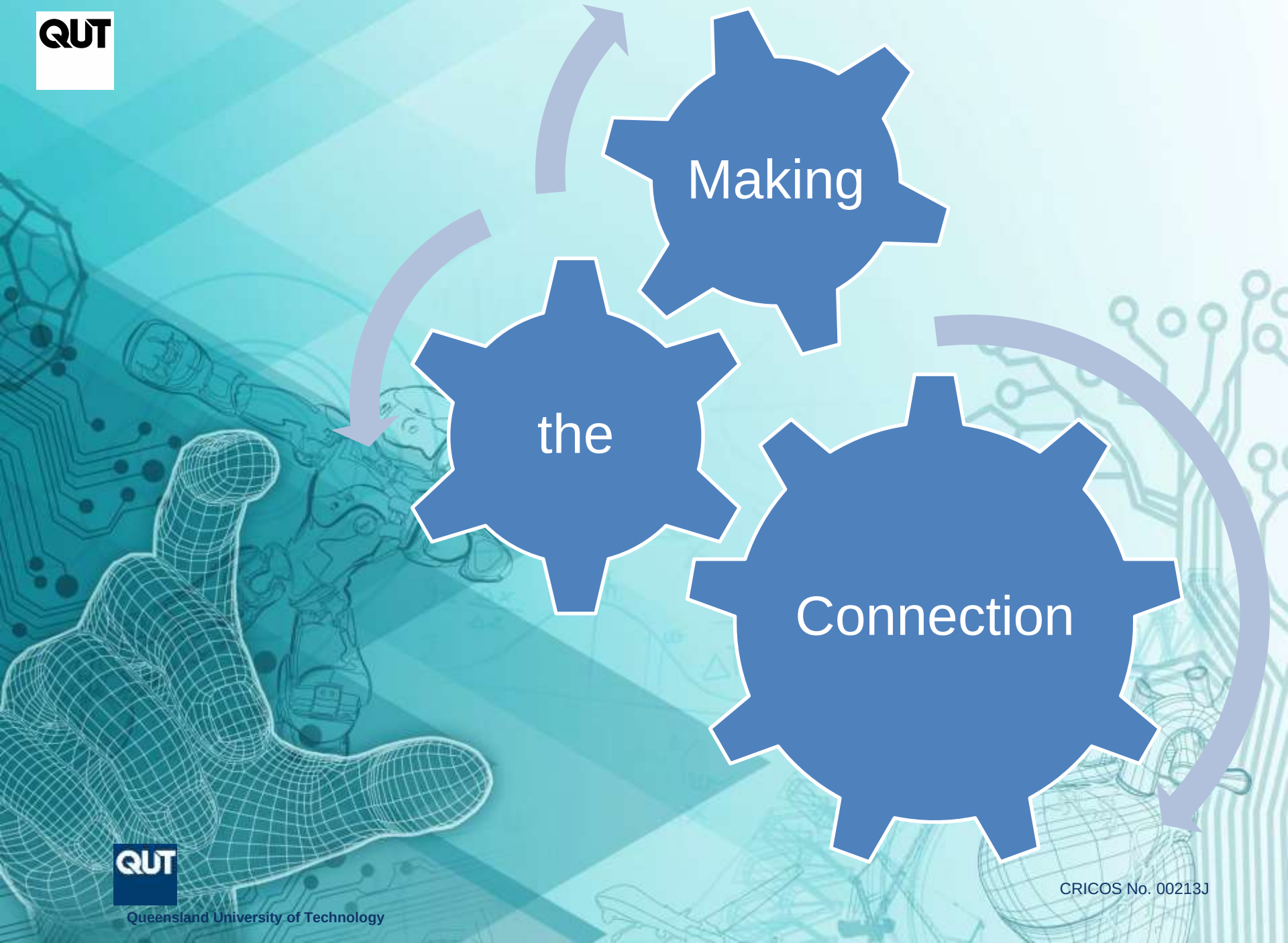

Making
the
Connection

For the first time in a decade, Queensland school girls are studying the hardest level of maths at a rate above the national average.

The Courier-Mail Sep 15, 2017

Sadly this is 7.2%,

putting them just above the national average of 7%.

How do we have between 25-30% of our students selecting Maths C? Six times the number in 2006.

STEM for Schools

We offer fully-funded on-campus experiences to high school students that aim to educate and inspire them to consider STEM careers.

1. Workshops:
    - On-campus for high school classes of up to 32
    - Half day or full day
    - Curriculum linked
    - Includes 30 min Cube Experience
2. Teacher Professional Development
    - Based on our workshop discipline areas
3. Events
    - VC STEM Camp and Internships
    - On-campus multi-school events

QUT Research Internships

- 5 day university experience with two days of work placement
- Year 12 students undertake work experience under mentorship of top QUT scientists
- In 2018 we expanded to 46 students from 160 applicants
- Across five QUT world-class research institutes

During mid-semester one break

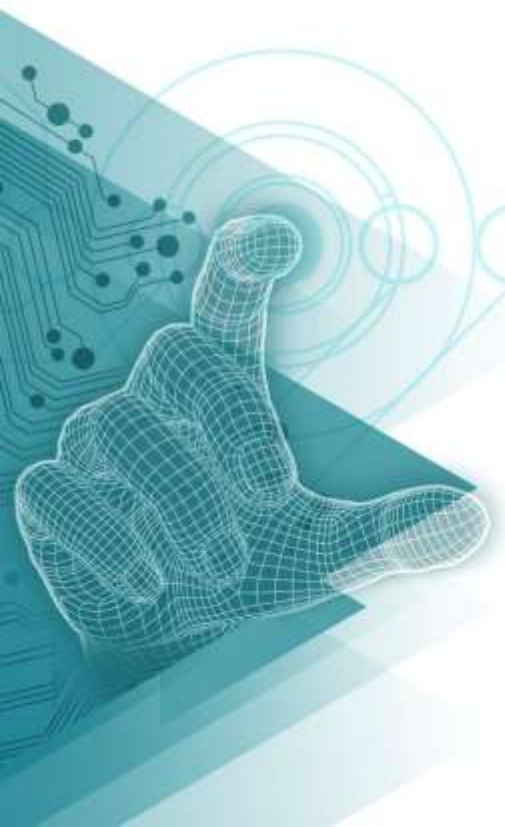
VC STEM Camp

Our flagship annual 5 day research camp for 160 high-achieving Year 11 students.

- Fully-funded including travel and accommodation for 80 regional students
- 10 cutting-edge STEM research projects led by QUT academics
- STEM research projects include
  - 3D printing body parts
  - Robotics and unmanned flight
  - Renewable energy, environmental engineering
  - Pharmaceutical sciences
  - Exercise science
  - Applied and computational mathematics

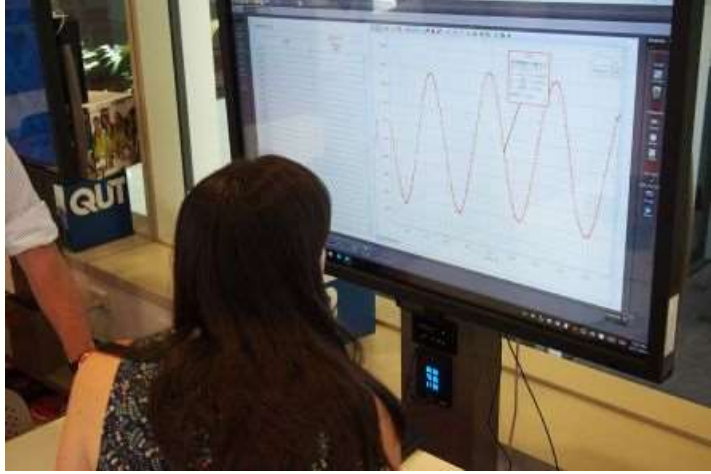
During mid-semester two break

Other events



- Applied Maths Seminars
- STEM Careers Subject Selection
- National Youth Science Forum
- The ConocoPhillips Science experience
- Science and Engineering Challenge-At Southbank during World Science Festival
- Power of Engineering
- QMEA STEM 4 School Kids
- Australian Youth Aerospace Forum
- Oodgeroo SID Winter School Camp
- The Engineering Link Project
- Women in IT Student Event Day
- STEMfest
- Café Scientifique
- QMEA energy for the Future
- National Science Week

Putting the M in STEM



Green energy: big data (Year 7-9)

Maths and engineering work together to achieve a greener built environment.

Modelling science data (Year 10-12)

Collect real data using motion sensors, fit mathematical models to represent the data and test the quality of the fitted model as a fair and accurate representation.

Aerodynamics and modelling lift with MATLAB (Year 11-12)

This hands-on workshop demonstrates how Maths is fundamental to flight.

Alan Finkel suggests METS?

