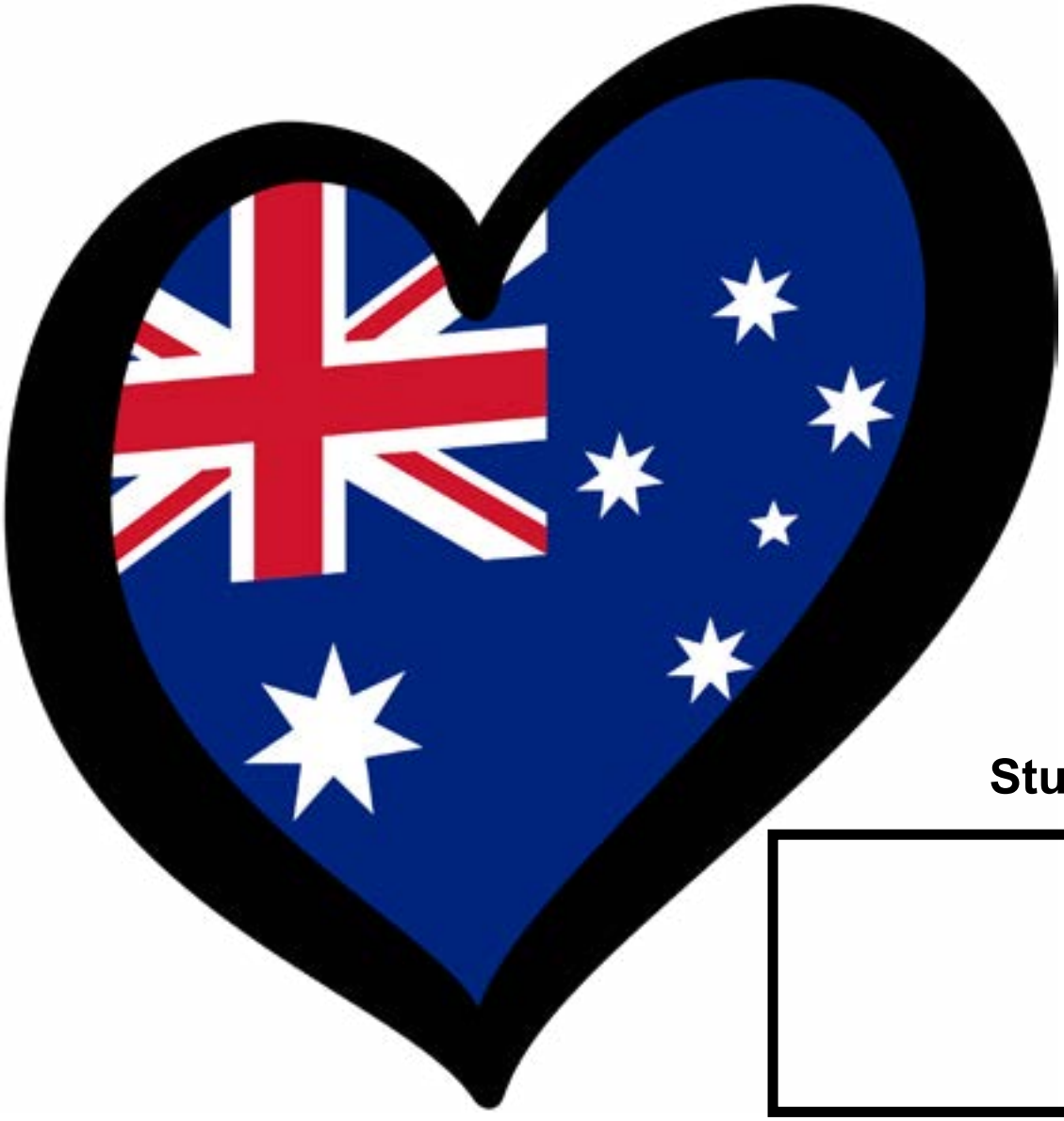
Who are we?

STEM Fundamentals ...



Introducing students to the basic ideals of STEM to develop a project that captures the identitity of who we are as a community.

Student's Name:

DISCLAIMER

Who Are We? STEM Fundamentals

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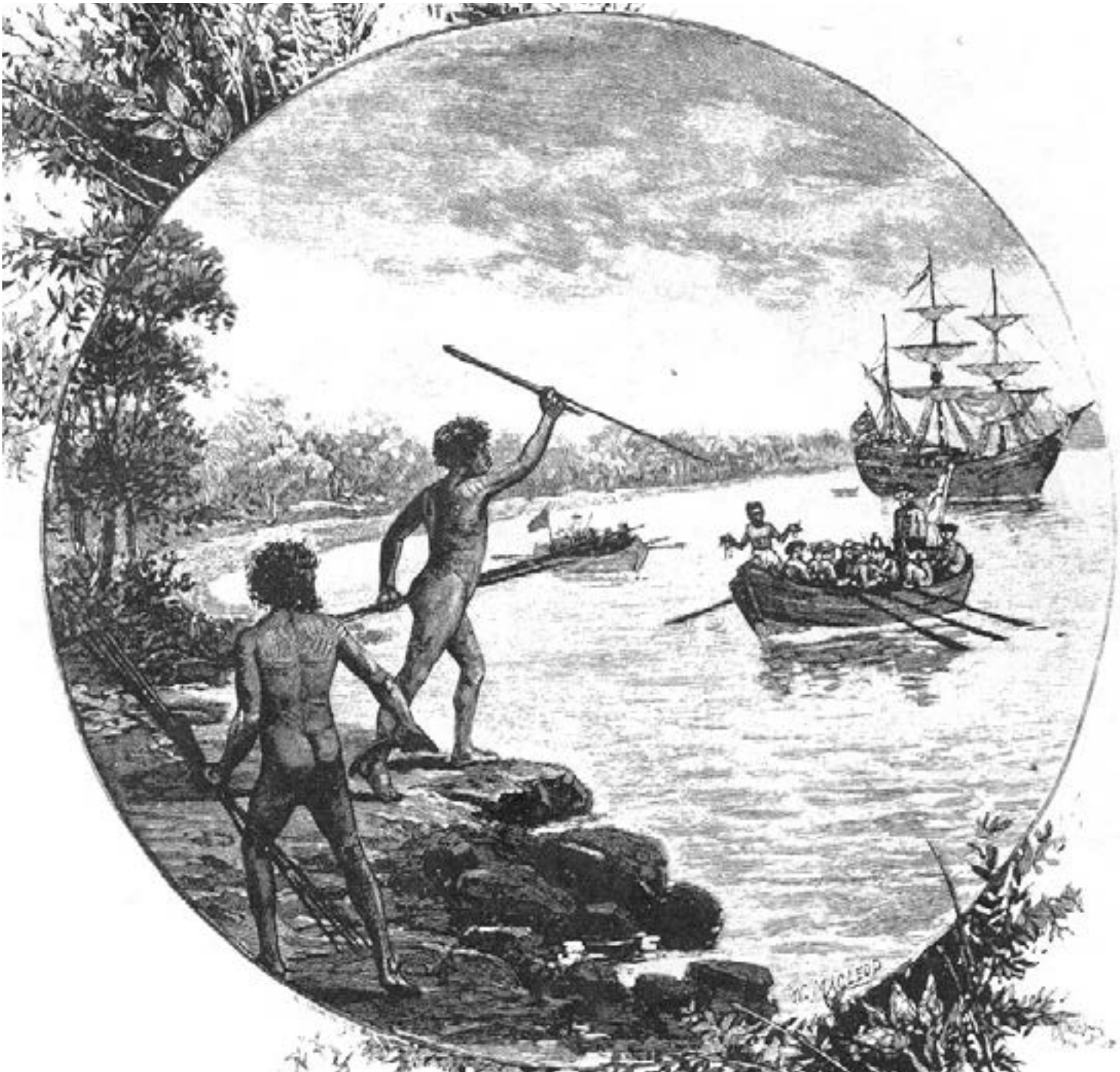
Content within this book is based around the BOSTES endorsed syllabus, iSTEM published in 2016. For the most up to date version of this syllabus and other current information pertaining to learning in this course, you should check on the web site at

http://www.boardofstudies.nsw.edu.au/



Basic Ideals

There is a lot of discussion about STEM in the political and educational arena.

