Environment

Portfolio summary

In this portfolio, students show that they can design questions for investigation using appropriate inquiry skills. They systematically record and tabulate data, analyse trends in collected data and summarise findings of a survey. Students draw conclusions from their results and discuss potential consequences of them.

Students use effective project planning techniques for a designed solution. They outline a research plan, design criteria and success criteria. Students explain the need for a designed solution, using photographic evidence and survey results. They demonstrate research into a range of options and provide a number of preliminary sketches before deciding on the solution. They are able to justify their designed solution. Students prepare an implementation plan. They make effective use of technologies.

Students use scale and scale factor to calculate area. They plan, budget and cost an event and use efficient strategies to calculate profit and loss. They cost the design choice and justify the cost.

This portfolio has its basis in Technologies with Mathematics and Science playing secondary roles.

Design project: The top playground

Sample summary

This task is the culmination of an extended unit of work that aimed to make connections for students between STEM disciplines in a project that targeted an identified need in the school. Students collaborated in small groups to investigate the effect of overpopulation on the school's top playground. They were asked to design a potential solution to address the identified problems, using their knowledge of the design process and mathematical, technological and scientific tools.

Achievement Standards

Science

Technologies

Mathematics

By the end of Year 9, students explain chemical processes and natural radioactivity in terms of atoms and energy transfers and describe examples of important chemical reactions. They describe models of energy transfer and apply these to explain phenomena. They explain global features and events in terms of geological processes and timescales. They analyse how biological systems function and respond to external changes with reference to interdependencies, energy transfers and flows of matter. They describe social and technological factors that have influenced scientific developments and predict how future applications of science and technology may affect people's lives.

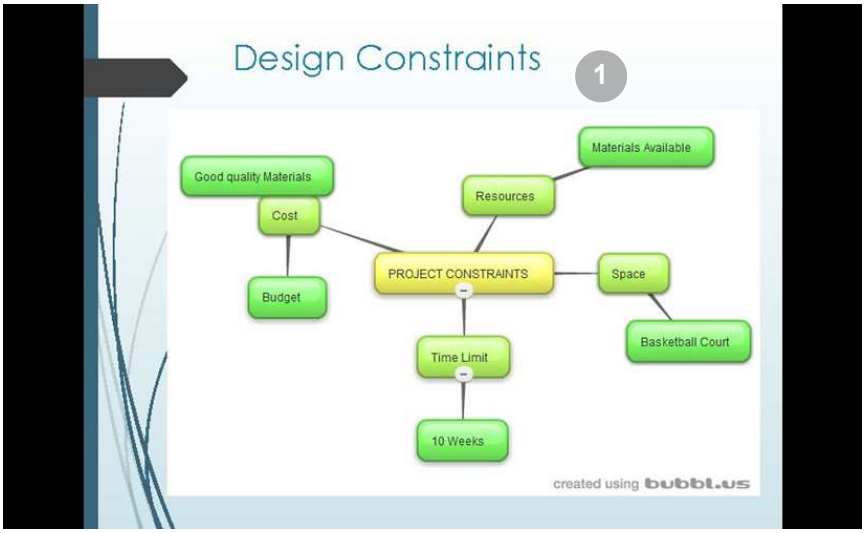
Students design questions that can be investigated using a range of inquiry skills. They design methods that include the control and accurate measurement of variables and systematic collection of data and describe

how they considered ethics and safety. They analyse trends in data, identify relationships between variables and reveal inconsistencies in results. They analyse their methods and the quality of their data, and explain specific actions to improve the quality of their evidence. They evaluate others' methods and explanations from a scientific perspective and use appropriate language and representations when communicating their findings and ideas to specific audiences.