Maths is the prerequisite to everything

or as Galileo said,

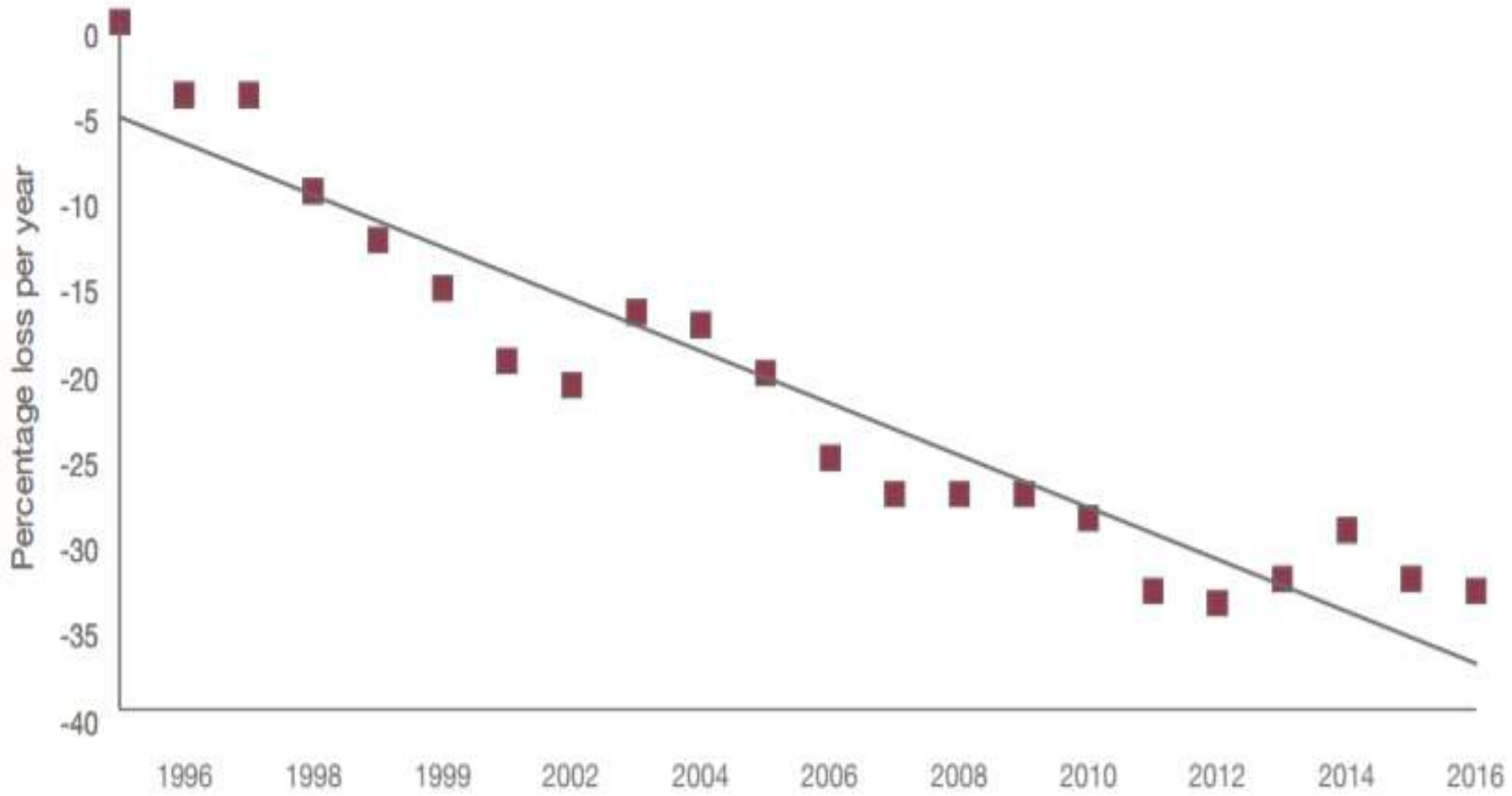
Nature is written in Mathematical language

- 14% of Australia's Science degrees have Yr 12 intermediate Maths as a prereq!
- 12 unis don't require any Maths to enrol in Science
- 18 don't require any Maths for Commerce
- 59% of engineering degrees have a Maths prereq.

http://amsi.org.au/wp-content/uploads/2015/11/The_Update_10_15.pdf

Percentage decline in proportion of students choosing advanced Mathematics

Michael Evans and Frank Barrington, Year 12 Mathematics Participation Rates in Australia, data collection commissioned by AMSI

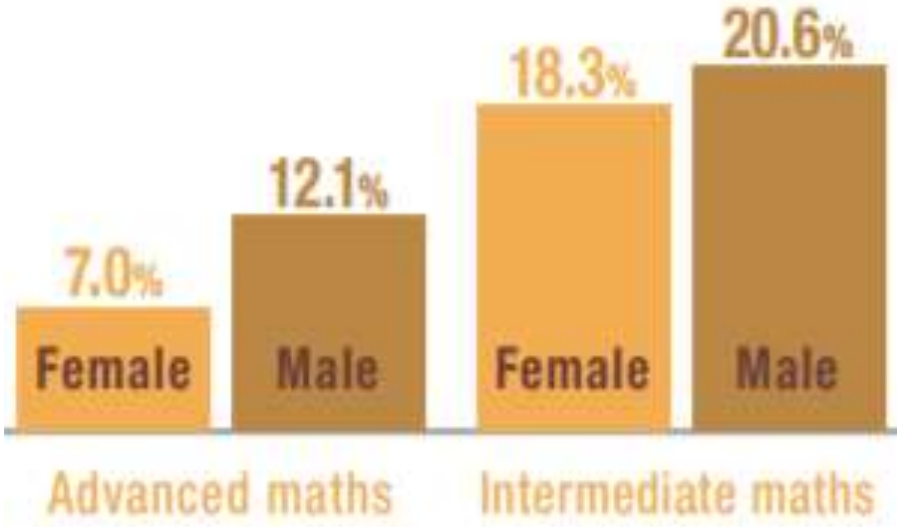


Alan Finkel suggests METS?

- Implications for schools around making Mathematics compulsory
- 26% of Yr 7-10 Maths teachers are not Maths qualified
- Half of Australia's Yr 8 students dislike Maths, compared to 38% internationally

https://amsi.org.au/wp-content/uploads/2017/10/discipline-profile-2017-web.pdf

TIMSS, 2015 Extracts Exhibit 10.4.



2016 Mathematics participation proportions

PISA results and the big ideas

The lowest achieving students were those who tried to memorise lots of methods

The highest achieving students were those who approached maths by

- thinking about big ideas
- thinking about how Maths related to the world
- thinking about what they knew and didn't know

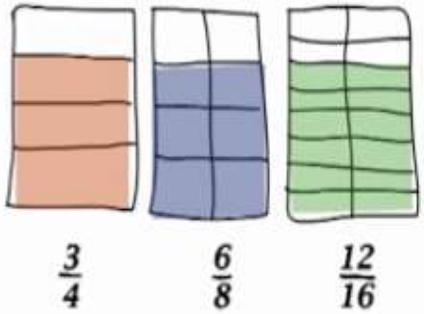
How to Learn Math: For Students

ENROLL IN EDUC115-S

Some fractions are equivalent, here are 3:

$\frac{3}{4}$ $\frac{6}{8}$ $\frac{12}{16}$

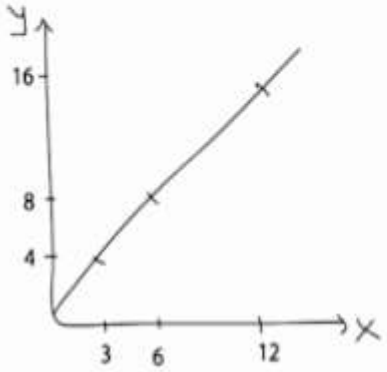
they are called equivalent because they have the same relationship

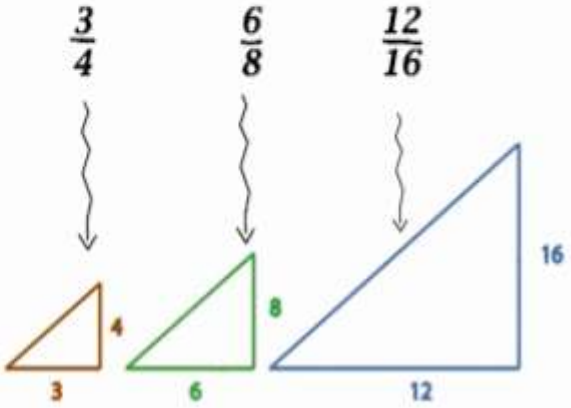


$\frac{3}{4}$ $\frac{6}{8}$ $\frac{12}{16}$

The fractions cover the same area on the same size rectangle

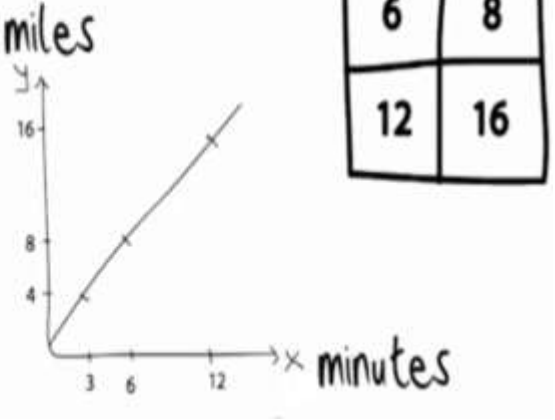
When we graph our 3 points draw a line and every point on the line has the same relationship, or rate which is 3:4

