

# Creating Your Own Investigations and Worksheets

*Sponsored by Sharp and SMD Technologies*

# Agenda

- Sharpies
- Basics
- The Difference between an investigation and worksheet
- CAPS Documents / ATP Documents
  - Content
  - Types / Levels of Questions
- Template and Design
  - Tips and tricks
- Extra Tools
- Additional tips

# Sharpies

- A reward program just for teachers
- Earn points for attending this webinar.
- Exchange your points for gifts.
- Sign up – [link](#)
- Tell all your friends - [link](#)

# SHARPIES



# Free Downloads and Resources

- **Download the simulator**
  - [Link](#)
- **Download Geogebra**
  - [Link](#)
- **Worksheets**
  - [www.mathsatsharp.co.za](http://www.mathsatsharp.co.za)
  - [www.e-classroom.co.za](http://www.e-classroom.co.za)
  - [www.math-drills.com](http://www.math-drills.com)
  - <https://www.mathx.net/>
  - <https://www.worksheetworks.com/> (one of my favourites for younger grades and fully customisable)
  - <https://www.mathwarehouse.com/sheets/> (FET mostly)
- **ATP documents ([link](#))**
- **My maths blog – [www.themathsjourney.com](http://www.themathsjourney.com)**

# Calculator Basics

- Turn the calculator on
- 2<sup>nd</sup> Function – used to activate orange functions
  - Turn the calculator off by pressing 2<sup>nd</sup> F and ON
- ALPHA – used to activate teal functions
- Mode – change to different modes
- BS – backspace – to delete something.
- Change – change between mixed, improper and decimal answers.
- Equals – to find an answer or used as enter.



# Modes

- Press
- 0: Normal
  - Fractions, integers, probability, trigonometry and much more
- 1: Stat
  - Single data, linear regression and more
- 2: Table
  - Functions but can also be used for teaching finance
- 3: Drill
  - Mental maths fun!



# The Difference between an investigation and a worksheet

# Investigations vs Worksheets

- Explore a particular concept
  - You don't need to have covered the work before
  - Can teach your students new things
  - Help students develop a more intuitive understanding of a section.
- Practice a particular concept
  - Need to have covered the work before
  - Can still teach your students new things
  - Help students to practice a section and make sure that they understand it.



# Investigations

- Grade 4 – 6 – just 1 in term 4
- We need 2 in grade 7 – 9 (term 2 and 4)
- Grade 10 – 12
  - Maths – 1 project or investigation in term 1
  - Math Literacy
    - Grade 10 and 11 – assignment or investigation in each term
    - Grade 12 – assignment or investigation in term 1 and 2
- [Download investigations from Maths@Sharp](#)

	Forms of Assessment	Minimum Requirements per term				Number of Tasks per Year	Weighting
		Term 1	Term 2	Term 3	Term 4		
SBA	Test	1	1	1		3	40%
	Examination		1			1	
	Assignment	1		1	1	3	
	Investigation		1		1	2	
	Project			1		1	
	<b>Total</b>		<b>2</b>	<b>3</b>	<b>3</b>	<b>2</b>	
End of the year Examination					1	60%	

\*To be completed before the End of the year Examination

# Worksheets

- Exercises and questions that help students to practice what they have already learned.
- They need to be scaffolded from theory (level 1) questions to complex, application type questions (level 4, ie questions for understanding).