Project folio

Annotations

1 **Technologies**
Outlines research plan for the project

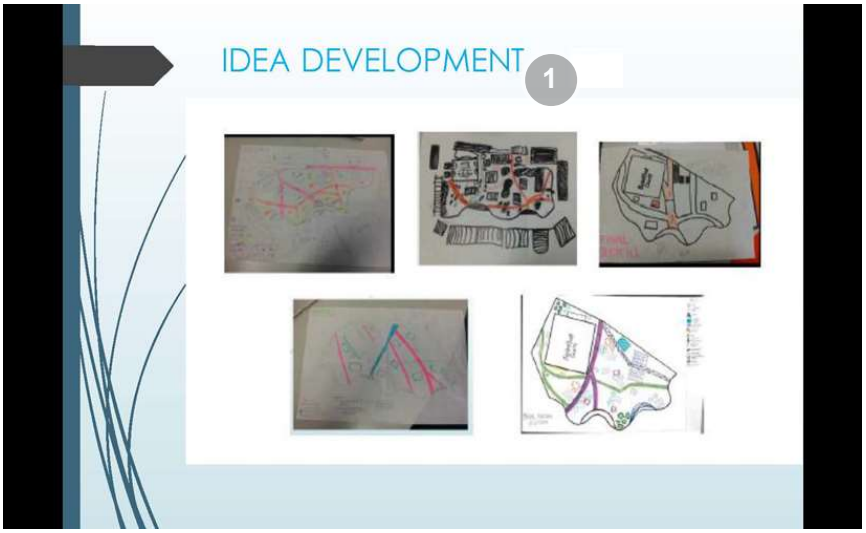


Annotations

1 **Technologies**
Considers important design constraints

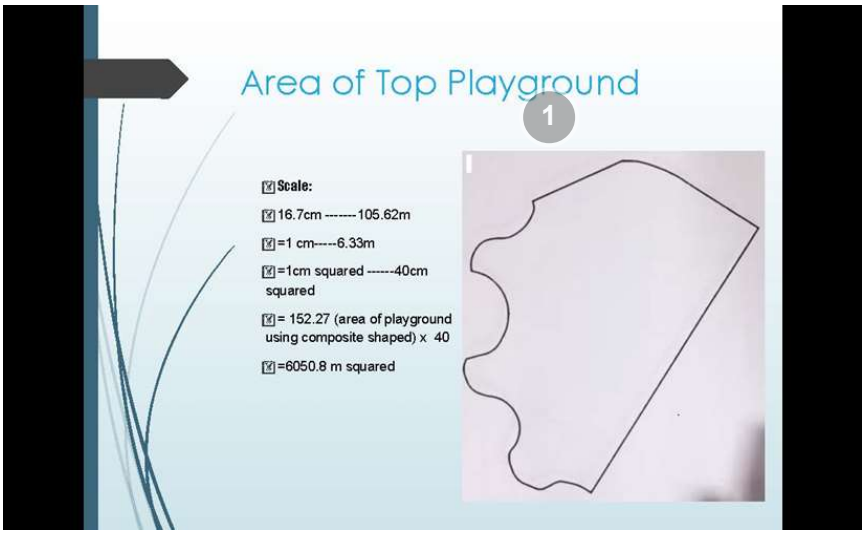
Annotations

1 **Technologies**
Identifies key success criteria



Annotations

1 Technologies
Sketches four possible design ideas before deciding on final designed solution