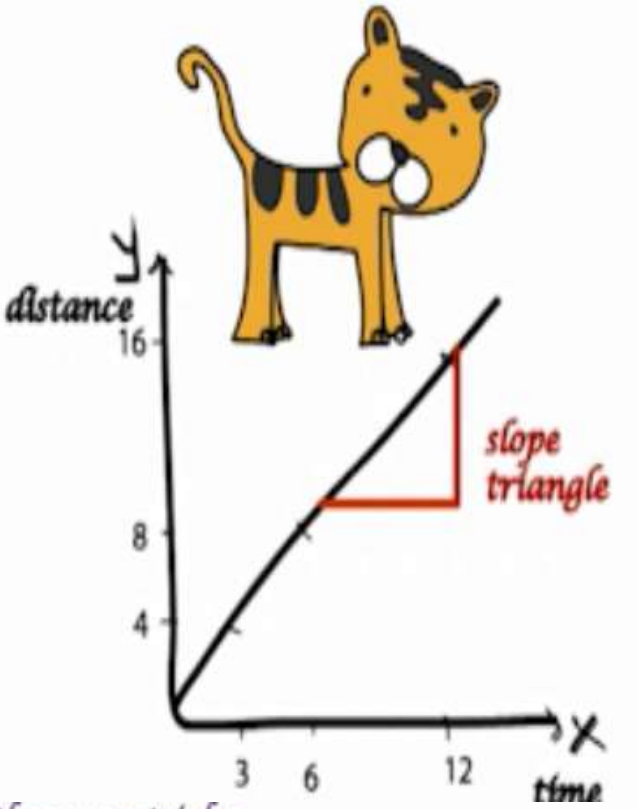




Mia graphs the rate

mins	miles
3	4
6	8
12	16



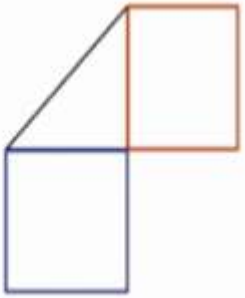


And she writes an algebraic expression for the rate....

$$y = \frac{4}{3}x$$

our numbers are Pythagorean triples

Pythagoras lived in Greece, he noticed that when we have a right-angled triangle



The areas of the 2 squares of the 2 sides of the triangle add up to the area of the square on the hypotenuse.

Singapore Mathematics System

PISA Maths Singapore 564	Australia 494	Av 490
TIMSS Singapore top at 621	Australia 505	Av 500

- Topics are cyclically taught with multiple representations and less review using Concrete-Pictorial-Abstract (C-P-A) approach
- 2013 Maths syllabus revamped to focus on making connections and application, Science in 2014

Bar Modelling Proportion

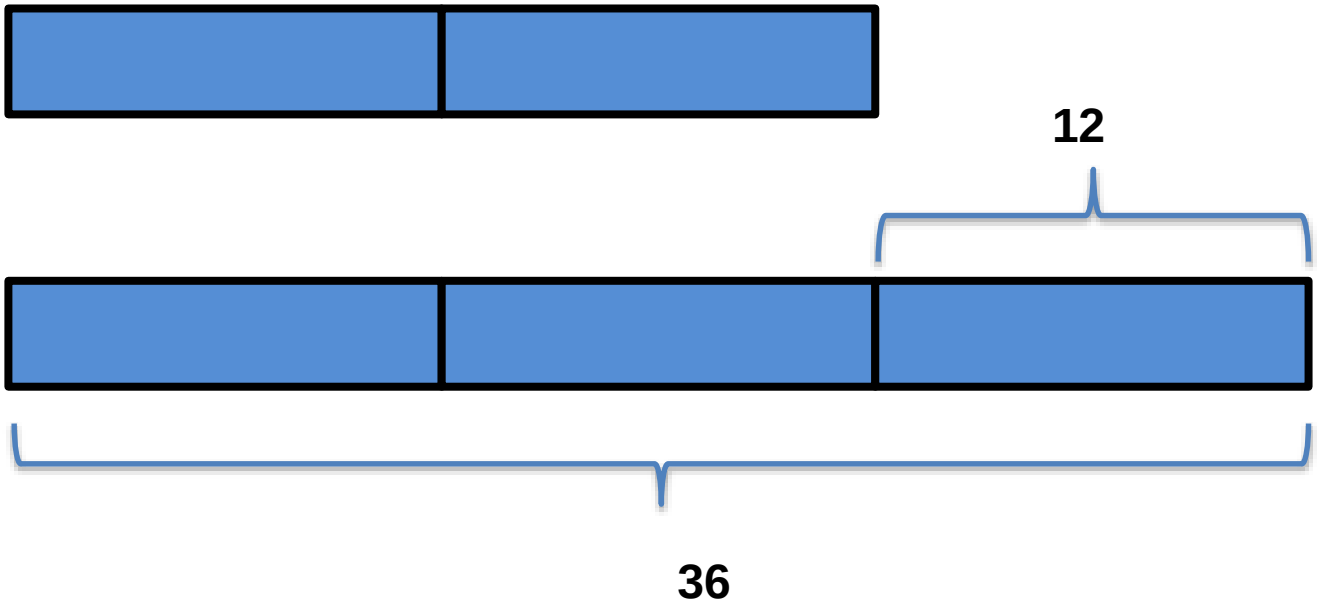
Take a bar (strip of card) and a paperclip

Your strip represents 1 metre

- Show me 50cm
- Show me half a metre
- Show me 20cm
- Show me 80cm
- Show me 70cm

The Bar Method

Tim and Sally share marbles in the ratio of 2:3
If Sally has 36 marbles, how many are there altogether?



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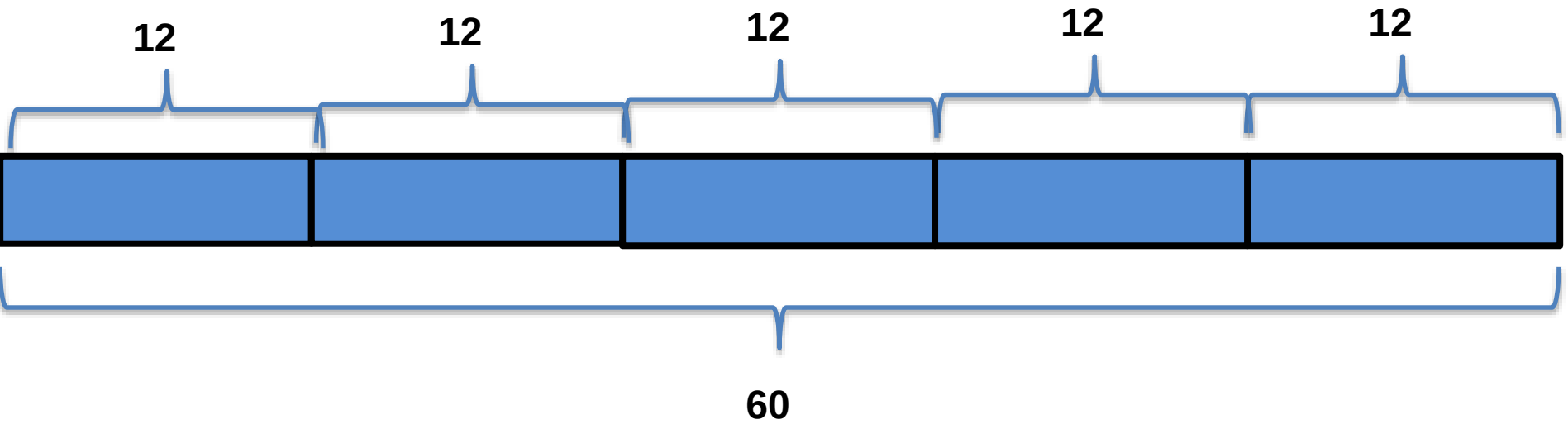


