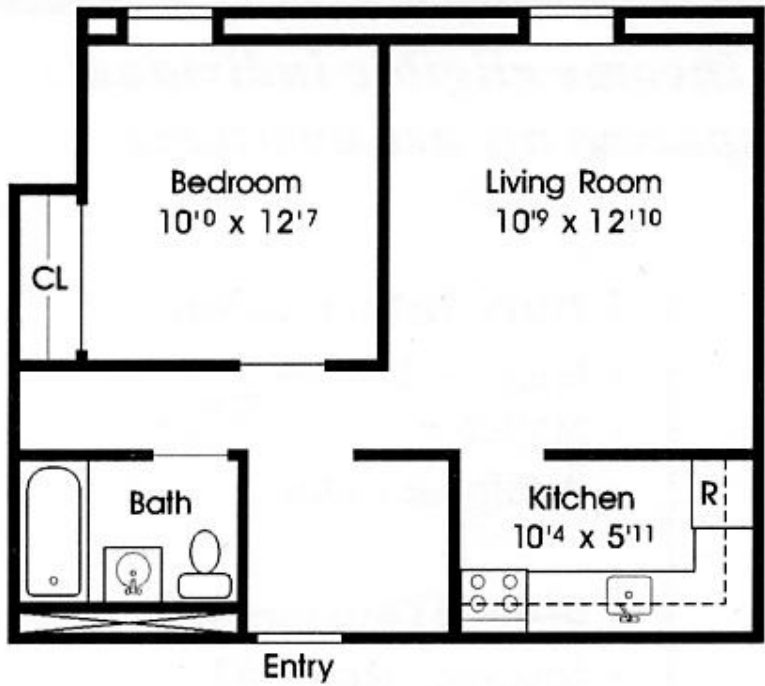
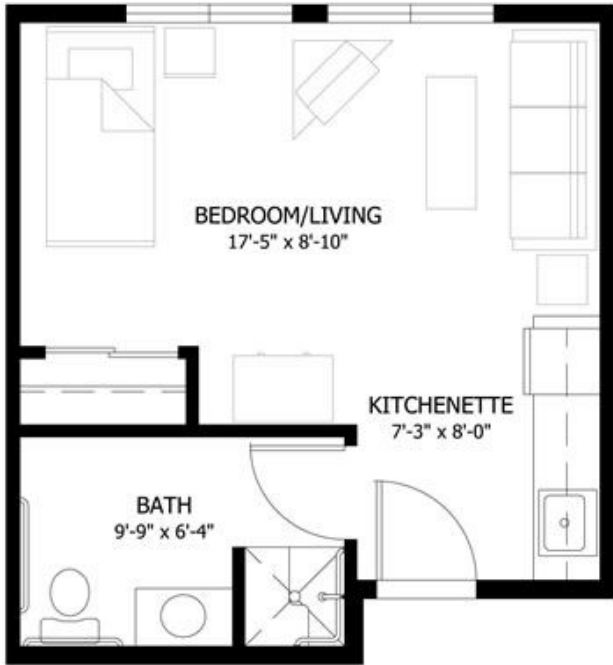
Art Rubrics Component (Will not constitute to mark calculations)

A	7 or 8			
B	5 or 6			
C	3 or 4			
D	1 or 2			
Assessment Criteria	Exemplary 4	Proficient 3	Developing 2	Emerging 1
Aesthetic Qualities	<ul style="list-style-type: none"> Works produced demonstrate at least 4 of the Art elements and principles[†]. 	<ul style="list-style-type: none"> Works produced demonstrate at least 3 of the Art elements and principles[†]. 	<ul style="list-style-type: none"> Works produced demonstrate at least 2 of the Art elements and principles[†]. 	<ul style="list-style-type: none"> Works produced reveal no attempt use of Art elements and principles.
Control of Materials and Technical Processes	<ul style="list-style-type: none"> Good understanding of the materials and a competent level of technical skills demonstrated. 	<ul style="list-style-type: none"> Sufficient understanding of the materials and appropriate technical skills selected and executed. 	<ul style="list-style-type: none"> Some understanding of the materials and the appropriate technical skills needed. Even if the execution is not competent. 	<ul style="list-style-type: none"> Little understanding and manipulation of materials.

Art Elements	
Color	Use of appropriate colors in design. Colors used consistent with design theme.
Line	Line is an element of art defined by a point moving in space.
Shape	Two-dimensional space. The selection of appropriate shape for the stated purpose.
Texture	The way a surface feels. Use of texture to attract interest.
Space	The area or the perceived area within the design.
Form	The three dimensional aspect of an object.

Art Principles	
Unit/harmony	Elements used are in agreement.
Balance	Symmetry or Radial balance around a central element.
Hierarchy	Elements lead the reader through the design in order of importance.
Scale/proportion	Appropriate use of size. Positioning, color, style or shape to bring about a focal point.
Dominance/emphasis	Appropriate use of positioning, color, style or shape to bring about a focal point.
Similarity and contrast	Use of similarity and contrast to stay true to theme without being too boring.

Appendix A



Appendix B

Year 2 Arts Integration Group Report

Guidelines

Requirement: The research report should be **two-pages** long on A4 size paper. Use **Times New Roman Font**, with **font size 12** and **single line spacing**.

1. Introduction

- Give a brief research of your task:
 - Explore the need of studio apartments in Singapore.
 - The mathematical pre-requisite knowledge that your group will require when designing the studio apartments.
 - The design elements your group will consider when designing the studio apartments for the senior citizens. Design elements include: functionality of the furniture, size efficiency of each room, positioning of the entrance/exits for each room, orientation of each room with respect to others.

2. Design of 2-D site plan

- Support your reasons with researched evidences e.g. Size of bed relative to the size of the bedroom.
- Show detailed calculations of site plan including total area, a detailed calculation of room and features.
- Ensure that you have used proper mathematical notations.

3. Design of 3-D Model

Part 1:

- Explain your use of scale.
- Discuss choice of material(s) used for construction of model.
 - What other materials did you consider before deciding on the final one? Why didn't the other materials work out.
 - Include descriptions of any trials and errors you had to undertake before deciding on the final material.
- Explain the choice of colour, other design considerations, etc

Part 2:

- Show detailed calculations of features in the model (e.g measurements for kitchen top, table, bed, human figures)

4. Conclusion

5. Citation in MLA format (Word count not included)

(Refer to website <http://www.citationmachine.net/mla/cite-a-book>)

Peer Assessment Form

Name of Group Member: _____

Item	Not at all	Sometimes	Most of the times	All the time
Has made every effort to make a contribution to the task.				
Has made every effort to carry out the duties that were assigned.				
Is able to carry out the duties on time.				
Is able to work well with the rest of members .				

Name of Group Member: _____

Item	Not at all	Sometimes	Most of the times	All the time
Has made every effort to make a contribution to the task.				
Has made every effort to carry out the duties that were assigned.				
Is able to carry out the duties on time.				
Is able to work well with the rest of members .				

Name of Group Member: _____

Item	Not at all	Sometimes	Most of the times	All the time
Has made every effort to make a contribution to the task.				
Has made every effort to carry out the duties that were assigned.				
Is able to carry out the duties on time.				
Is able to work well with the rest of members .				

Name of Group Member: _____

Item	Not at all	Sometimes	Most of the times	All the time
Has made every effort to make a contribution to the task.				
Has made every effort to carry out the duties that were assigned.				
Is able to carry out the duties on time.				
Is able to work well with the rest of members .				