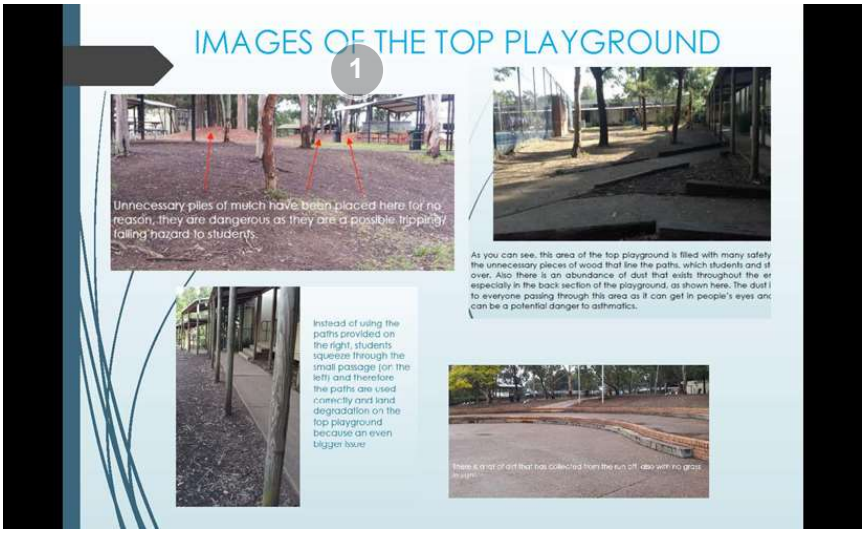


Annotations

1 Mathematics
Uses scale and scale factor to approximate area

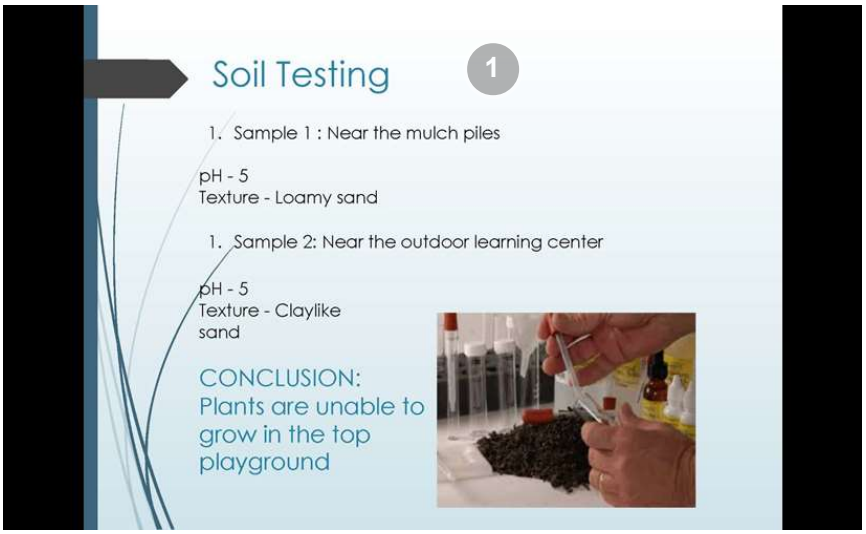
Annotations

1 Mathematics
Summarises key findings of the survey



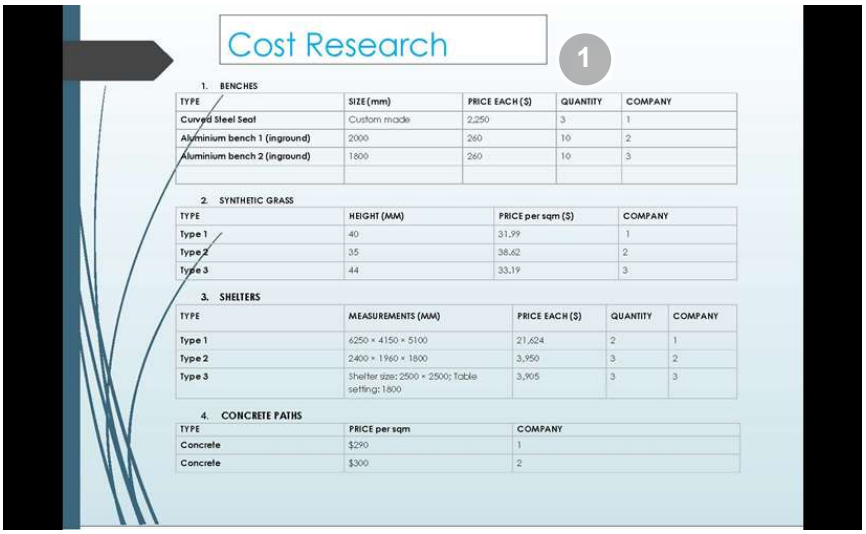
Annotations

1 **Technologies**
Explains the need for a designed solution and provides photographic evidence