The Unitary Method

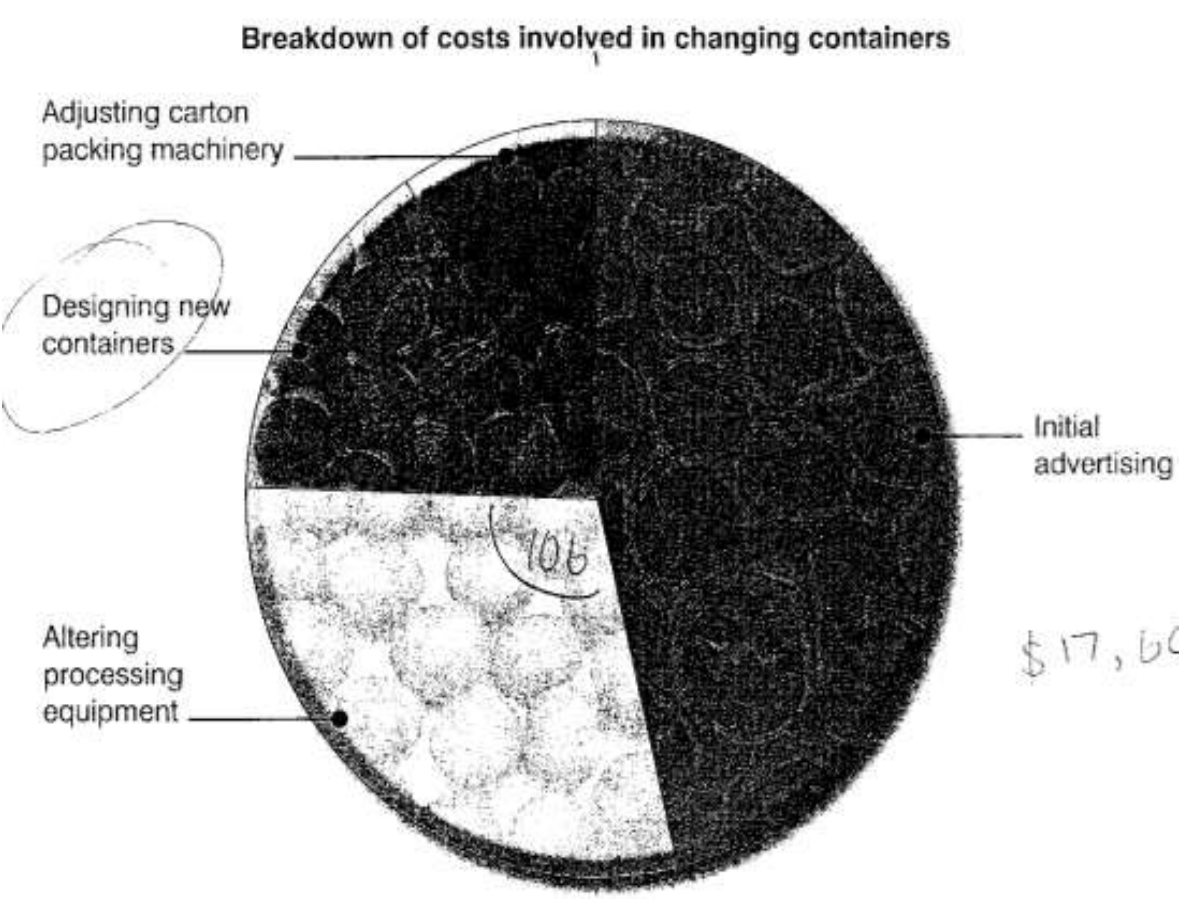
Breaks any relationship down to one unit then make it in to any amount

For example our previous Q

Tim and Sally share marbles in the ratio of 2:3

If Sally has 36 marbles, how many are there altogether?

Tim	Sally
2	3
÷ 3 × 36	1 ÷ 3 × 36
24	36



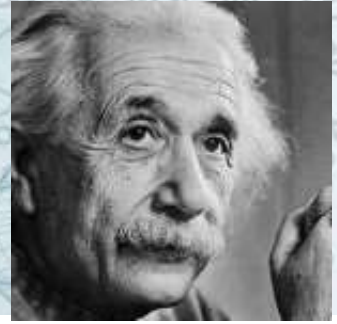
The cost of advertising was given as $115 000. Use this information to find, as accurately as you can, the cost of designing the new container.

$	°
115 000	167
÷ 167 × 55	1
37 874.25	55

÷167

× 55

Neurons vs Astrocytes



- Einstein's brain had unusually large and more complex astrocytes and lowest ratio of neurons
- Astrocytes are critical to all mental activity, controlling every phase of synaptic function - their formation, neuroplasticity, normal function, and their pruning
- Neurons build memories (knowledge elements)
- Astrocytes build conceptual frameworks of understanding

Conceptual Approach

Switch from a simple outcome of learning and remembering discrete knowledge to being able to apply an understanding of the core concepts

http://www.learningnetwork.ac.nz/shared/professionalReading/MTWS12012.pdf

	Reading & Writing	Driving a car
Hours of practice	1000's	3-75
Teacher training & competence	degree or better	zero -minimal
Educator strategic planning and preparation	Extremely high with ongoing professional development, reading/research and peer assistance combined with government standards	Zero-minimal
Success rate	Variable range from 40-75%	99.85%
Life test (capability after years of training)	20-40% (brighter the better)	99.9% (The accident rate seems independent of intellectual ability but on a personal note I would rather the apprentice drive me around than the university professor!)

Connecting Inquiries

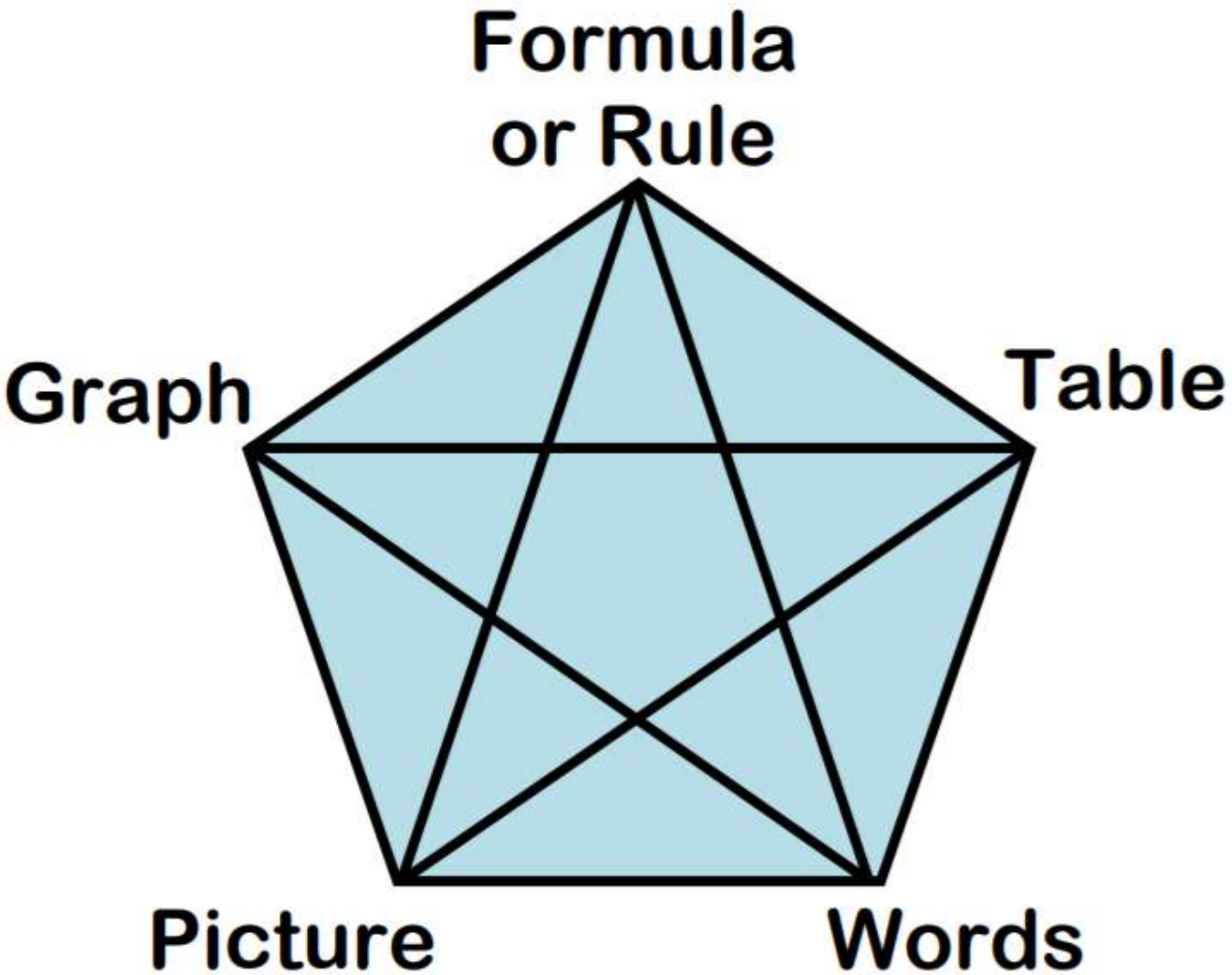
Linear modelling, functions, proportionality, rates and ratio activities

1. How long is a piece of string…with knots in it?

2. Cinderella's shoe size

3. How many pieces of paper in a pile?

The Five Views of a Function



How long is your piece of string? Let's brainstorm ideas first

What do we know?

No of knots	Length of string (cm)
0	
3	75

What else can we find out?

Can we represent it in another way?

What do we want to know?

Estimate about how long it is.

How did you work that out?
Can you describe the pattern in words?