Here is one examle of what they are saying ...

BroganSpots. (2012). **Interview - STEM**. https://www.youtube.com/watch?v=8V8EjEzIpkg

If you did not get what the advertisement was about, it is saying that most jobs in the future will be STEM based, and the people that will have the best opportunities for employment will be the ones that can best undertsnad and use technology, and employ creative problem solving skills.

So what does STEM stand for?

Science, Technology, Engineering and Mathematic.

However, they are also talking about STEAM (add in Art). Catholic schools are talking about STREAM (add Religion) ... and it goes on and on!

The thing that you need to understand is that this is about a way of learning rather than a formal mandated curriculum. That is, we are choosing to deliver a STEM course as it is a fun way of understanding how the world works, and it helps put traditional course like Mathematics and Science into real life learning experiences.

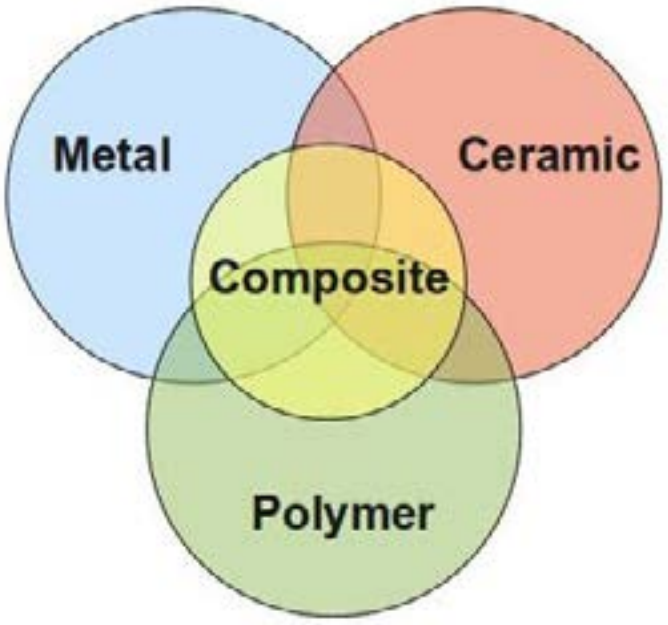
So what does iSTEM, the official name for this course, stand for:

Integrated Skills, Technology, Engineering & Mechanics

In English, we will be using math and science to help design and engineer technological solutions.

So here are the basics ...

Materials



Materials can be catogorised into four different groups.

Metals

A solid is considered to be a metal if it has high electrical and thermal conductivity. The chemical definition of a metal also includes having a characteristic surface luster or shine. It is characteristic of metals that they are malleable (can be hammered into sheets) and ductile (can be drawn into wires).

hyperphysics.phy-astr.gsu.edu/hbase/Solids/metal.html

Some common forms of metal that we will be using in this course include steel, brass, copper and sterling silver.

Ceramics

A ceramic is an inorganic non-metallic solid made up of either metal or non-metal compounds that have been shaped and then hardened by heating to high temperatures. In general, they are hard, corrosion-resistant and brittle. Ceramic comes from the Greek word meaning 'pottery'.

sciencelearn.org.nz/Contexts/Ceramics/Science-Ideas-and-Concepts/What-are-ceramics

Ceramics will not be necessarily used in this course, however they can be found in electronic components and everyday objects like plates and bowls that we use everyday.

Polymer

A polymer is a very large, chain-like molecule made up of monomers, which are small molecules. It can be naturally occurring or synthetic. Polymers can be broken up into two different forms; naturally forming and human made synthetics.

https://www.vocabulary.com/dictionary/polymer

Some common forms of polymers used in this course will be solid timber, paper and various forms of plastics.

Composite

A composite material (also called a composition material or shortened to composite, which is the common name) is a material made from two or more constituent materials with significantly different physical or chemical properties that, when combined, produce a material with characteristics different from the individual components. The individual components remain separate and distinct within the finished structure. The new material may be preferred for many reasons: common examples include materials which are stronger, lighter, or less expensive when compared to traditional materials.

https://en.wikipedia.org/wiki/Composite_material

Some common forms of composite used in this course will be sterling silver, brass and plywood.

Lets classify some materials!

There are lots of different tests that we can do to classify materials that we are using. Read the following to better understand how the properties of a materials can help us understand the abilities of classified materials.

For a great place to do secondary research on these methodologies, check out the following source:
electrical4u.com. (2017). **Mechanical Properties of Engineering Materials.** http://www.electrical4u.com/mechanical-properties-of-engineering-materials/

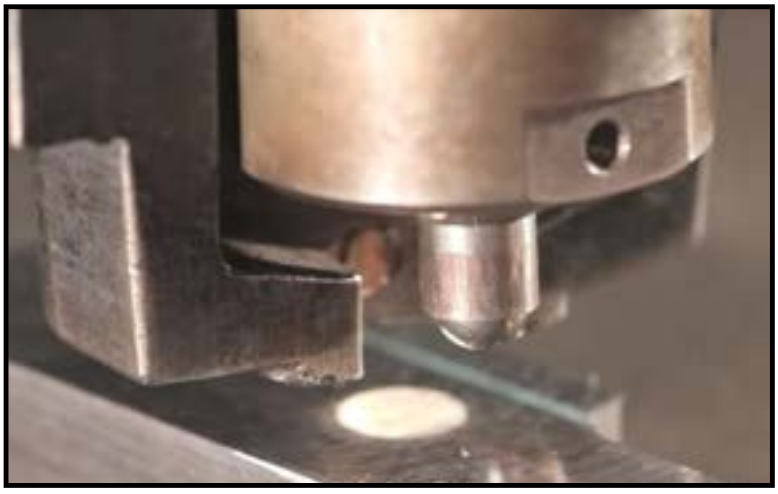
Some of the language is quite technological, and we want to keep this fun. So look at the following videos to work out how these tests can be done in our workshops.

Strength/Toughness

What is happenning to the material here?

Adelio Lopez. (2013). **Strength of Materials Flexural Test.** https://www.youtube.com/watch?v=4un_GHoSvlA

How can we mimic the test at school?



Hardness

What is happenning to the material here?

Hardox Official. (2012). **What is hardness?** https://www.youtube.com/watch?v=6I2yMEVLclc

How can we mimic the test at school?

Hardenability

What is happenning to the material here?

techvid888. (2012). **Hardening and Tempering.** https://www.youtube.com/watch?v=W9w4tj1ETVQ

How can we mimic the test at school?

Brittleness

What is happenning to the material here?

daniel bolanos. (2016). **Dropping a ceramics piece.** https://www.youtube.com/watch?v=itMzw2yYQHU

How can we mimic the test at school?

Malleability/Ductility

What is happenning to the material here?

7activestudio. (2014). **MALLEABILITY.** https://www.youtube.com/watch?v=08mGIgBcscI

How can we mimic the test at school?