**SHARP**

Worksheet 16: Area and Perimeter of 2D Shapes  
Grade 6 Math

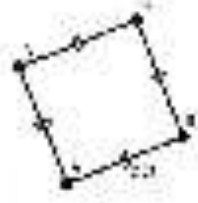
1. Give the formulae for the perimeter and area of each of these shapes:

a) square	b) rectangle
c) triangle	d) circle

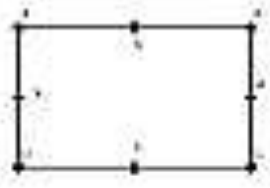
2. Give the area and perimeter for the following shapes:

a) triangle	b) square
c) rectangle	d) semi-circle

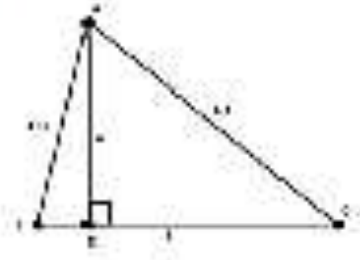
3. Give the perimeter and area of each of the shapes below:




a)



b)



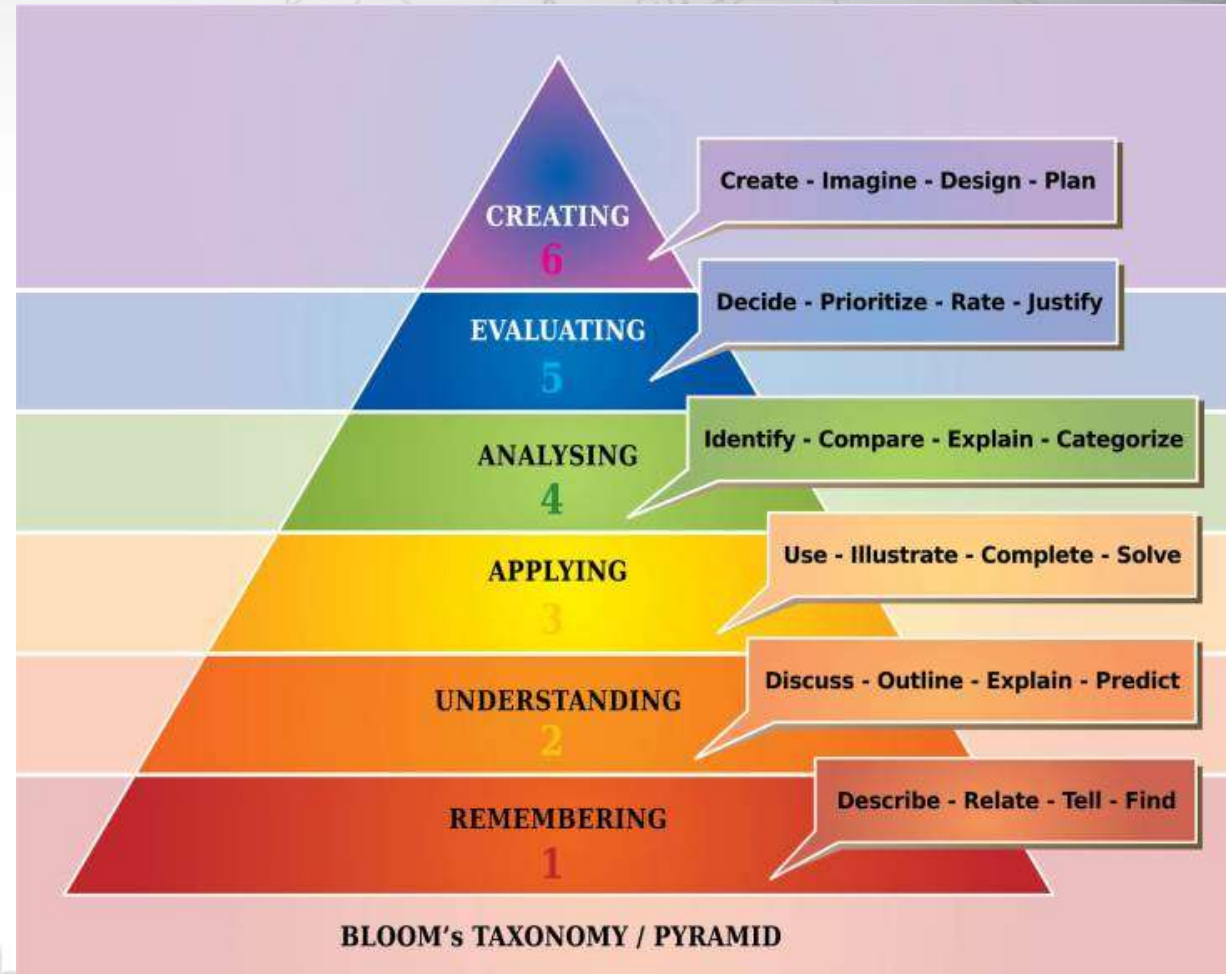
c)