The Five Views of a Function

No of knots	Length of string (cm)
0	?
3	75
4	72
5	68.8

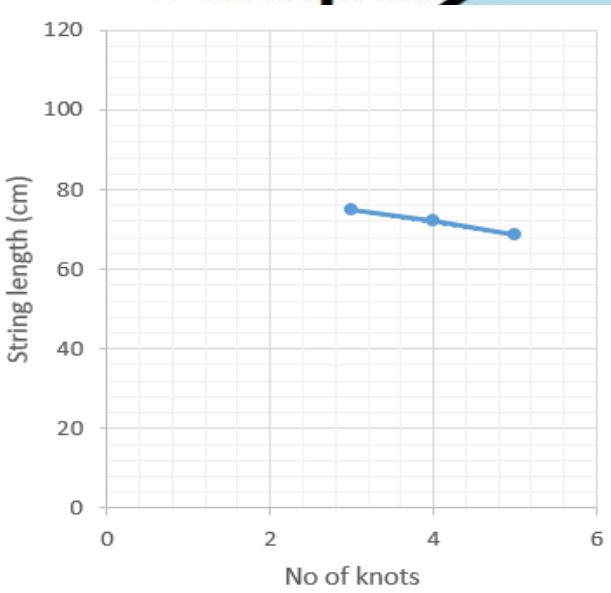
$y = -3.1x + 84.333$

$R^2 = 0.9997$

Formula or Rule

Graph

Table



String decreases by approx. 3cm for each extra knot.

Words

How many pages in a pile? Let's brainstorm!

What do we know?

What do we want to know?

Estimate about many pages.

How did you work that out?

What else do we know or can find out?

Can we represent it in another way?

Number of pages	Height of pile (mm)
0	0
500	55

The Five Views of a Function

$y = 0.11x$

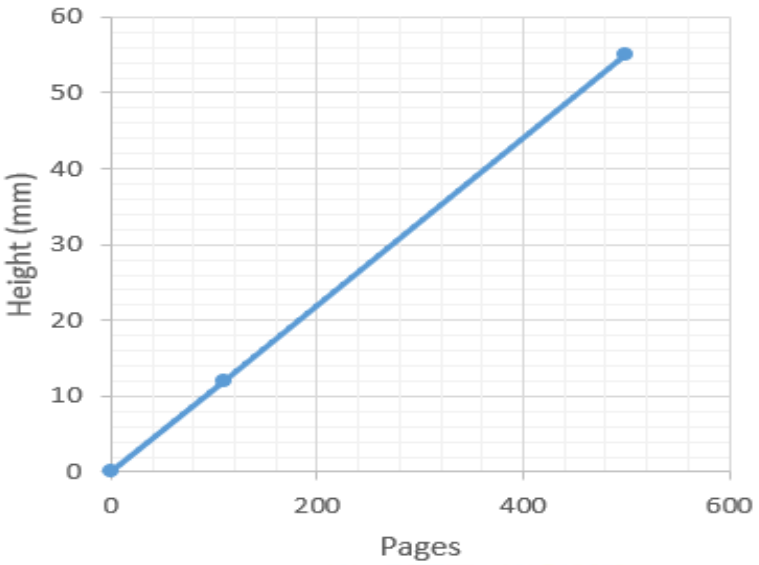
$R^2 = 1$

Pages	Height (mm)
0	0
?	12
500	55

Formula or Rule

Graph

Table



500 pages is 55mm high so 1 page will be

My pile is 12 mm high

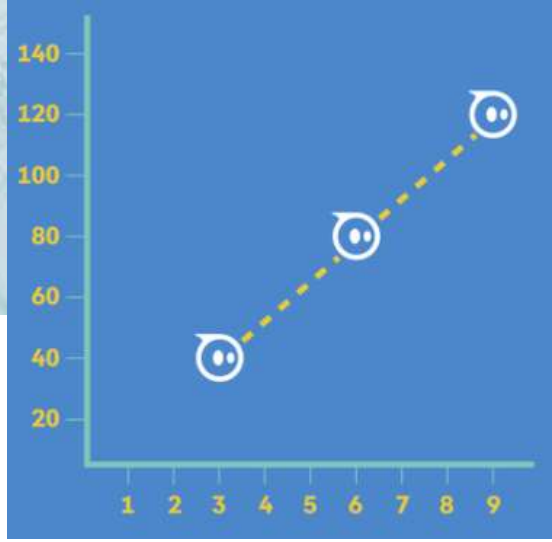
Words

The Unitary Method

Pages	Height (mm)
500	55
÷ 55	÷55
1	1
× 12	× 12
109	12

Sphero Activities

Linear Modelling in a STEM context



Create a blocks program for a single roll
a metre stick (or tape) and three spheros

Use time, speed, and distance to introduce students to linear relationships.

Two possible experiments (again depending on Year level)
1) Observing the relationship between time and distance, and
2) Observing the relationship between speed and distance.

This activity is a remix of Jenn Ferguson's Time, Speed and Distance (https://edu.sphero.com/cwists/preview/3985x) which is an updated version of a previous activity from our MacroLab activities.

Linear Modelling with Spheros

Discuss the **independent variable** (time or speed) and **dependent variable** (distance).

- Create a new blocks program and add a single roll block. For each test use the settings specified below. Use the same starting point each time.

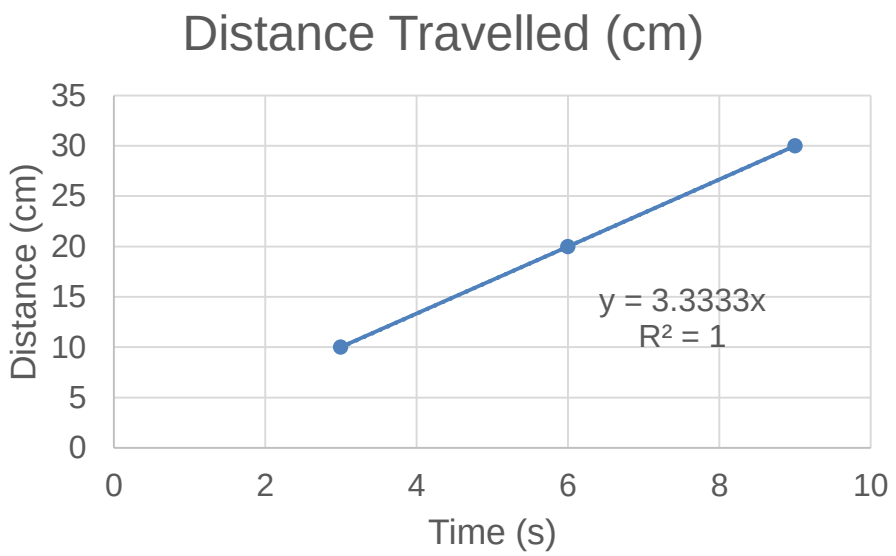
- Measure and record the distance travelled by the bot after each attempt.

Patterns in the data

Discuss representations of relationships/functions including data, tables, graphs and models.

ie for every three seconds Sphero travels, how does the distance compare?

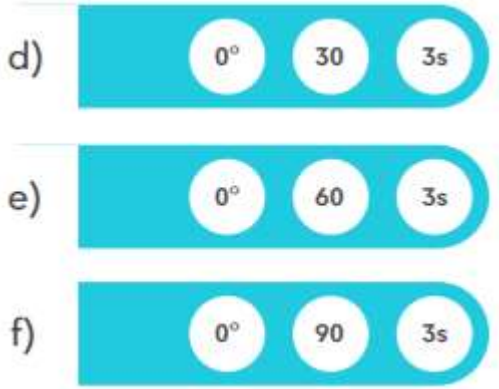
Time (s)	Distance Travelled (cm)
3	
6	
9	



- Can add trendline and develop model manually to compare.
- If it travelled for 0 seconds, how far will Sphero have travelled?
- Can align with the PSMT Problem-Solving process.

Linear Modelling with Spheros

- Similarly can do adjusting the speed.

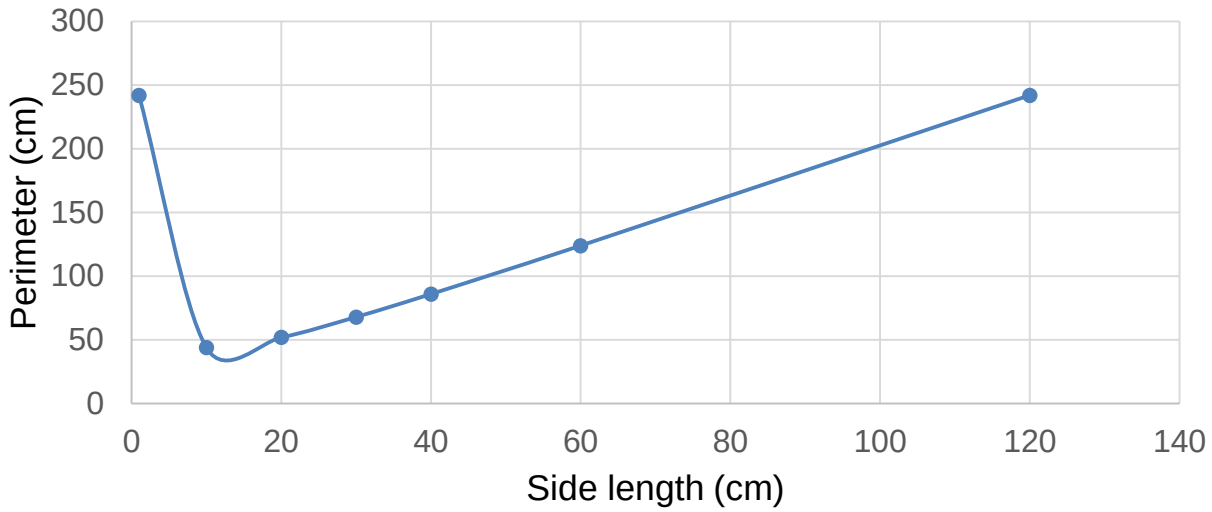


- Discuss scientific approach of keeping the other variables constant and changing only the one variable at a time

- Discuss difference between varying time and speed

Sphero Shapes!