Annotations

1 **Science**
Uses soil testing results to reach a conclusion



1. BENCHES

TYPE	SIZE (mm)	PRICE EACH ($)	QUANTITY	COMPANY
Curved Steel Seat	Custom made	2,250	3	1
Aluminium bench 1 (inground)	2000	260	10	2
Aluminium bench 2 (inground)	1800	260	10	3

2. SYNTHETIC GRASS

TYPE	HEIGHT (MM)	PRICE per sqm ($)	COMPANY
Type 1	40	31.99	1
Type 2	35	38.62	2
Type 3	44	33.19	3

3. SHELTERS

TYPE	MEASUREMENTS (MM)	PRICE EACH ($)	QUANTITY	COMPANY
Type 1	6250 × 4150 × 5100	21,624	2	1
Type 2	2400 × 1960 × 1800	3,950	3	2
Type 3	Shelter size: 2500 × 2500; Table setting: 1800	3,905	3	3

4. CONCRETE PATHS

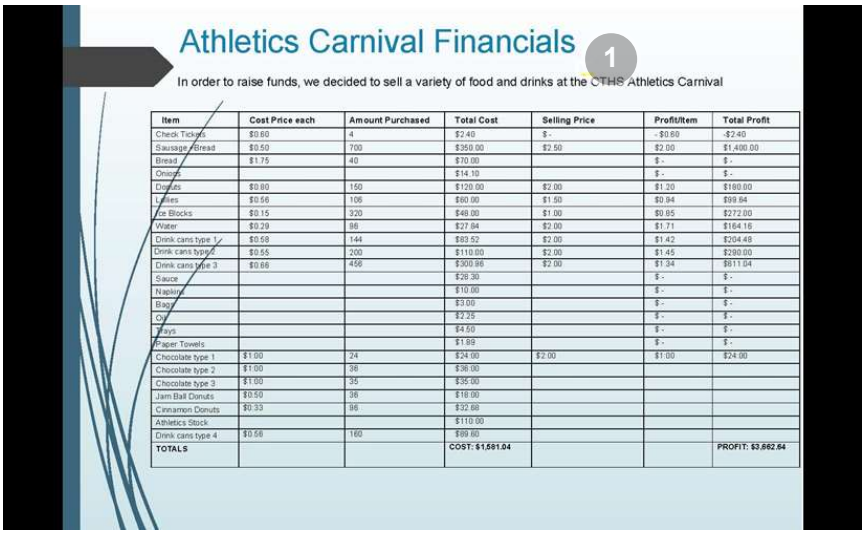
TYPE	PRICE per sqm	COMPANY
Concrete	$290	1
Concrete	$300	2

Annotations

1 **Mathematics**
Shows evidence of costing a variety of equipment and materials from a range of sources

