



# Mathematics Masterclass Years 7-12

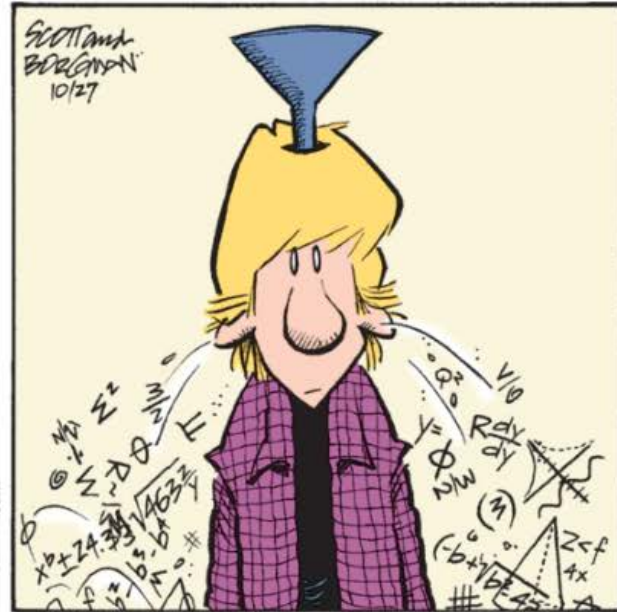
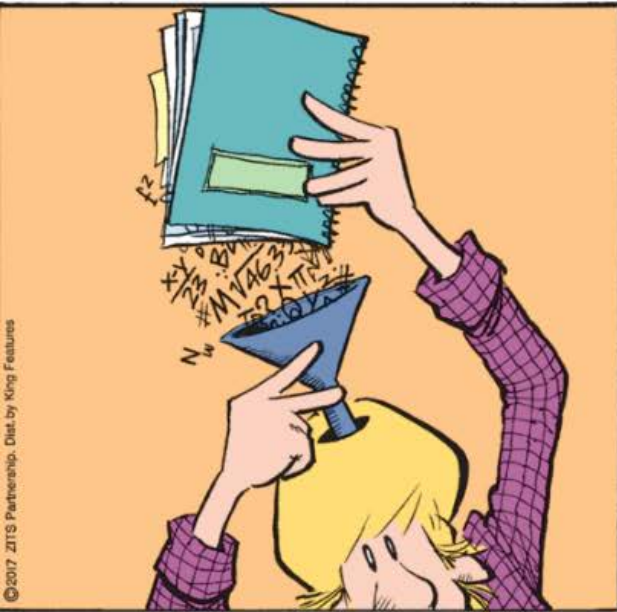
**Ilhea and Robert Yen**

*This PowerPoint can be downloaded  
from the Canterbury Girls HS website*









## The teenager in 2020



# The teenager in 2020 studying maths



**Why are you  
here tonight?**



Because you want to  
help your teen do well  
at high school,  
especially in maths.

Because you want to  
talk to them more and  
fight with them less.



Whatever the difference between brilliant and average brains, we are all creative. And through practice and study we can enhance our skills and talents.

**- Jeff Hawkins -**

American inventor  
and brain researcher

# Online external tests at high school

- **NAPLAN: National Assessment Program**
  - Literacy and Numeracy
  - (Years 7 and 9: 4 short tests in May)
  - CANCELLED FOR 2020)**
- **VALID: Validation of Assessment for Learning and Individual Development (Science)**
  - (Year 8 in October, optional Year 10 in September)
- **HSC Minimum Standard (Literacy and Numeracy)**
  - (Year 10: 3 short tests throughout year)



# Higher School Certificate (HSC)

- **Year 11: 3 terms  
6 subjects (12 units)**
- **Year 12: 4 terms  
Best 10 units (5 subjects) will count for  
ATAR**