Creep and Slip

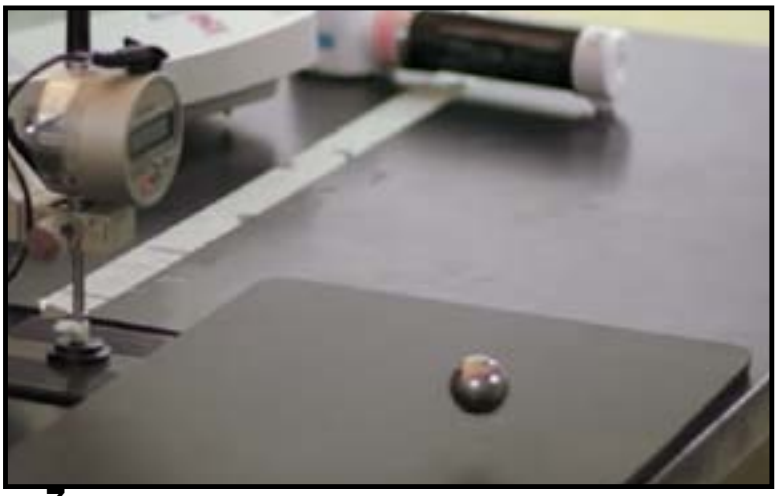
What is happenning to the material here?

Ingrid Geisler. (2015). **How to Roll a Clay coil.** https://www.youtube.com/watch?v=DCsL-Sewqqg

How can we mimic the test at school?

Resilience

What is happenning to the material here?



XRD Tech. (2013). **Test for Yourself the Benefits of PORON® Performance Cushioning.** https://www.youtube.com/watch?v=9XhUm8-nrOI

How can we mimic the test at school?

Fatigue

What is happenning to the material here?

GSeasonSG. (2011). **GS - Altrunium Material Fatigue Test.** https://www.youtube.com/watch?v=-umbMDmAihM

How can we mimic the test at school?

Getting a handle on this? Lets go and do this for real to start to determine the different properties that are present for each category of material!

Tests and Experiments

Use the table below to indicate how the different materials supplied respond to your testing procedures.

		Material						
		Steel	Copper	Ceramic	Perspex	Timber	Plywood	MDF
Classification								
Description Here just record your general observations of what the materials looks and feel like.								
Test	Strength							
	Hardness							
	Harden							
	Brittle							
	Maleabile							
	Creep							
	Resilliant							
	Fatigue							

It is great the we are now starting to understand how materials react under stressful conditions. But how is it to our advantage to have this knowledge and how can it help us in the future? Basically, this information is really of no value unless we use what we have learnt.

What we need to do is evaluate our findings and determine how it can best be used to help us.

For this process, we will be using the ...

d'SLEEKa

... scaffold.

Lets go to the next page so I can explain how it works!

Let's start at the beginning.

Why call it

d'SLEEKa

Now I can give you this fantastic speech about my Italian heritage, but that would be a lie.

The truth is when I read students' work, I find myself naturally using hand gestures as part of the celebration of excellence, or as a way to signal my disgust at a lack of effort. And, when it comes to hand signals, there are no better in the business that the Italians!

Take a look at this video and you will see what I mean!

TempleRome. (2016). **TEMPLE ROME Italian Hand Gestures.** https://www.youtube.com/watch?v=aRdrj153GxY

d'SLEEKa

... stands for:

. d' - Define the factor of design that you are going to be evaluating.

S - Make a statement about how the factor of design applies to your project.

L - Link what you are saying to your developing project ideas.

E - Provide an example to provide a better understanding of what you are saying.

E - Evaluate what you are saying by passing a judgement (this is good or this is a bad situation) and offer a reason as to why you are making this judgement.

K - Indicate what the "Knock-On"effect of this situation means for your project.

a - Show how you will apply what you are saying to help improve your project.

So in this case, we would need to look at how the findings of the testing and work out how we can apply the technique to our learning.

Lets step through it on the next page.

d'SLEEKa

Response to the testing process used to determine material properties:

Define		
Statement		
Link		
Example		
Evaluate		
Knock On Effect		
Apply		

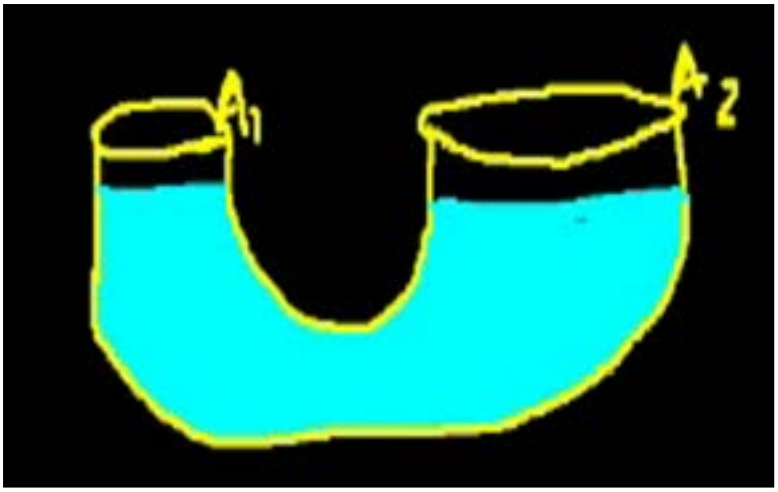
Now for every decision that you make, or every change that you make to your developing idea, you need to tell us what you are thinking by giving us **d'SLEEKa** answer!

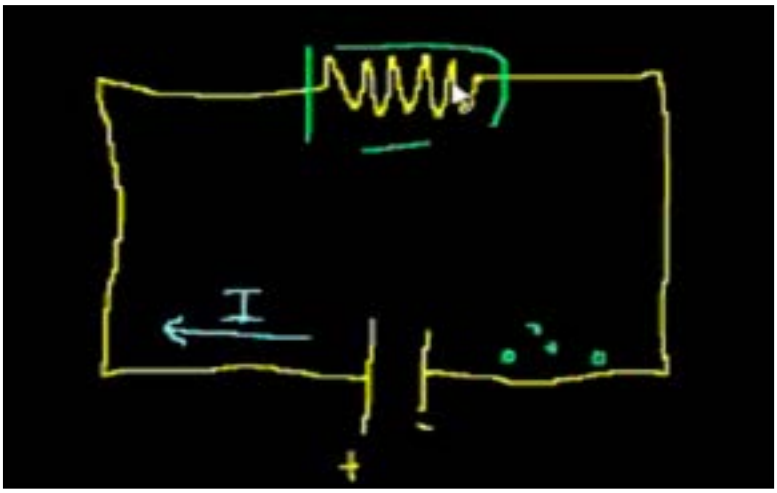
But wait! There is more!

There is so much to learn in this course it is ridiculous!

What about applied scientific concepts like Pascal's Principle?

Khan Academy (viewed 2017). **Pressure and Pascal's principle (part 1).** https://www.khanacademy.org/science/physics/fluids/density-and-pressure/v/fluids-part-1