1. Draw a rectangle with an area of 120cm^2 (or 12$units^2$) and then calculate the perimeter.
2. Can you think/draw another rectangle that has an area of 120cm^2?
3. Compare across groups and discuss.
4. Discuss the factors of 120 (or 12) and why there are different rectangles with integer values.
5. How many different rectangles can there be?
6. Is this the same if we were drawing a square?
7. Discuss integer vs decimal, discrete vs continuous.
8. Draw a table of values and graph the perimeter for different lengths of a rectangle that has an area of 12$units^2$. Develop a model.



	A	B	C	D	E
1	**Side length (cm)**	**Perimeter (cm)**	Other side (cm)	Area Check (cm^2)	
2	1	242	120	120	
3	10	44	12	120	
4	20	52	6	120	
5	30	68	4	120	
6	40	86	3	120	
7	60	124	2	120	
8	120	242	1	120	

$$Area\ of\ rectangle = length \times width$$

$$width = \frac{Area}{length}$$

$$w = \frac{120}{l}$$

$$P\ of\ rectangle = 2(l + w)$$

$$P = 2(l + \frac{120}{l})$$

$$P = 2(\frac{l^2 + 120}{l})$$

Connecting to Assessment

- Conceptual approach seems to link perfectly into the new Problem-Solving and Modelling Task internal assessment item

- Teaching and learning for an external examination is not going to work if students are memorising individual pieces of knowledge.

- Need students to see the bigger, connected picture and to use effective study techniques throughout their studies.

Metacognition:
(metacognitive strategies effect size 0.69)

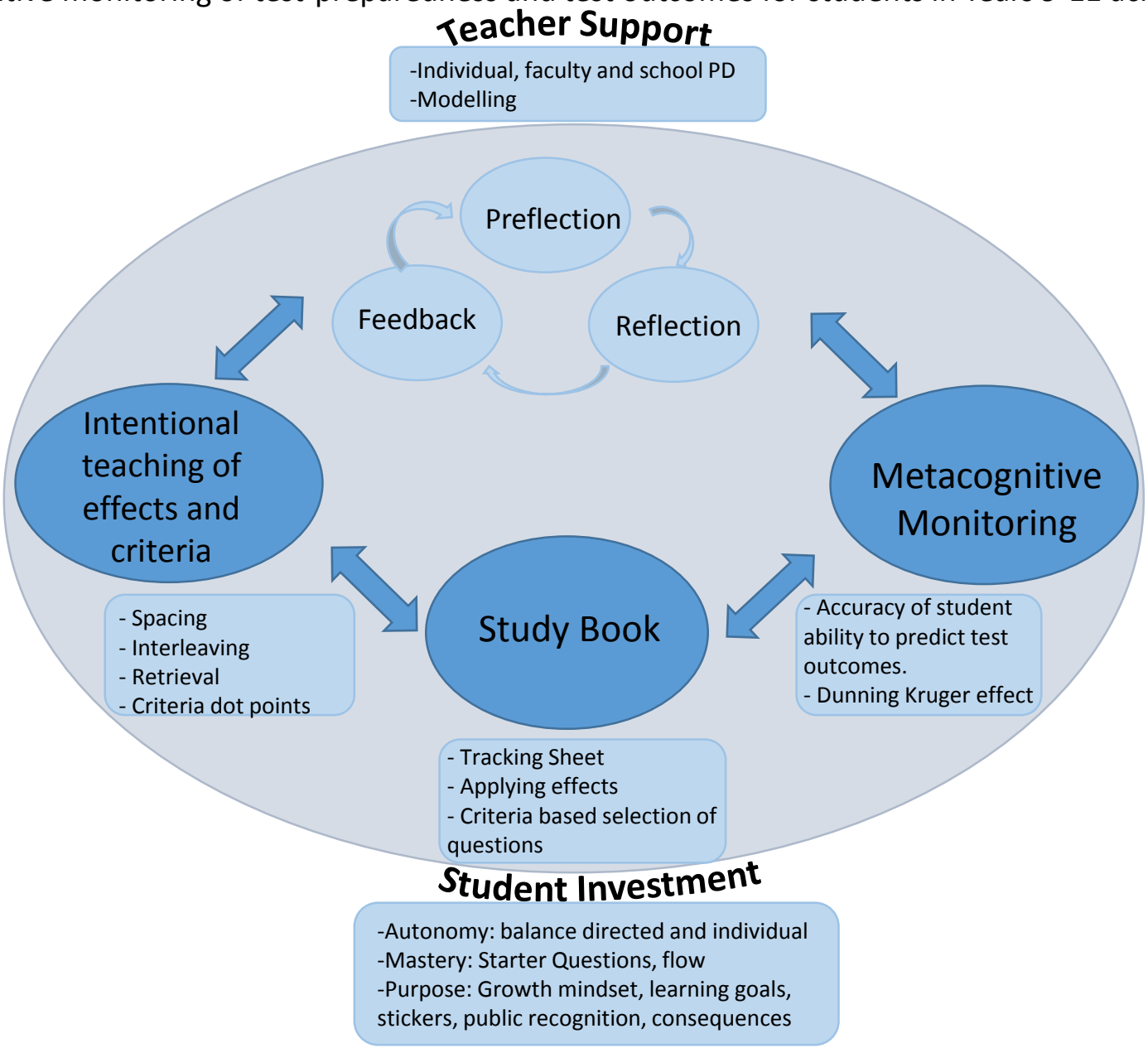
Those who engage in monitoring performance perform better in measures of learning (self-report grades effect size 1.44)

Dunning-Kruger Effect links accuracy of predicting to the metacognition.

- Students achieving in the lowest quartile (lowest 25%) were most confident
- Students who achieved in 12th percentile estimated their performance in the 61st percentile on average.

Improving Metacognitive Monitoring

What effect does the intentional instruction in test preparedness by teachers have on the alignment of student metacognitive monitoring of test-preparedness and test outcomes for students in Years 9-11 across faculties?



Knowing for Longer

Interleaving Effect: studying across topics and learning topic as whole rather than pieces

Retrieval Effect: Memory-revisiting graph

Spacing Effect: spacing study as opposed to massing them together

Interleaving Effect

PEN Principle 7 from SLRC

- Problems of different type/topic are mixed together rather than separated.
- Links to conceptual approach-seeing bigger ideas as connected skills

Interleaving $A_1B_1C_1A_2B_2C_2A_3B_3C_3$

Blocking $A_1A_2A_3B_1B_2B_3C_1C_2C_3$

- Helps discriminating –categorising between the questions (more like in a test) which enhances ability to apply appropriate solution to that problem.

Interleaving Strategies

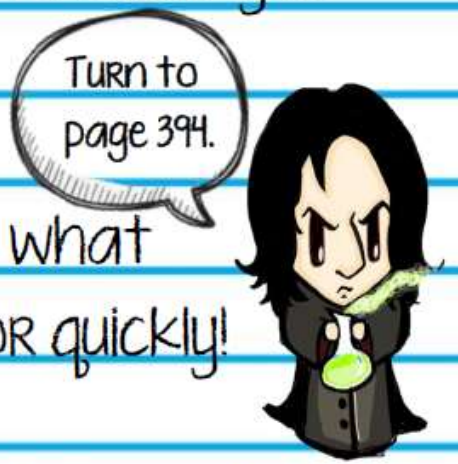
- HW & QQ from previous topic & reviews of previous topic notes and write summary of key ideas.
- Concept map or compare of a whole unit.
- Cumulative and cross topic quizzes/tests
- Rearrange the order of practice questions (as texts generally use blocking) or and chapter reviews.
- NPP/Maths Mate

The Summary Book

a summary book is...

... full of useful things from year 10-12 maths.

... for **YOU**. Tailor it to what you need.



... designed to find what you're looking for quickly!

e.g. non-CAS instructions

... concise. Annotate enough to help remember what you need to know but **NO MORE!**

Try using the **Cornell System!**

Hermione G.
31/07/2018

the Cornell System
TIPS

← 5cm → ← 15cm →

PUT IN HERE:	**Record:** Paraphrase, use symbols or abbreviate!
Cues	Use bullets or lists, leave extra space
Keywords	between main ideas for future revision.
Questions	**Recite:** Cover this section. Look at the cue column.
Main Ideas	Say aloud the answers to the questions
	or ideas indicated by the cues.
	**Reflect:** Ask yourself questions about what
	you've written down.
	Review: Spend 10min every week reviewing all your
	previous notes.