# The Mathematics journey through high school

- **Years 7-8 (Stage 4)**
- **Years 9-10 (Stage 5)**
- **Years 11-12 (Stage 6)**

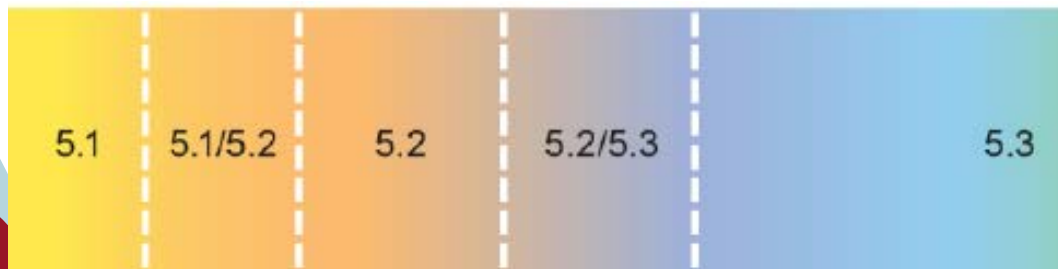
## Stages 4 and 5

- **Years 7-8: Common Stage 4 course**

Years 9-10: Stage 5 'continuum'

Differentiated curriculum for

Stages 5.1 ('elementary'), 5.2 ('intermediate'),  
5.3 ('advanced')



## MATHEMATICS YEAR 7

1 Integers

2 Angles

3 Whole numbers

4 Fractions and percentages

5 Algebra and equations

6 Geometry

7 Decimals

8 Area and volume

9 The number plane

10 Analysing data

11 Probability

12 Ratios, rates and time

## MATHEMATICS YEAR 8

1 Pythagoras' theorem

2 Working with numbers

3 Algebra

4 Geometry

5 Area and volume

6 Fractions and percentages

7 Investigating data

8 Congruent figures

9 Probability

10 Equations

11 Ratios, rates and time

12 Graphing linear equations

**MATHEMATICS YEAR 9 STAGE 5.1/5.2****MATHEMATICS YEAR 9 STAGE 5.3**

1 Pythagoras' theorem

1 Pythagoras' theorem **and surds**

2 Working with numbers

2 Working with numbers

3 Algebra

**3 Products and factors**

4 Trigonometry

4 Trigonometry

5 Indices

5 Indices

6 Geometry

6 Geometry

7 Equations

7 Equations

8 Earning money

8 Earning money

9 Investigating data

9 Investigating data

10 Surface area and volume

10 Surface area and volume

11 Coordinate geometry and graphs

11 Coordinate geometry and graphs

12 Probability

12 Probability

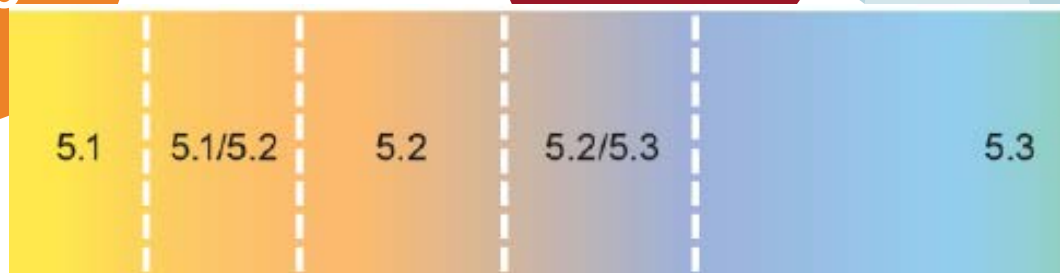
13 Congruent and similar figures

13 Congruent and similar figures

**MATHEMATICS YEAR 10 STAGE 5.1/5.2****MATHEMATICS YEAR 10 STAGE 5.3**

	<b>1 Surds</b>
1 Interest and depreciation	2 Interest and depreciation
2 Coordinate geometry	3 Coordinate geometry
3 Surface area and volume	4 Surface area and volume
4 Algebra	<b>5 Products and factors</b>
5 Investigating data	6 Investigating data
6 Equations and inequalities	7 Equations <b>and logarithms</b>
7 Graphs	8 Graphs
8 Trigonometry	9 Trigonometry
9 Simultaneous equations	10 Simultaneous equations
	<b>11 Quadratic equations</b>
10 Probability	12 Probability
11 Geometry	13 Geometry
Option topics preparing for Year 11 Maths Standard	<b>Option topics preparing for Year 11 Maths Advanced and Extension 1</b>

# Stages 5 and 6



No Maths/  
Numeracy  
course?