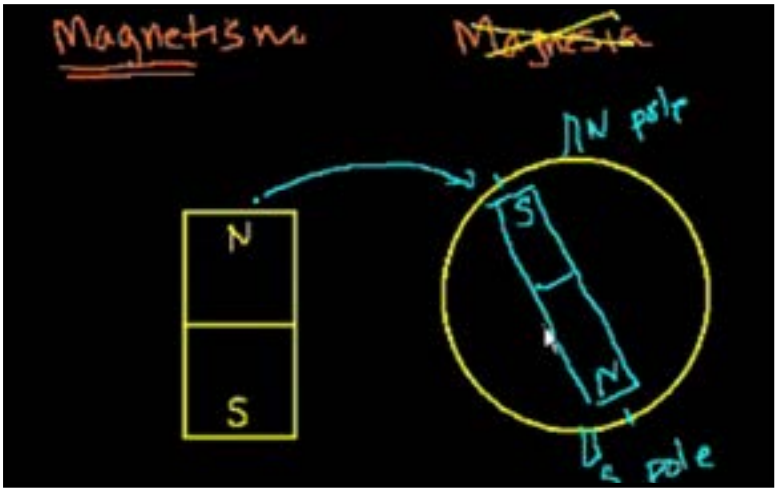


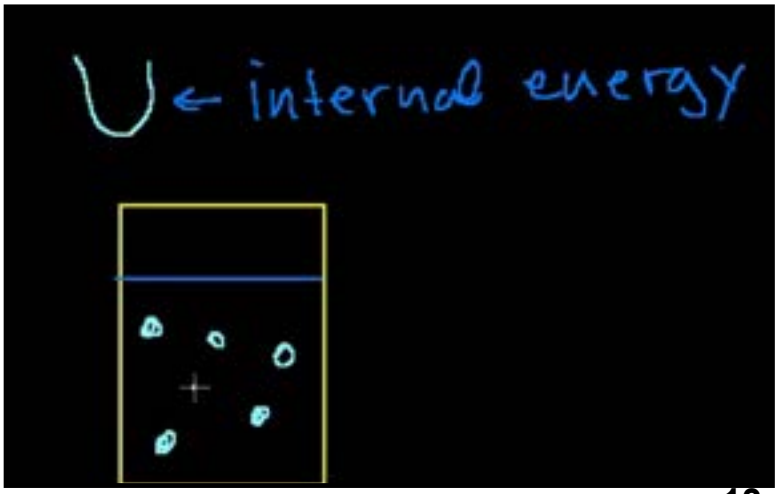


Then there is electricity, magnetism and thermodynamics, which are stand alone concepts of their own!

Khan Academy (viewed 2017). **Introduction to circuits and Ohm's law.** https://www.khanacademy.org/science/physics/circuits-topic/circuits-resistance/v/circuits-part-1

Khan Academy (viewed 2017). **Introduction to magnetism.** https://www.khanacademy.org/science/physics/magnetic-forces-and-magnetic-fields/magnets-magnetic/v/introduction-to-magnetism





Khan Academy (viewed 2017). **First law of thermodynamics / internal energy.** https://www.khanacademy.org/science/physics/thermodynamics/laws-of-thermodynamics/v/first-law-of-thermodynamics-internal-energy

Then there is the math!

Just have a look at these prefixes! It will blow your mind and one day make you wish to be a

SI prefixes

Prefix		1000^m	10^n	Decimal	English word		Adoption[nb 1]
Name	Symbol				Short scale	Long scale	
yotta	Y	1000^8	10^{24}	1 000 000 000 000 000 000 000 000	septillion	quadrillion	1991
zetta	Z	1000^7	10^{21}	1 000 000 000 000 000 000 000	sextillion	thousand trillion or trilliard	1991
exa	E	1000^6	10^{18}	1 000 000 000 000 000 000	quintillion	trillion	1975
peta	P	1000^5	10^{15}	1 000 000 000 000 000	quadrillion	thousand billion or billiard	1975
tera	T	1000^4	10^{12}	1 000 000 000 000	trillion	billion	1960
giga	G	1000^3	10^9	1 000 000 000	billion	thousand million or milliard	1960
mega	M	1000^2	10^6	1 000 000	million		1960 (1873)
kilo	k	1000^1	10^3	1 000	thousand		1960 (1795)
hecto	h	$1000^{2/3}$	10^2	100	hundred		1960 (1795)
deca	da	$1000^{1/3}$	10^1	10	ten		1960 (1795)
		1000^0	10^0	1	one		–
deci	d	$1000^{-1/3}$	10^{-1}	0.1	tenth		1960 (1795)
centi	c	$1000^{-2/3}$	10^{-2}	0.01	hundredth		1960 (1795)
milli	m	1000^{-1}	10^{-3}	0.001	thousandth		1960 (1795)
micro	µ	1000^{-2}	10^{-6}	0.000 001	millionth		1960 (1873)
nano	n	1000^{-3}	10^{-9}	0.000 000 001	billionth	thousand millionth	1960
pico	p	1000^{-4}	10^{-12}	0.000 000 000 001	trillionth	billionth	1960
femto	f	1000^{-5}	10^{-15}	0.000 000 000 000 001	quadrillionth	thousand billionth	1964
atto	a	1000^{-6}	10^{-18}	0.000 000 000 000 000 001	quintillionth	trillionth	1964
zepto	z	1000^{-7}	10^{-21}	0.000 000 000 000 000 000 001	sextillionth	thousand trillionth	1991
yocto	y	1000^{-8}	10^{-24}	0.000 000 000 000 000 000 000 001	septillionth	quadrillionth	1991

quadrillionaire!

Look, there is so much to learn, and while all these theories are great, interesting and important, they will make so much more sense when we bring them to life!

... and have fun while doing it!

So lets get our first project on the road!

Empathize ...

In this part of the folio we will be trying to understand the problem that people face everyday, and the one that we are trying to solve through this design project.

Entry Document

Who are we?

In 2017 there was this new commercial used to promote eating lamb.

Big Sam The Video Man. (2017). **2017 Australian Inclusive Lamb Advert -- 'Australia Day'?** https://www.youtube.com/watch?v=uGdjX8QqL_Y

Now didn't this cause some drama!

Tradtionally, this has been a big push to promote Australia Day, and not once was the national day of celebration mentioned. And that in itself is another arguement ... should it be a day of celebration or one commisorating an invasion?

But it does not stop there! Is it OK to take a shot at the vegetarians? Me, being one, did not find that funny at all! And thank goodness for Dave Hughes quick reply to help set the facts straight!

motboltz. (2017). **Dave Hughes Addresses Australia. No LAMB???** https://www.youtube.com/watch?v=AnSYeojvPOM

But when you sit back and think about it, how can we define our cultural heritage fairly and equally when we are so diverse in nature. Just look around

you at all the people in the room you are sitting in. We are all so different in ideas and beliefs, let alone being defined by a region of the world that we come from. In some cases we do not even know our heritage, so how can we argue the point?

In developing this project, I thought that if I really wish to understand where it is that I come from, then I need to do some investigation. I started asking questions of my mum, and we could trace back who I was for a couple of generations. This was a pretty good start, and I now know that I am “bitza” (bits of this and bits of that), so the gains where quite small.

At the same time, DNA testing was being advertised, which I knew would help me discover my real origins!

This information was hard and true facts about the makeup of who I am. While my DNA says that I am mainly European, I also have undesputable biological traces that put my hertiage out of India and Africa! How cool is that! I knew that my Grandmother was a gyspy, but these results show how far and wide my father’s side of the family travelled for me to finally be able to call myself an Aussie!

Just looking at this research data, and me being a member of our learning community, you can see how far and wide the ideals of culture can stretch. This does not take into consideration my Bogan pride, or my religious beliefs, or even the fact that I am a vegetarian! And, I am only one in a community of one thousand ... what am I supposed to use as a symbol that can be as far reaching as my hertiage and be true to Australian ideals?

REGION	APPROXIMATE AMOUNT
Asia	5%
Trace Regions	5%
Asia South	5%
Europe	93%
Ireland	38%
Europe East	32%
Great Britain	6%
Trace Regions	17%
Italy/Greece	6%
Iberian Peninsula	5%
European Jewish	2%
Finland/Northwest Russia	2%
Scandinavia	1%
Europe West	< 1%
West Asia	2%
Trace Regions	2%
Caucasus	2%

So...

The Driving Question ...

… for this project is:

“How can we use the priciples of STEM to create an engineered represenation of who we are as a community?”

Define

Knows

As a class, develop a list of things that you already know about the project that you are doing. Take a photo of the work completed in class and paste it in the space below.