**PROUD DISTRIBUTOR OF SHARP**  
www.sharp.com

# Level of Questions

- Bloom's taxonomy of learning
- Great article to read →
  - Gives suggestions on how to apply it in your maths classroom
  - Really nice example using prime numbers and factors.
- Structure your questions from level 1 to level 6 (if possible)
- Suggested: Ask your students to create their own question
  - This will show you whether or not they understand the topic, and might give you some ideas for your own questions ;)
  - Could be a great project / investigation



# Caps and ATP Documents

# Caps Documents

- Gives in-depth descriptions of each section
  - How long we should be teaching it for
  - Examples of questions
  - Clarifies definitions and what is expected.
- When creating worksheets write down all the subsections or requirements that are needed.
- [Download the caps documents here.](#)



# Grade 8 – Algebraic Expressions (T1)

CONTENT AREA	TOPICS	CONCEPTS AND SKILLS	SOME CLARIFICATION NOTES OR TEACHING GUIDELINES	DURATION (in hours)
	<p><b>2.3</b></p> <p><b>Algebraic expressions</b></p>	<p><b>Algebraic language</b></p> <ul style="list-style-type: none"> <li>Revise the following done in Grade 7:           <ul style="list-style-type: none"> <li>recognize and interpret rules or relationships represented in symbolic form</li> <li>identify variables and constants in given formulae and equations</li> </ul> </li> <li>Recognize and identify conventions for writing algebraic expressions</li> <li>Identify and classify like and unlike terms in algebraic expressions</li> <li>Recognize and identify coefficients and exponents in algebraic expressions</li> </ul> <p><b>Expand and simplify algebraic expressions</b></p> <p>Use commutative, associative and distributive laws for rational numbers and laws of exponents to:</p> <ul style="list-style-type: none"> <li>Add and subtract like terms in algebraic expressions</li> <li>Determine the squares, cubes, square roots and cube roots of single algebraic terms or like algebraic terms</li> <li>Determine the numerical value of algebraic expressions by substitution</li> </ul>	<p><b>What is different to Grade 7?</b></p> <ul style="list-style-type: none"> <li>Introduction to conventions of algebraic language</li> <li>Manipulating algebraic expressions</li> </ul> <p><b>Algebraic expressions are done again in Term 2, where the focus is more fully on manipulating algebraic expressions. In this term the focus is on interpreting algebraic expressions and introducing conventions of algebraic language through adding and subtracting like terms.</b></p> <p>Learners have opportunities to write and interpret algebraic expressions when they write general rules to describe relationships between numbers in number patterns, and when they find input or output values for given rules in flow diagrams, tables, formulae and equations.</p> <p><b>Examples of interpreting algebraic expressions</b></p> <p>a) What does the rule <math>2^n</math> mean for the following number sequence: 2; 4; 8; 16; 32...</p> <p>Here learners should recognize that <math>2^n</math> represents the general term in this sequence, where <math>n</math> represents the position of the term in the sequence. Thus, it is the rule that can be used to find any term in the given sequence.</p> <p>b) The relationship between a boy's age (<math>x</math> yrs old) and his mother's age is given as <math>25 + x</math>. How can this relationship be used to find the mother's age when the boy is 11 years old? Here learners should recognize that to find the mother's age, they must substitute the boy's given age into the rule <math>25 + x</math>. They should also recognize that the given rule means the mother is 25 years older than the boy.</p> <p>See further examples given for functions and relationships, as well as notes in Term 2.</p>	<p>Time for algebraic expressions in this term:</p> <p>4,5 hours</p>

# ATP Documents

- The shortened version of CAPS.
- What stays in and what is taught where.
- [Download them here.](#)
- These will give you guidance in what to create and ask.