Year 11  
Mathematics Standard

Year 11  
Mathematics  
Advanced

Year 11  
Mathematics Extension

No Maths/  
Numeracy  
course?

Year 12  
Mathematics  
Standard 1

Year 12  
Mathematics  
Standard 2

Year 12  
Mathematics  
Advanced

Year 12  
Mathematics  
Extension 1

Year 12  
Mathematics  
Extension 2

## MATHEMATICS STANDARD YEAR 11

1 Collecting and presenting data

2 Formulas and equations

3 Earning money and taxation

4 Probability

5 Measurement

6 Managing a home

7 Linear functions

8 Interest and depreciation

9 Owning a car

10 Analysing data

11 World locations and times

12 Driving safely



MATHEMATICS ADVANCED YEAR 11	MATHEMATICS EXTENSION 1 YEAR 11
1 Algebraic techniques	1 Algebraic techniques
2 Equations and inequalities	2 Equations and inequalities
	3 Permutations and combinations
3 Functions	4 Functions
4 Trigonometry	5 Trigonometry
	6 Polynomials and inverse functions
5 Further functions	7 Further functions
6 Introduction to calculus	8 Introduction to calculus
7 Probability	9 Probability
8 Exponential and logarithmic functions	10 Exponential and logarithmic functions
9 The trigonometric functions	11 The trigonometric functions
10 Discrete probability distributions	12 Discrete probability distributions

# Homework and study routine


Goalcast

US Navy SEAL Admiral  
William McRaven,  
University of Texas  
graduation speech (2014)



If you wanna **change the world,**  
start off by **making your bed.**

<https://www.youtube.com/watch?v=KgZLzbd-zT4>

A hiker in a blue t-shirt and yellow shorts stands on a grassy mountain slope, looking out over a vast landscape. A large backpack is on the ground next to him. The sky is bright blue with large, white, fluffy clouds. In the distance, there are rugged, rocky mountains.

**“A Journey of a Thousand Miles  
Begins With a Single Step.”**

**-Lao Tzu**

Chinese philosopher (570-490 BCE)

**千里之行，始於足下**

# Homework and study routine

1. Develop a daily homework and study routine
2. Work at the same time and place each day
3. Develop a weekend routine: start small
4. Use a diary, calendar and/ or planner
5. Use technology as a learning/ organisation tool  
(less an entertainment / social media device)

# Productivity apps





## As high school students get older:

- the workload becomes heavier
- the learning content becomes harder
- they have more distractions
- they become more emotional and stressed







1. Switch off or remove phones, devices and the TV
2. Avoid having your teen studying behind closed doors
3. Keep an eye on them
4. Be a role model and don't be distracted by technology yourself
5. Consider using a central space for study sometimes, such as the lounge or dining room, as long as it's quiet