Need to Knows

I am sure that there are a hundred questions buzzing around in your head about this course that need to be answered. In this section, as a class, develop a list of question that you feel need to be answered in order to reach a good solution to this problem. Think about the projects' design, technological, administrative and STEM learning needs. After developing your ideas as a class. Photograph the work completed with your teacher and paste it in the space below.

Criteria for Success

Now all parts of your folio need to be linked. You have come up with a "need to know" list, and these questions need to be answers. The criteria for success will be used to tell us what will need to be done as evidence that the question has been understood and answered.

Based on the needs to know questions, a successful solution to the problem will be developed if:

Design:

Technology:

Administration:

STEM Ideals:

Action/Time Planning

The following time plan will be used to understand the time requirements needed to finish the project.

	Weeks									
Steps	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Ideate										
Prototype										
Test										
Evaluate										

It is great the we now understand what is required for the project to be a success and the time requirements needed to manage the development of a successful solution, but this information is really of no value unless we use what we have learnt.

Use the “d’SLEEKa” scaffold to evaluate your findings and apply your knowledge.

Ideate ...

So now lets start having some fun in generating idea to help create our final solution. This will involve us doing research, developing original ideas and testing prototypes.

Who are we? The science of life ...

DNA helps to tell us the story of who we are based on the hard evidence of science. In simple terms, it is the blue print, or recipe, for life. Watch the video here to get a better idea of what I mean.

Stated Clearly. (2012). **What is DNA and How Does it Work?** https://www.youtube.com/watch?v=zwibgNGe4aY

While this defines who we are as a physical human being, is that the be all and end all of life?

After a class discussion about defining who we are, write down some ideas that you feel need to be further explored in order to define who we are as individuals, and in a broader sense, who we are as a community.

Forms of Research - Primary versus Secondary

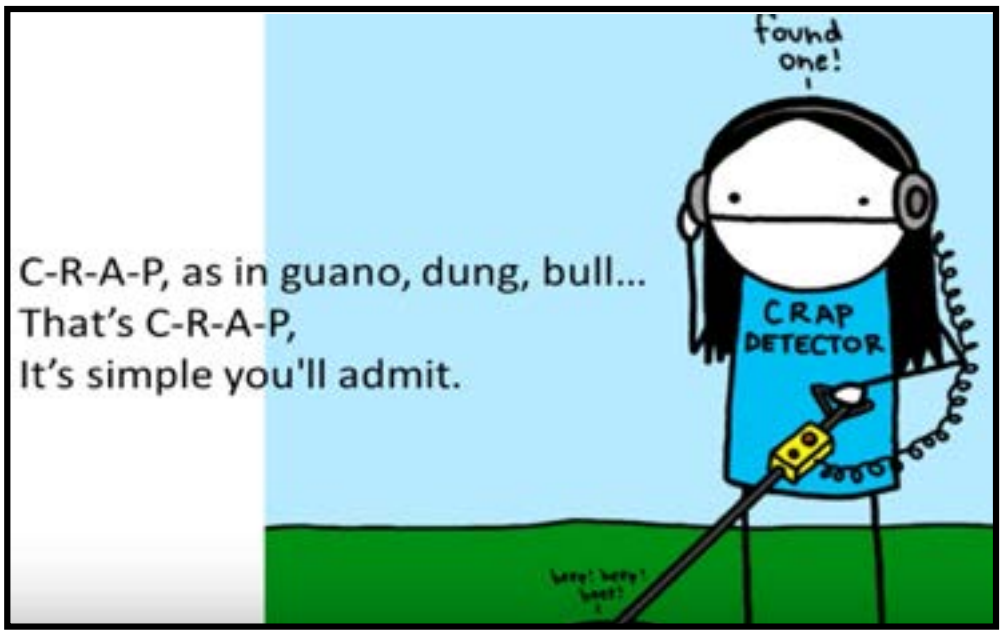
So far we have used two different forms of research to start to understand the problem that we are trying to solve. The first one was **Primary Research**.

Primary Research relates to doing the research first hand. In this case, I interviewed my mum and gathered data that would help clarify and confirm who I am as a member of the community. Furthermore, to better clarify the situation, I went out and got a DNA test to discover who I was.

While the process would have been better if I could have done the analysis myself, the fact is that I instigated and controlled the gathering of data myself, and this was used to cross check what I had already been told. Other forms of primary research also include the tests and experiments that you have done on materials, as well surveys and observation that you will do at sometime in this course.

The other form of research is **Secondary Research**. Secondary look at the data collected by other people and using it to help develop ideas and confirm your findings based on the work of others. In this case, to understand DNA, I got you to watch a video created by an expert in-the field. Now I could pretend to tell you that I am the fount of all knowledge, but that would be a lie, and you need to know that you have to source your information from the best people in the business rather than people who claim they are experts.

With all information, you need to validate what you have been told. This is your course and your project, so it is important that you get your facts from valid and reliable sources. This can best be done by putting it to the CRAP Test.



Dr. Chad Bauman. (2013). **The CRAPpy Song (aka, the C.R.A.P. Test Song).** https://www.youtube.com/watch?v=CMaLgec2XWY

Believe it or not ... well actually I hope that you do not believe me as I am hoping that you will challenge everything that I say as a true scientist would in their search for answers ... the C.R.A.P test is what the teach at university level to ensure that information being collected is valid and reliable. To be the bets that you can be, you need to check and ensure that accuracy of your sources.

So lets start putting this all to work.

Secondary Research - Who is our College?

Start looking at year books and do some Internet research on who we are as a school. Jot down any ideas that you think we could explore to help establish our community culture.

Primary Research - Who am I?

Go home and talk to your family members to discover first hand your family history and the stories of who you are as a human being. In the space below, jot down any findings that you find important or interesting that we can use to inspire us in solving the problem.

Primary Research - Who are we as a school community?

After a class discussion about what makes us whole human beings, jot down some ideas that we can use to help inspire our developing design. Do not stop at thinking just about our human make up, here we are going beyond science to find out what the fabric of our culture is.

d'SLEEKa Evaluation

Use the "d'SLEEKa" scaffold to evaluate the data that you have gathered and how you can apply it to the class project.

Class Resolution

After discussing all of the ideas being developed by the class, use the space below to state the class consensus of what the inspiration for our class project will be.

Expert Session - Mathematical Probability

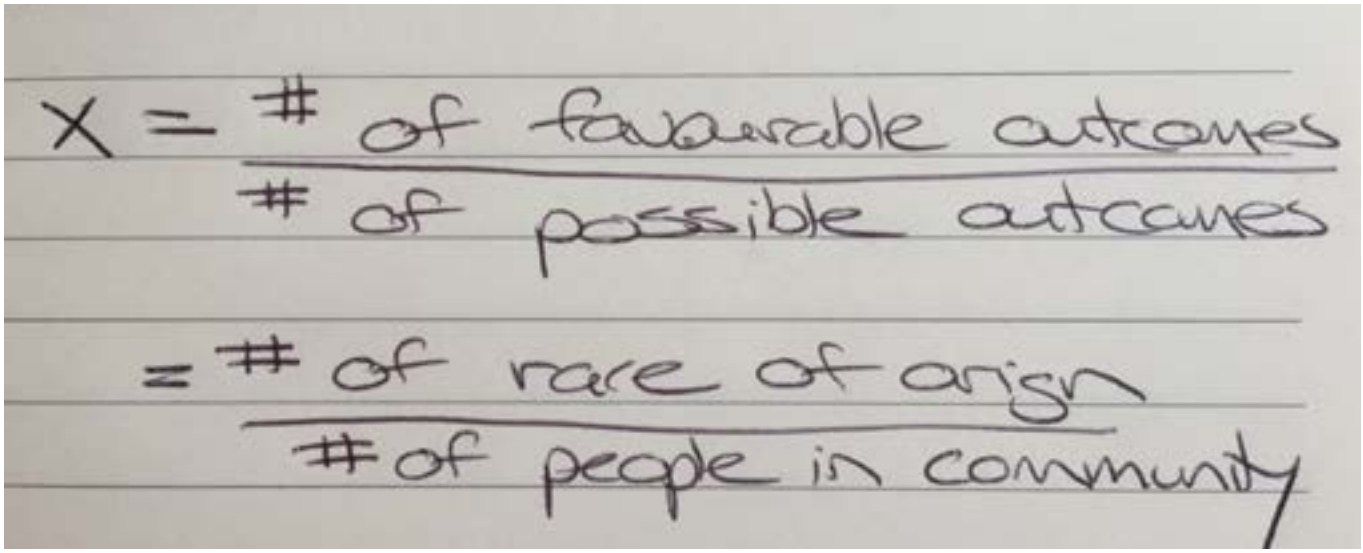
So we have down the scientific research to help start to develop ideas. But what is the probability of this data being representative of the whole school community? While we are a group of twenty-five people in a class, can we verify that this is an accurate cross section of the school when there are about a thousand people in our community? Will the developing idea represent us all?