TYPES OF ANGLES

Acute Angle 	An angle measuring between 0° and 90°.
Right Angle 	An angle measuring exactly 90°.
Obtuse Angle 	An angle measuring between 90° and 180°.
Examples:	Classify these: 90.1° 89.9° 90.0° 179.9°
Summary:	Angles are classified by the degrees they measure.

Starter Questions

4.7 Rates

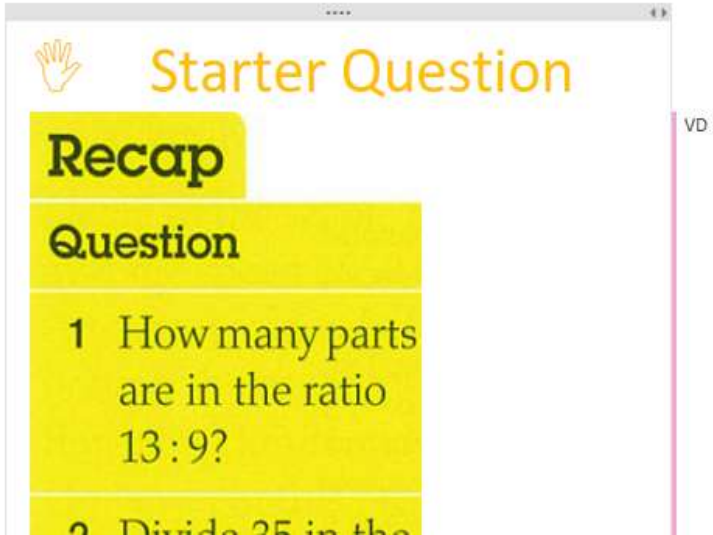
The Big Picture

An understanding of ratio is important for completing many tasks. A baker making a cake, a builder mixing concrete, a photographer enlarging an image or a cartographer drawing a map; all need skills in working with ratios and scale factors. Rates enable us to compare quantities of different types, or how an amount, such as the population of a city or a country, is changing over time.

Today's Lesson

By the end of today's lesson, you should be able to:

- Calculate with rates such as speed
- Use the unitary method to compare different rates
- Calculate population growth rates



Exit Questions

LESSON 7 WORLD TIME ZONES MAPS.docx [Compatibility Mode] - Word

ferences Mailings Review View ACROBAT Tell me what you want to do

EXIT QUESTION

The following scores were obtained by students from the same class in Maths and English.

English:

13	14	16	12	8	6	15	18	12	14	13	11	10
9	7	9	12	8	9	7	10	10	9	11	13	

Maths:

5	2	9	7	9	12	8	9	7	10	10	9	11
18	11	14	16	17	8	6	20	18	12	4	6	

a. Calculate the mean and standard deviation for each subject.
b. Interpret and compare the mean for each subject.
c. Interpret and compare the standard deviation for each subject.

The Challenge

- Interleaving has positive effects on learning BUT students generally prefer blocking as it is easier as it makes learning seem harder.

- Challenge is when you grow your brain. Easier will not help in the final test.

- Interleaving will help increase metacognitive monitoring because students learn to differentiate

Test, test and more testing…is a good thing?
(providing formative evaluation 0.9)

Retrieval Effect QBI, The Science of Learning, Ottmar Lipp

- Increase op for students to retrieve info/skills without using notes or peers by repeated ‘testing’ (teacher directed and ‘self-testing’)
- Benefits to strengthen neural pathway in the retrieval and feedback opportunity
- Not dependant on form of testing (MC, SR etc)

Retrieval Strategies
(questioning 0.48)

- Revision quizzes (external test changes perspectives)
- Guess the Test
- Quick questions (start/end of lesson, 3-5 mins with f.b.)
- Clickers, LANschool survey, google form, sml whiteboards, T/F cards, Kahoot https://getkahoot.com
- Frequent questioning (HOT Qs are great but the closed content Qs are too)

Call on students at random or if volunteering, all students write ans 1st.

Self Testing

- Flashcards

Title/topic/skill on front : rule/procedure on back

- For senior develop a ‘deck’ for the whole year (rather than current topic)
- Text book ch reviews-do 1st without looking at ans, then check, then redo, redo, redo
- Free recall of what was learnt today/week/topic (can be in class or self) (can do at end of each lesson)

STRATEGIES TO HELP YOU LEARN RULES AND SPELLING

Look

Look carefully at the shape of the rule/word.
Close your eyes and put the rule/word in your mind.

Say

Say the rule/word aloud

Cover

Cover the rule/word with your hand.
Close your eyes and see the rule/word in your mind.

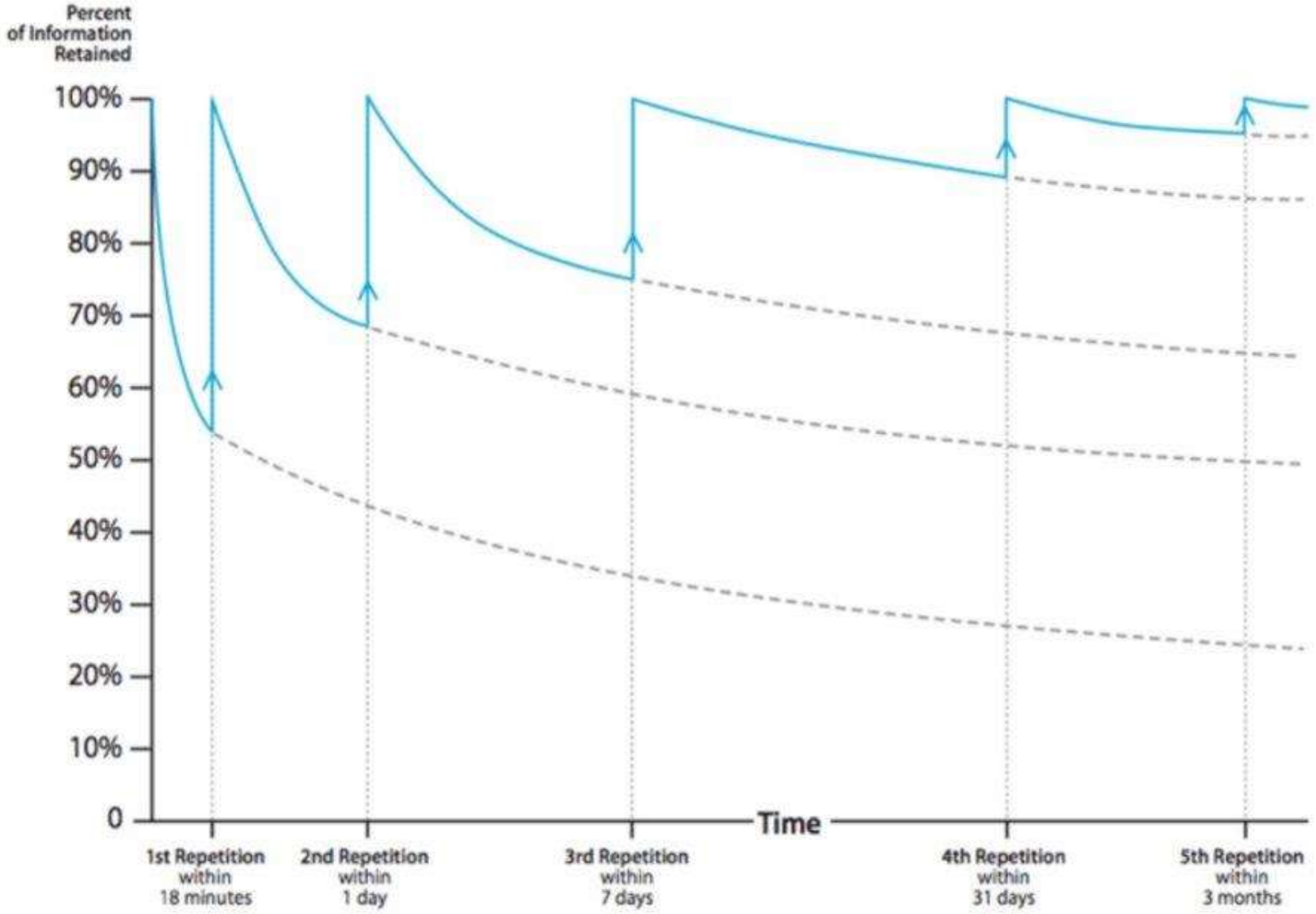
Write

Write the rule/word.

Check

If wrong start the steps again. If correct move onto the next rule/word.

Rate of Forgetting with Study/Repetition



Spacing Effect (0.71)

- Better memory retention when exposures are separated in time than when same number of exposures occur in immediate succession.
- Optimal spacing around 10-20% of test delay

For external test in 100 days spacing gap between each encounter is around 10 to 20 days.

ie need retrieval ‘testing’ of concepts every 2-3 weeks.

Smart Study based on brain research (Study skills 0.59)

- Smart Study implemented from 9 to 12 (Yr 7 we use Maths Mate to cover all topics each week)

- Teach how much easier a problem seems if one has already seen the answer (implication to study if looking back and also to wide practice to increase familiarisation).

- Study book poster

A STUDY BOOK IS...