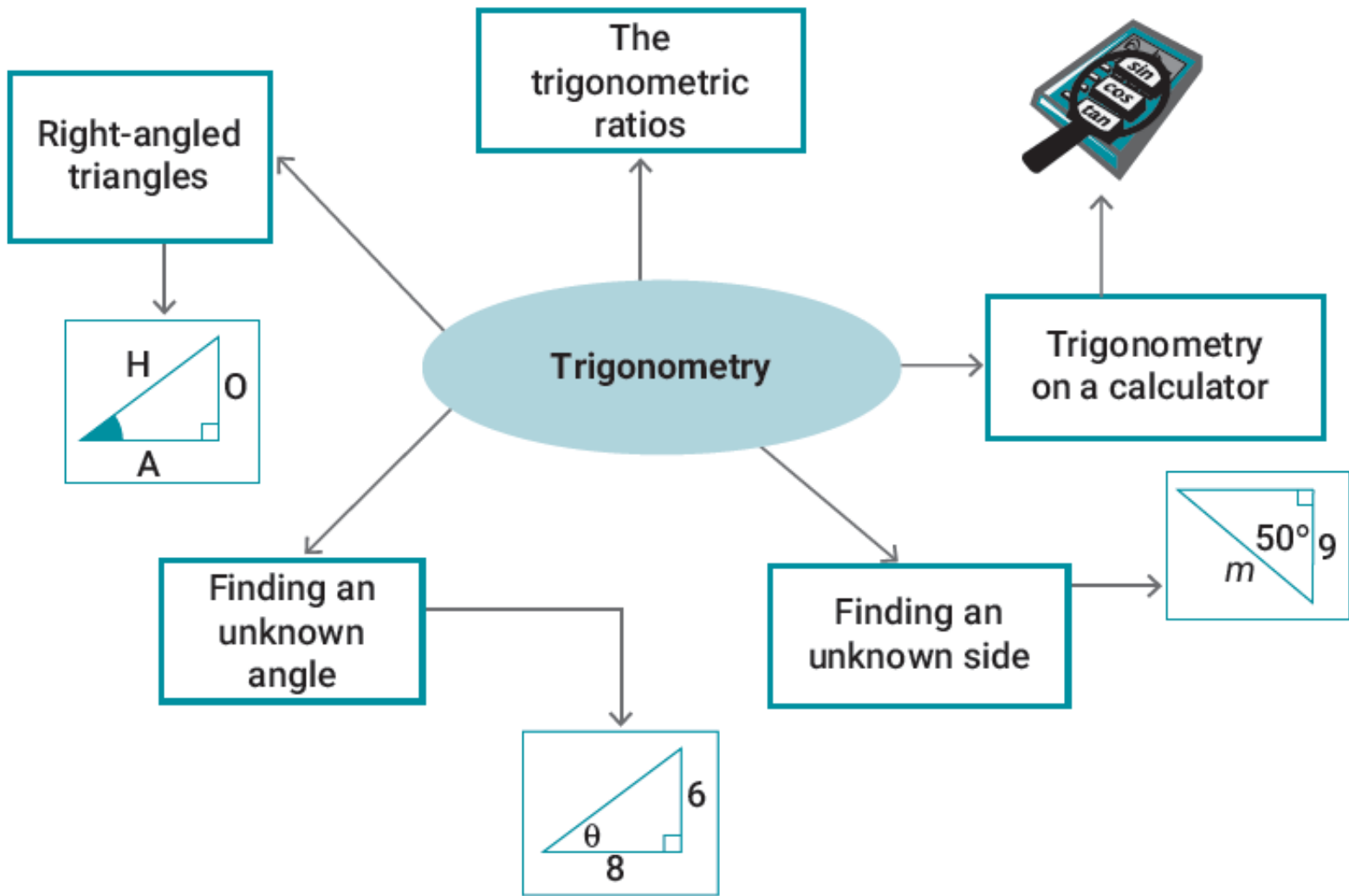


# STEP 1: PRACTISE YOUR MATHS

- Learning maths is about mastering a collection of skills
- You become successful at maths by doing it more, through regular practice and training
- Do your homework ('make your bed')
- Aim to achieve a high level of understanding

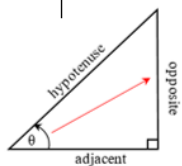
## STEP 2: REWRITE YOUR MATHS

- Homework and study are not the same thing
- Study is your private 'revision' work for strengthening your understanding of a subject
- Summarise each topic to see the 'whole picture' and know it all
- Rewrite the theory and examples in your own words
- Take ownership of your maths



# TRIGONOMETRY

## Right-angled triangles



## The trigonometric ratios

$$\sin \theta = \frac{\text{opp}}{\text{hyp}} \left( \frac{O}{H} \right)$$

$$\cos \theta = \frac{\text{adj}}{\text{hyp}} \left( \frac{A}{H} \right)$$

$$\tan \theta = \frac{\text{opp}}{\text{adj}} \left( \frac{O}{A} \right)$$

(SOH - CAH - TOA)

## Trigonometry on a calculator

$1^\circ = 60'$  (1 degree = 60 minutes)

$1' = 60''$  (1 minute = 60 seconds)

When rounding, use 30 as the halfway mark.

$$5.8 \cos 63^\circ 24' = 2.597\dots$$

A small image of a calculator keypad showing the sequence of buttons: cos, 63, 24, =, resulting in 2.597...