This is where we need to use math to ensure that we are taking all of us into account. Lets look at probability to start with ...

eHow. (2012). **How to Teach Probability With M&Ms : Math Education.** https://www.youtube.com/watch?v=ijbuU75wiVo

Now to do this accurately there would be 1000's of hours of work. We would have to interview every student and their parents to discover what their make up is and what the cultural affect of their being looks like. Otherwise, based on the small section that we have done the work on, that is our class, we can estimate through probability equations what our community looks like.

So if you have decided to make your project based upon the origins of the individuals' race, the equation would look like this:



Using the space on the next page, develop an equation that is specific to your area of research to determine the probable number of people in the school that fit the cultural profile that our class is exploring.

After a class discussion and an overall consensus, confirm that the equation above is agreed upon to be used by all class members. Now lets go out and collect the data to make this math work in the real world... How? Well you guys can work that out!

Develop a plan as a group as to how the data can be collected, divide the workload up, and put it into action! Use the space below to state the plan of attack and the results that you have found by conducting your research method.

Whoo Hoo!

We have a number that we can use! But what can we do with it? Have a look at this definition of fractions relating to solids.

Waterford Institute. (2011). **Fractions of Regions Song.** https://www.youtube.com/watch?v=d96clBxPP0I

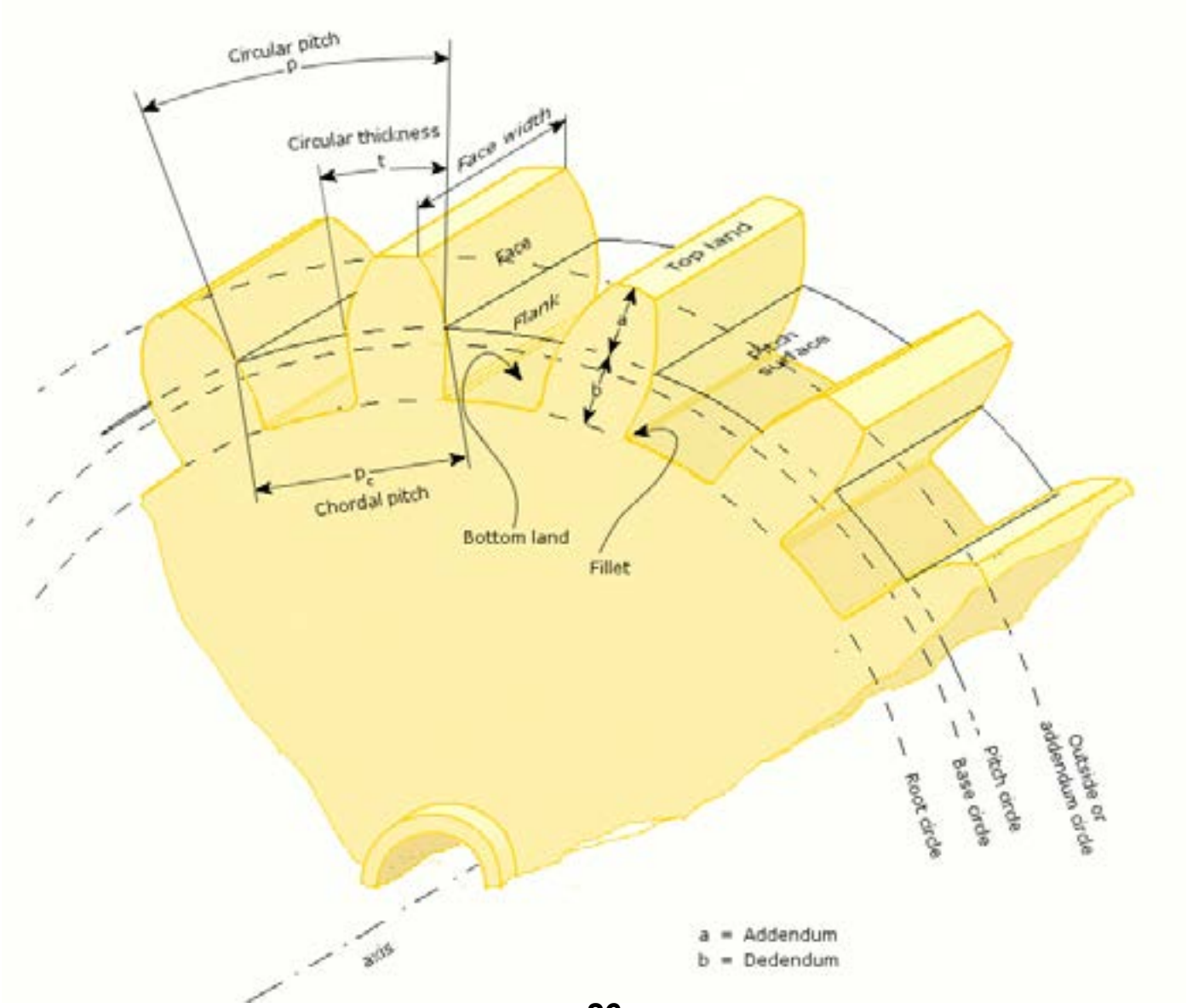
We are now starting to get into divergent thinking ... we have a fraction based on our probability research, but how can we make this directly linked to our project. Let me explain it this way, if the denominator represents the size of the whole project, how big should the part that you are researching be? Use the space below to show your mathematical working to explain how you have obtained your answer.

Expert Session - Engineering Mechanics

In all of this we need to tie in some engineering principles. One on the items that we use everyday to make life easier are gears. They are in motors everywhere, and help make our progress easier and more accurate. So what are gears?

Nishant Kumar. (2013). **working of all type of gears.** https://www.youtube.com/watch?v=uFjVWIyv6lU

The first part of this video is a fantastic explanation of how gears were developed from the simple ideals of using a lever. There are some very clever people out there to have worked all this out!