# Grade 8 Term 2 - ATP

TERM 2	Week 1 4 days	Week 2 5 days	Week 3 3 days	Week 4 5 days	Week 5 5 days	Week 6 5 days	Week 7 5 days	Week 8 5 days	Week 9 5 days	Week 10 4 days	Week 11 5 days	
Hours per week	3.5 hrs	4.5 hrs.	2.5 hrs	4.5hr s.	4.5 hrs.	4.5 hrs.	4.5 hrs.	4.5 hrs.	4.5 hrs.	3.5 hrs.	4.5 hrs.	
Hours per topic	3.5 hrs.	1.5 hrs.	3 hrs	7 hrs	9 hrs.		2 hrs.	2.5 hrs.	4.5 hrs	4.5 hrs.	3.5 hrs.	4.5 hrs
Topic, concepts, skills and values	<p><b>DECIMAL FRACTIONS</b> Calculations with decimal fractions</p> <ul style="list-style-type: none"> <li>Revise                             <ul style="list-style-type: none"> <li>Multiplication of decimal fractions not limited to one decimal place</li> <li>Division of decimal fractions by decimal fractions</li> <li>Calculate the squares, cubes, square roots and cube roots of decimal fractions</li> </ul> </li> </ul> <p><b>Solving problems</b></p> <ul style="list-style-type: none"> <li>Solve problems in context involving decimal</li> </ul>	<p><b>EXPONENTS</b> Comparing and representing numbers in exponential form</p> <ul style="list-style-type: none"> <li>Revise compare and represent whole numbers in exponential form</li> <li>Compare and represent integers in exponential form</li> <li>Compare and represent numbers in scientific notation, limited to positive exponents</li> </ul> <p><b>Calculations using numbers in exponential form</b></p> <ul style="list-style-type: none"> <li>Establish general laws of exponents, limited to:                             <ul style="list-style-type: none"> <li><math>a^m \times a^n = a^{m+n}</math></li> <li><math>a^m \div a^n = a^{m-n}</math> if <math>m &gt; n</math></li> <li><math>(a^m)^n = a^{m \times n}</math></li> <li><math>(a \times t)^n = a^n \times t^n</math></li> <li><math>a^0 = 1</math></li> </ul> </li> <li>Recognise and use the appropriate laws of operations using numbers involving exponents and square and cube roots</li> <li>Perform calculations involving all four operations with numbers that involve squares, cubes, square and cube roots of integers</li> </ul>	<p><b>NUMERIC AND GEOMETRIC PATTERNS</b></p> <p><b>Investigate and extend patterns</b></p> <ul style="list-style-type: none"> <li>Revise investigate and extend numeric and geometric patterns looking for relationships between numbers, including patterns:                             <ul style="list-style-type: none"> <li>represented in physical or diagram form</li> <li>not limited to sequences involving a constant difference or ratio</li> <li>of learner's own creation</li> <li>represented in tables</li> </ul> </li> <li>Extend investigate and extend numeric and geometric patterns looking for relationships between numbers, including patterns represented algebraically</li> <li>Describe and justify the general rules for observed relationships between numbers in own words or in algebraic language</li> </ul>	<p><b>FORMAL ASSESSMENT TASK</b></p> <p><b>INVESTIGATION</b></p> <ul style="list-style-type: none"> <li>Exponents</li> <li>Patterns</li> </ul>	<p><b>FUNCTIONS AND RELATIONSHIPS</b></p> <p><b>Input and output values</b></p> <ul style="list-style-type: none"> <li>Revise, determine input values, output values or rules for patterns and relationships using:                             <ul style="list-style-type: none"> <li>flow diagrams</li> <li>tables</li> <li>formulae</li> </ul> </li> <li>Extend determine input values, output values or rules for patterns and relationships using equations</li> </ul> <p><b>Equivalent forms</b></p> <ul style="list-style-type: none"> <li>Revise determine, interpret and justify equivalence of different descriptions of the same relationship or rule presented:                             <ul style="list-style-type: none"> <li>verbally</li> <li>in flow diagrams</li> <li>in tables</li> <li>by formulae</li> <li>by number sentences</li> </ul> </li> <li>Extend determine, interpret and justify equivalence of different descriptions of the same relationship or rule presented by equations</li> </ul>	<p><b>ALGEBRAIC EXPRESSIONS</b></p> <p><b>Algebraic language</b></p> <ul style="list-style-type: none"> <li>Recognize and identify conventions for writing algebraic expressions</li> <li>Identify and classify like and unlike terms in algebraic expressions</li> <li>Recognize and identify coefficients and exponents in algebraic expressions</li> </ul> <p><b>Expand and simplify algebraic expressions</b></p> <ul style="list-style-type: none"> <li>Use commutative, associative and distributive laws for rational numbers and laws of exponents to:</li> <li>Add and subtract like terms in algebraic expressions</li> </ul>	<p><b>FORMAL ASSESSMENT TASK</b></p> <p><b>TEST</b></p> <p>All Term 1 and Term 2 topics</p>					