Annotations

1 **Mathematics**
Calculates total cost of project correctly

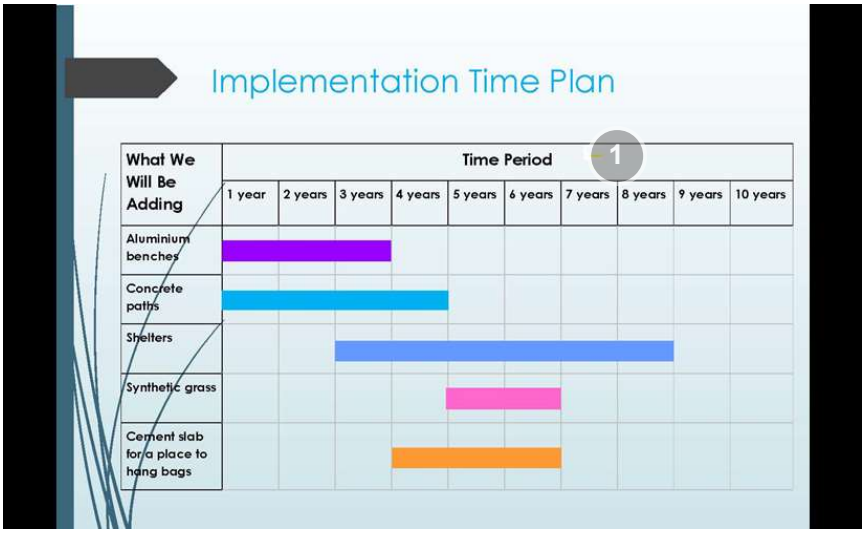


Annotations

1 **Mathematics**
Uses a table to compare cost, selling price and profit per item

Annotations

1 **Mathematics**
Calculates profit correctly



Annotations

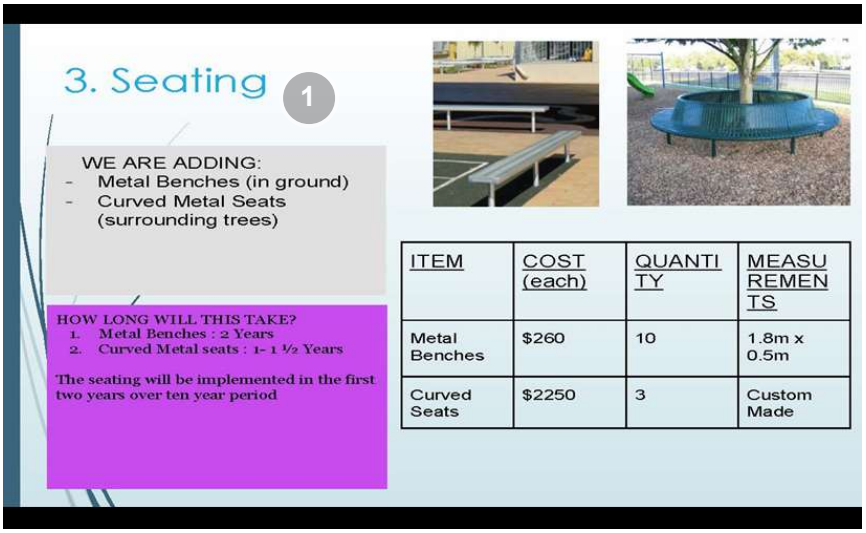
1 **Technologies**
Uses a Gantt chart to show stages of implementation