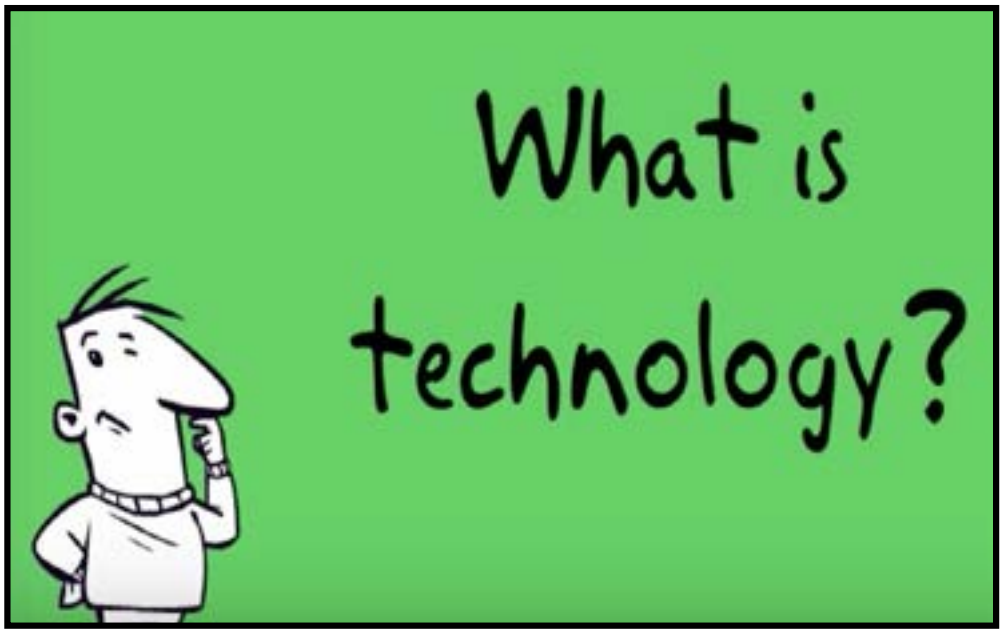


As we start designing and engineering our product, we need to make sure that we use the same language. We have a starting point for the size of the cog that we will be creating based on the mathematical fractions being used. However, we can do so much more with designing our product through the use of additional gears and levers. For example, speed could be representative of power in the community, so you need to decrease the number of teeth that you wish to use. You may also feel that you wish to join your gear to another persons. In this case you really need to talk the same language so that all turning components are synthesised and work together. Use the space below to sketch and work out what is is that you wish your cog to do, which best represents the cultural profile of your representative group.

Take measurements of the parent gear created by your teacher, and the overall initial structure holding all of the components, so that you can start to work out how your cog can connect to the project and those being developed by your fellow students.

Expert Session - Nature of Technology

So here is the $40,000 question ... What is technology?



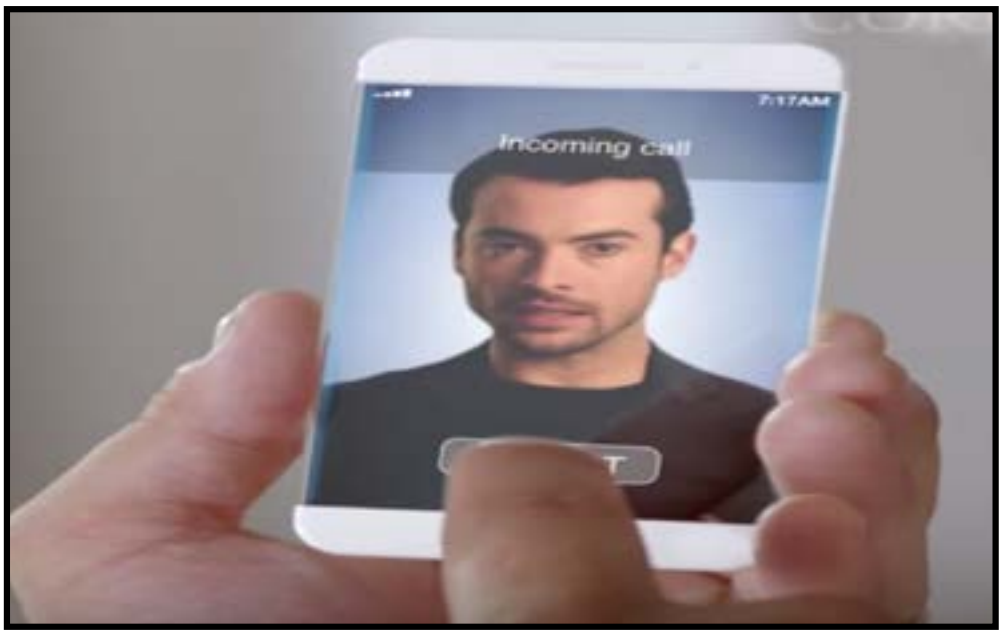
Tony Montez. (2014). **What is Technology?** https://www.youtube.com/watch?v=Giiz81_uzK8

The truth is that we bandy about this word technology around so much that we forget what it really means. In simple language, and just like the video stated. However, as Designers and Engineers we need to also consider what we are doing to our world, thus the definition from the video needs to be expanded. For the purpose of this course we will define

Technology as being ...

... anything that has been created by humans that helps make our life easier and/or solve problems for the benefit of the world that we live in and all of its inhabitants.

So lets look at some technology in action to confirm this ideal.



Corning Incorporated. (2012). **A Day Made of Glass 2: Unpacked. The Story Behind Corning's Vision.** https://www.youtube.com/watch?v=X-GXO_urMow

What can we access now?

The biggest problem that all technology teachers have is that we are expected to teach for tomorrow when it does not exist!

Lets pull this video apart ... what did you see in the video that actually exists in society today? Use the space below to record you findings.

Now the above exercise was about what we have seen in the community, but what technologies do we have at school that can help us create our projects? Go on a tour of the school facilities to see what is available to us and record you finding in the space below.

So now lets start having some fun in generating idea to help create our final solution. This will involve us doing research, developing original ideas and testing prototypes.

Factors of Design

For all that we do in design, we need to consider the factor that can affect the solution that we are developing. For example, with an engineered artistic installation, we need to think about how we can make it aesthetically appealing to the viewer. In the space below, answer any outstanding “Need to Know” question, consider our PALS in this project and also anything else that you wish to say throgh the developing artwork.

Aesthetics

Socio-Cultural Ideals

PALS Ideals

Outstanding Needs To Know Questions

So we have started thinking about the factors of design, but that is not enough! What does this new information mean to our developing solution? Time to write a d'SLEEKa evaluation.

Use the space below to evaluate your factor of design research and PALS information to show how it will help to improve your developing solution.

WHS

In everything that we do we need to be safe! While using technology does not look like much, there is a whole lot that we need to understand about being safe in its use.

OnGuard Safety
MAKING SENSE OF WORKPLACE SAFETY TRAINING

First thing that you need to do is your OnGuard Safety Test. These tests will help us understand the basic expectation of classroom safety that are specifically related to the technology that we are using.

So click on the link below and follow the prompts to get your safety test!

http://tinyurl.com/zshjc54

The tests that you are required for this course are:

- Computing in Australian Workplaces
- Workplace Safety Signs
- Risk Management Principles in Australian Workplaces
- Manual Handling
- Introduction to PPE
- General Machine Safety
- General Workshop Safety
- Workplace Safety Signs
- Laser Cutter

- 3D Rapid Prototype Printer
- 3D Bench Milling Machine
- Wood Machine Safety
- Woodworking Hand Tools
- Finishing Materials

After you have completed your tests, your teacher will demonstrate the finer points of the safety test so that you can better understand what is to occur, as well as watch you in action in order to deem you competent and able to work independently using the stipulated technology.

Expert Session - CAD/CAM Technologies

Your teacher is going to lead you through a series of CAD/CAM learning experiences that you will need to successfully develop your project. In your journals take detailed notes of what you have learned, and in the space below, place images from your journal as evidence of you completing the exercises.

Final Ideas

Use the space below to indicate the final ideas that you wish to create for your project. Place in the space below images of your development sketches and your CAD ideas as evidence of the work that you have completed.

Pitching Your Idea

While your CAD drawings are an excellent starting point, some people will not understand them. This is where PALS really kicks in. In the space below place a rendered image of what it is that you wish to create and annotate your drawing to provide greater meaning to the viewer. To complete your work here, do a d'SLEEKa evaluation to indicate the reasons for your final design.