...YOUR PERSONAL WEEKLY REVISION

...USED TO PRACTISE EXTRA PROBLEMS

...A SOURCE OF TEACHER FEEDBACK

...A PROVEN WAY TO IMPROVE YOUR RESULTS

TO USE YOUR STUDY BOOK EFFECTIVELY...

...PRINT OUT AND GLUE IN THE TOPIC OUTLINES

...SHOW ALL WORKING AS YOU WOULD IN A TEST

...COMMUNICATE AND JUSTIFY ALL RESPONSES CLEARLY

...DRAW DIAGRAMS IN PENCIL

...MARK YOUR WORK

...INCLUDE A HEADING FOR EACH NEW SECTION

Tracking Sheet – 11 MAB

St Aidan's Anglican Girls' School Year 11 Mathematics B

Unit 3: Exponential and Logarithmic Functions and Applications 4 weeks

In Weeks 1 to 7 in Term 2, please complete a tally of each time you revisit a skill for KAPS and MAPS.

Topic Number	Topic	Learning Goal		Revisiting Weeks 1	2	3	4	5	6	7	Mandatory Homework Exercises	HW tracking (incorrect Qs)
1	Review of Exponential Laws	Be able to use exponent laws to simplify expressions	KP	✓	✓		✓				✓7A Q1ah, 2ai, 3i, 4e, 7bf, 8g, 9de	3i 9de
			MP					✓				
2	Negative and Fractional Indices	Be able to write expressions using positive indices Be able to manipulate expressions involving fractional indices	KP		✓	✓		✓			7B Q1agh, 2af, 3ejo 7B Q4abc, 5bek	4e
			MP									
3	Indicial Equations	Be able to solve equations where the index is unknown	KP			✓					✓7C Q1aeh, 2af, 3af, 4ad, 5ad	3ß, 4ad
			MP									
4	Graphs of Exponential functions	Be able to sketch graphs of exponential functions	KP			✓				✓	✓7D Q1aefgi, 2ae, 3aefgh, 4, 5adg	
			MP									
5	Logarithms	Be able to solve exponential equations using logarithms Be able to use the log rules to simplify expressions	KP				✓		✓		✓7E Q1ace, 2ace, 4,6ace, ✓7F Q5acei	
			MP				✓		✓		✓7E Q7ace, 8ace, 9ace, 14ace	
6	Applications of Exponential functions	Be able to solve practical problems using exponential functions	KP			✓					✓7G Q1, 2, 4, 5, 13	Q1Q13
			MP			✓						
7	Graphs and applications of logarithmic functions	Be able to graph logarithmic functions Be able to solve equations involving logarithmic functions	KP								✓Exercise 7F Logarithmic Graphs 7F Q1afj, 2ajn, 3ah 7G Q9, 10	
			MP					✓		✓		
8	Growth and Decay Functions	Be able to model linear and exponential growth and decay functions	KP				✓				8C Q1ab, 4, 9ab, 10, 11, 19, 22, 23	
			MP				✓					

9 Maths tracking sheet

In Weeks 1 to 7 in Term 4, please complete some questions from the **unshaded** exercises in your study book.

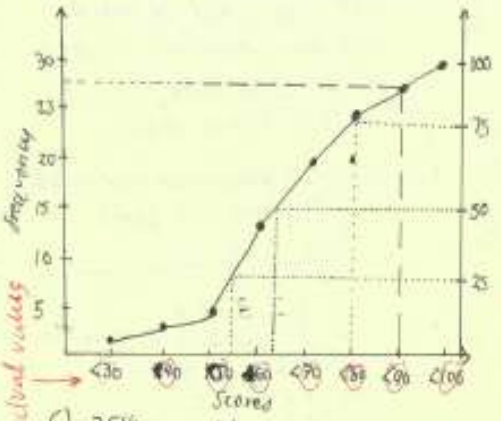
Trigonometry

Topic	Revisiting Weeks							Mandatory Homework Exercises	HW tracking (incorrect questions)
	1	2	3	4	5	6	7		
Introduction to trigonometry								Ex 7.1	
Trigonometric Ratios								Ex 7.2	
Using trig to find side lengths								Ex 7.3	
Using trig to find angles								Ex 7.4	
Applications of trig								Ex 7.5	

Expanding and Factorising

Topic	Revisiting Weeks							Mandatory Homework Exercises	HW tracking (incorrect questions)
	1	2	3	4	5	6	7		
Expanding Brackets								Ex 3.5	
Expanding Special Products								Ex 3.6	
Factorising using Common Factors								Ex 3.7	
Factorising by Grouping								ex 3.8	
Factorising Monic Quadratic Trinomials								Worksheets	
Factorising using Special Products								Worksheets	

Ogive: Physics class test results:



c) • 75th percentile: <80, with that it means that 75% of the class received less than 80 marks. ✓

• 50th percentile: <65, less than 50% of the class received a mark less than 65, but the other half achieved higher than 65. ✓

• 25th percentile: <55, less than 25% of the class achieved higher than 55 marks. ✓

d) → find top 10% of data:

10% of 30 = 3

30 − 3 = 27

∴ trace from graph to find higher than frequency 27

They would need a mark of 90 or higher, to receive a certificate of achievement. ✓

MAPS Friday Question TLC

→ advise which bank is better.

original amount = $500

→ create a rule for 'blue bank'

let total saved = T ✓

→ time past = y (years) ✓

BLUE BANK

general form: $y = a + bx$ ✓

(linear growth, same amount each year) ✓

∴ → find 15% of original in retirement

$= 500 \times 0.15$

$= \$75$

∴ $b = 75$ (amount added yearly) ✓

∴ $T = 500 + 75y$ ✓ → 420

BLACK BANK

general form: $y = ka^x$

(exponential growth, as amount increases by a rate)

$k = 500$ (initial amount)

a = percentage inc. + 1

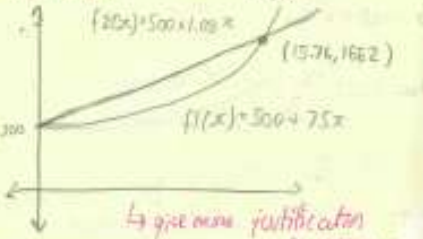
$= 0.08 + 1$

$= 1.08$

∴ $T = 500 \times 1.08^y$ ✓ 420

→ find 'break even point' of each of the banks: (as best price will be determined by how much they money ✓ spends in the bank).

→ from CAS



↳ give some justification for CAS skills

blue bank → $f1(x)$ (linear)

black bank → $f2(x)$ (exponential)

→ as the student who won the competition is in the junior school, and we are not given her grade, we can assume that she has a max of 12 years until her formal (from prep, smallest grade) (assuming that she does not repeat). ∴ Blue bank is the better option as she will make more money to spend for her formal. The break even point is not until 15 years after the money is put in, after this, black bank would be a better choice ✓

↳ CRAVE....

Check by subbing in $y = 12$

(To find which is the most)

A: interest rate the same ect.

Check-up quiz (TLC)

1) → sketch graph: $y = 2^{x+1} - 9$

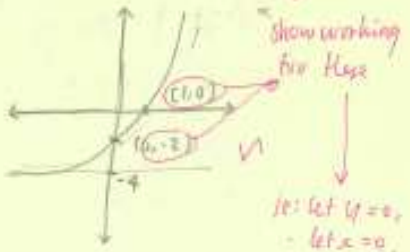
• describe transformation:

• dialation factor of 2

• increasing

• 1 unit to the ~~right~~ left

• 9 units down



asymptote: $y = -9$

2) $10 \times 3^{x+3} + 7 = 50$

$10 \times 3^{x+3} + 7 = 50$

$10 \times 3^{x+3} = 43$

$3^{x+3} = 4.3$

$\log 3^{x+3} = \log 4.3$

$x + 3 = \frac{\log 4.3}{\log 3}$

$x = 1.3276... - 3$

$x = -1.67231...$ ✓

3) $\log_2(x+1) - \log_2 3 = 3$

$\log_2 \frac{(x+1)}{3} = 3$

→ write in index form

$\frac{x+1}{3} = 2^3$

$x + 1 = 8 \times 3$

$x = 23$ ✓

LOGS and indicies.

1a) $\frac{6a^9b^3}{16a^7b^6} \div \left(\frac{3a^2b}{2a^3b^2}\right)^3$

$= \frac{6a^9b^3}{16a^7b^6} \div \frac{3^3a^{2\times3}b^3}{2^3a^{2\times3}b^{2\times3}}$

$= \frac{6a^9b^3}{16a^7b^6} \div \frac{27a^6b^3}{8a^6b^6}$

$= \frac{6a^9b^3}{16a^7b^6} \times \frac{8a^6b^6}{27a^6b^3}$

$= \frac{48a^{15}b^9}{432a^{13}b^9}$

$= \frac{48a^{-2}}{432}$

$= \frac{1}{9a^2}$

Survey Link:
http://www.surveymonkey.com/r/MAV1806

Mailing List - To find out more about QUT's STEM programs.
https://www.qut.edu.au/study/stem-for-schools

Did you know we have a new Facebook Group? Join us at QUT's #STEMis4me community space to showcase the many diverse, exciting careers and research in STEM.