Annotations

1 **Technologies**
Justifies design decision

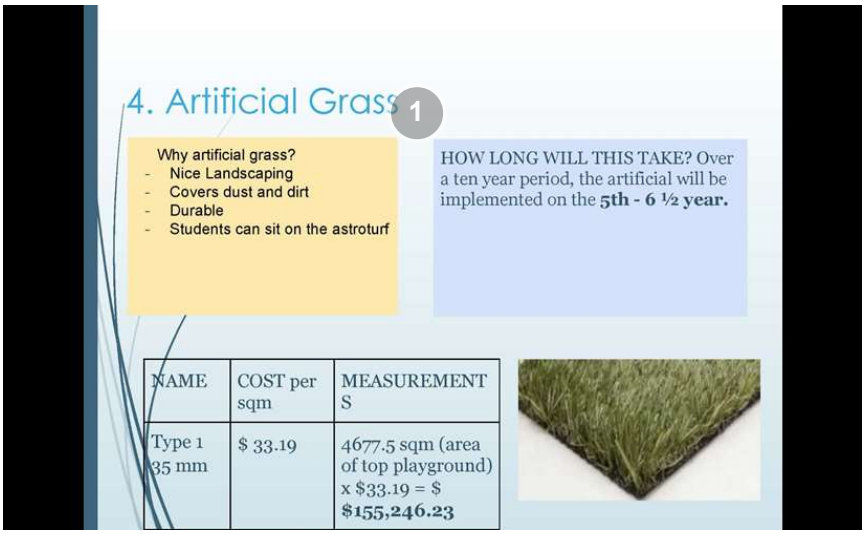
Annotations

1 **Mathematics**
States choice of equipment with details of design and cost



Annotations

1 **Technologies**
Illustrates choice of equipment with projected timeline



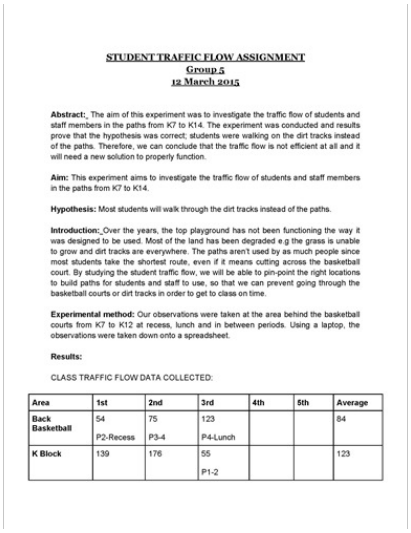
Annotations

1 **Mathematics**
Justifies and costs design choice

Annotations

1 **Technologies**
Provides two uncosted designed solutions with some justification for their inclusion

Scientific report



STUDENT TRAFFIC FLOW ASSIGNMENT
Group 5
12 March 2015

Abstract: The aim of this experiment was to investigate the traffic flow of students and staff members in the paths from K7 to K14. The experiment was conducted and results prove that the hypothesis was correct; students were walking on the dirt tracks instead of the paths. Therefore, we can conclude that the traffic flow is not efficient at all and it will need a new solution to properly function.

Aim: This experiment aims to investigate the traffic flow of students and staff members in the paths from K7 to K14.

Hypothesis: Most students will walk through the dirt tracks instead of the paths.

Introduction: Over the years, the top playground has not been functioning the way it was designed to be used. Most of the land has been degraded e.g the grass is unable to grow and dirt tracks are everywhere. The paths aren't used by as much people since most students take the shortest route, even if it means cutting across the basketball court. By studying the student traffic flow, we will be able to pin-point the right locations to build paths for students and staff to use, so that we can prevent going through the basketball courts or dirt tracks in order to get to class on time.

Experimental method: Our observations were taken at the area behind the basketball courts from K7 to K12 at recess, lunch and in between periods. Using a laptop, the observations were taken down onto a spreadsheet.

Results:

CLASS TRAFFIC FLOW DATA COLLECTED:

Area	1st	2nd	3rd	4th	5th	Average
Back Basketball	54 P2-Recess	75 P3-4	123 P4-Lunch			84
K Block	139	176	55 P1-2			123
Woodchips	83 P1-2	147 P2-Recess	132 Recess-P3	78 P3-4	92 P5-6	106
Outdoor Learning Space	88 P4-Lunch	33 P2-Recess	11 P2-Recess			44
E Block	76 P3-4					76
Serpentine Wall	194 P5-6	147 P1-2	251 P3-4	166 P3-4		189.5
Dirt Path next to B/ball Court	31 P1-2	17 Recess-P3				24

Discussion: By looking at the results of the amount of students walking behind the basketball court, we learn that almost all of the students walked through the dirt instead of the path. This can bring about many hazards, such as for people that are asthmatic or sensitive to dust, because from the dirt ground, dust can rise up into air. The idea in this report (traffic flow issues in the top playground) has recently become a great problem for our school, and in order to solve it, we need to come up with a solution that ensures for the top playground to be running efficiently while being free from safety risks.

Conclusion: From this experiment we can conclude that the traffic flow wasn't very effective in our area since people were walking around in all directions and weren't using the path.

Annotations

1 **Science**
Formulates a plausible hypothesis

2 **Science**
Explains the motivation for the investigation and how its results will support decision-making

3 **Science**
Systematically collects and records data

Annotations

1 **Science**
Draws conclusions from the experimental results and discusses potential consequences to health- and safety-related issues

3D walkthrough