Prototyping

So we are ready to go! So what are you waiting for!

Using the technology available to you, develop models and prototypes of your ideas to make sure that it will work! Use the space below to document your finding and achievements in photographic and written formats.

Developing your design

In this section of your folio, you are to journal how you have created your coded game. Use the space below to indicate the steps that you have taken in creating your project. This is best updated every week to ensure that you keep your project on track and it will be used as evidence to support your efforts in creating your solution.

Week/Step Taken	Description of work completed	Photo of Progress
1		
2		
3		
4		

5		
6		

Once your project has been completed, write a d'sleeka response to indicate where you feel you have done really well in this task and what you where you think you could improve.

Testing

Before any product is completed, it really needs to be tested to ensure that all is in working order. For example, there would be nothing worse than discovering that your gear cog actually stops the whole installation working! If a component was found lacking in anyway it needs be changed to ensure greater success. The same must be done for the gear cog that you are creating. Put your cog into the gear chain and ensure that it is working correctly with all other components.

Have your peers look at your work and ask them to see if everything is in working order and if they feel that it is presented in a professional manner. Use the space below to record their thoughts and the steps that you will be taking to improve your final product prior to submission for grading.

Evaluation

If you have reached this page, you will find that you have come to the end of your project.

Congratulations!

However, there is still a little bit of work to be done. There may come a time where you will have to do another game project and it would be great to look back on this page to obtain some handy hints on how you could do this project better.

Using the d'sleeka response scaffold, write an evaluation that sums up how you went in this project. Think about what you would have done differently, which could have improved your overall results.

One more step ...

Make sure that you submit this document in the manner prescribed by your teacher so that you can be awarded the grade that represents your efforts in this course to date!

Word List ...

The following words need to be understood in order to understand what is being learnt and how we are required to answer questions being posed.

Term		Definition
STEM		
iSTEM		
Investigation		
Systematic		
Measurement		
Formulation		
Testing		
Modification		
PALS		

Term		Definition
Hypotheses		
Properties		
Mechanics		
Electricity		
Magnetism		
Thermodynamics		
Statics		
Dynamics		
Modelling		
Evaluation (dSLEEKa)		
Collaboration		

References

This text could not have been possible without specific academic knowledge taken from referenced sources, and the generosity of Creative Commons and all of their contributors.

electrical4u.com. (2017). **Mechanical Properties of Engineering Materials.** http://www.electrical4u.com/mechanical-properties-of-engineering-materials/

ME Program. (2016). **iSTEM. Version 3.** NSW Board of Studies Teaching and Educational Standards (BOSTES). NSW Endoresed Course Stage 5. Hunter Regional Development.

Images

Andreyyshore. (2010). **File:EuroAustralia.svg.** https://commons.wikimedia.org/wiki/File:EuroAustralia.svg

Dupain, M. (1937). **Sunbaker.** Wikipedia. https://upload.wikimedia.org/wikipedia/commons/b/b9/Sunbaker_maxdupain_nga76.54.jpg

Flickr. (2017). **Start Now.** https://encrypted-tbn1.gstatic.com/images?q=tbn:ANd9GcTLPqIBkugqnra_-evh5bqXXknFDCTBZHlzYSgLNJsVgJwYs4kX

Galvez, E. (2014). **Asking the right questions: Resources for your survey strategies.** https://blog.wikimedia.org/2014/06/10/asking-the-right-questions-resources-for-your-survey-strategies/

geralt. (2014). **Industry/Craft.** https://pixabay.com/p-551263/?no_redirect

Kurious. (2017). **Australian Fingerprint.** Pixabay. https://pixabay.com/p-653164/?no_redirect

Sushanta Kumar Sahu. (2017). **Material Classification.** https://sengerandu.wordpress.com/

Wikimedia Commons. (2006). **File:Gear words.png.** https://commons.wikimedia.org/wiki/File:Gear_words.png

Wikipedia. (2017). **Artwork depicting the first contact that was made with the Gweagal Aboriginal people and Captain James Cook and his crew on the shores of the Kurnell Peninsula.** https://en.wikipedia.org/wiki/Indigenous_Australians

Wikipedia. (2017). **List of SI Prefixes.** https://en.wikipedia.org/wiki/Metric_prefix

Videos

7activestudio. (2014). **MALLEABILITY.** https://www.youtube.com/watch?v=08mGIgBcscI

Adelio Lopez. (2013). **Strength of Materials Flexural Test.** https://www.youtube.com/watch?v=4un_GHoSvlA

Big Sam The Video Man. (2017). **2017 Australian Inclusive Lamb Advert -- 'Australia Day'?** https://www.youtube.com/watch?v=uGdjX8QqL_Y

Corning Incorporated. (2012). **A Day Made of Glass 2: Unpacked. The Story Behind Corning's Vision.** https://www.youtube.com/watch?v=X-GXO_urMow

BroganSpots. (2012). **Interview - STEM**. https://www.youtube.com/watch?v=8V8EjEzIpkg

daniel bolanos. (2016). **Dropping a ceramics piece.** https://www.youtube.com/watch?v=itMzw2yYQHU

Dr. Chad Bauman. (2013). **The CRAPpy Song (aka, the C.R.A.P. Test Song).** https://www.youtube.com/watch?v=CMaLgec2XWY

eHow. (2012). **How to Teach Probability With M&Ms : Math Education.** https://www.youtube.com/watch?v=ijbuU75wiVo

GSeasonSG. (2011). **GS - Altrunium Material Fatigue Test.** https://www.youtube.com/watch?v=-umbMDmAihM

Hardox Official. (2012). **What is hardness?** https://www.youtube.com/watch?v=6I2yMEVLclc

Ingrid Geisler. (2015). **How to Roll a Clay coil.** https://www.youtube.com/watch?v=DCsL-Sewqqg

Khan Accadamy (viewed 2017). **First law of thermodynamics / internal energy.** https://www.khanacademy.org/science/physics/thermodynamics/laws-of-thermodynamics/v/first-law-of-thermodynamics-internal-energy

Khan Accadamy (viewed 2017). **Introduction to circuits and Ohm's law.** https://www.khanacademy.org/science/physics/circuits-topic/circuits-resistance/v/circuits-part-1

Khan Accadamy (viewed 2017). **Introduction to magnetism.** https://www.khanacademy.org/science/physics/magnetic-forces-and-magnetic-fields/magnets-magnetic/v/introduction-to-magnetism

Khan Accadamy (viewed 2017). **Pressure and Pascal's principle (part 1).** https://www.khanacademy.org/science/physics/fluids/density-and-pressure/v/fluids-part-1

motboltz. (2017). **Dave Hughes Addresses Australia. No LAMB???** https://www.youtube.com/watch?v=AnSYeojvPOM

Nishant Kumar. (2013). **working of all type of gears.** https://www.youtube.com/watch?v=uFjVWIyv6IU

Stated Clearly. (2012). **What is DNA and How Does it Work?** https://www.youtube.com/watch?v=zwibgNGe4aY

techvid888. (2012). **Hardening and Tempering.** https://www.youtube.com/watch?v=W9w4tj1ETVQ

TempleRome. (2016). **TEMPLE ROME Italian Hand Gestures.** https://www.youtube.com/watch?v=aRdrj153GxY

Tony Montez. (2014). **What is Technology?** https://www.youtube.com/watch?v=Giiz81_uzK8

Waterford Institute. (2011). **Fractions of Regions Song.** https://www.youtube.com/watch?v=d96clBxPP0I

XRD Tech. (2013). **Test for Yourself the Benefits of PORON® Performance Cushioning.** https://www.youtube.com/watch?v=9XhUm8-nrOI