If  $\tan A = 2.581$ ,  $A = 68.821\dots^\circ$

A small image of a calculator keypad showing the sequence of buttons: SHIFT, tan, 2.581, =, resulting in 68.821...



## Finding an unknown side

SOH - CAH - TOA?

$w$  is adjacent to  $67^\circ$  and 8.9 m is the hypotenuse.

$$\therefore \cos 67^\circ = \frac{w}{8.9}$$

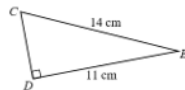
$$\begin{aligned} w &= 8.9 \cos 67^\circ \\ &= 3.477\dots \\ &\approx 3.5 \text{ m} \end{aligned}$$



## Finding an unknown angle

SOH - CAH - TOA?

Find  $\angle C$  in the triangle.



The known sides to  $\angle C$  are the opposite and hypotenuse, so use sin.

$$\sin C = \frac{11}{14}$$

$$\begin{aligned} C &= 51.786\dots \\ &\approx 52^\circ \end{aligned}$$

# STEP 3: ATTACK YOUR MATHS

- All maths knowledge is interconnected
- If you don't understand one topic fully, then you may have trouble learning another topic:  
'You cannot run until you have learned to walk'
- Identify your areas of weakness and work on them
- Fill in any gaps in your mathematical knowledge to see the 'whole picture'
- Spend MOST of your study time on the topics which you find difficult

# STEP 4: CHECK YOUR MATHS

- Once you have mastered the maths skills, there is no further learning or reading required
- Compared to other subjects, the questions asked in maths exams are more conventional and predictable
- Test your understanding with revision exercises, practice papers and past exams
- Develop your exam technique and problem-solving skills
- Go back to Steps 1 to 3 to improve your study



P

R

A

C

The background is a solid orange color with various light orange shapes scattered across it, including circles of different sizes and some larger, irregular rounded shapes. The text is centered in a white serif font.

How can parents help?



1. Be a cheerleader and timekeeper:

help them develop a study routine and stick to it.

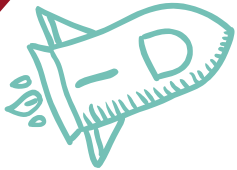
2. Supervise but keep a distance:

don't do their home work for them.

3. Help but don't hinder.

4. Ideally, everyone in the house should be on board and working quietly: no TV

5. Help them keep track of important dates and deadlines, such as for assignments.





6. Encourage them to start working on their assignments early, do a little each day rather than leave it to the last day or night.

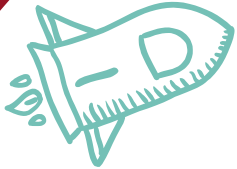
7. Help them understand the requirements of an assignment.

8. Bring them food and drink for their breaks, such as fruit and water.

9. Know their school timetable.

10. Quiz them on their knowledge.

11. Ask them to explain what they are learning in their own words.





12. Ask them how they are going:

listen actively and patiently.

13. Don't be too quick to give advice or solve their problems.



14. Don't take it personally if they lash out. Stay calm, show empathy, be firm and fair.

15. Listen to them read out their speeches and assignments.

16. Stay in touch with school news through the website and app, contact the teacher if you have questions.



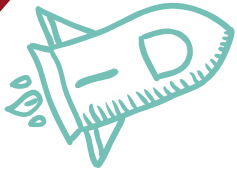


17. Supervise them cleaning their room for 10 minutes each day: they can't study if it's messy.

18. Make sure they are eating, drinking, moving, resting and sleeping.

19. Keep your expectations realistic and achievable.

20. Keep *their* expectations realistic as well: there's only 24 hours in each day.





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