# Template and Design



# Word

- Header
  - This can include date created,
  - Page number
  - Your details
- Footer
  - As above
- Heading
  - The title of your worksheet
  - Make sure it is descriptive enough
- Saving
  - Make sure you save it so that you can find it again
  - Add tags
  - Save as a pdf so that the layout isn't altered when you send it.

# SHARP

## Worksheet 10: Probability

### Grade 10 Math Literacy

1. Give a definition for each of the following in your own words:
  - a) probability
  - b) prediction
  - c) event
  - d) outcome
  - e) probability scale
  - f) relative frequency
  - g) theoretical probability
  - h) tree diagram
2. Say whether the following events are likely, unlikely, equally likely and unlikely, almost never, or very likely to happen:
  - a) a 90% chance of rain tomorrow
  - b) a tsunami in Johannesburg
  - c) turning into a frog
  - d) throwing a dice and having it land on an even number
  - e) throwing a dice and having it land on 1
3. For each of these events, give the theoretical probability that the outcome given will occur:
  - a) throwing a dice and having it land on 2
  - b) throwing a dice and having it land on an even number
  - c) throwing a dice and having it land on 7
  - d) flipping a coin and having it land on heads
  - e) flipping a coin and having it land on its side

# Another Example

themathejourney.com

## Patterns, Functions and Algebra

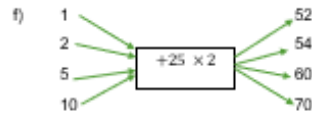
### Functions and Relationships 1

1. Give the definitions for each of these terms:

- a) input value                      b) output value  
c) rules                                d) flow diagrams

2. For each of the patterns given below give the rule in words, and as a number sentence.

- a) 1, 2, 3, 4, 5, 6...                      b) 2, 4, 6, 8, 10, 12...  
c) 3, 5, 8, 12, 17, 23...                d) 1, 4, 9, 16, 25, 36...



g)

x	1	2	3	4	5
y	12	24	36	48	60

h)

x	1	2	3	4	5
y	0	1	1	2	3

- i)  $y = 2x + 5$                               j)  $y = 100 - 5x$   
k)  $y = \frac{1}{2}x + \frac{1}{4}$                                   l)  $A = l \times b$

themathejourney.com

3. For each of the following functions, write the function in the form given in brackets first.

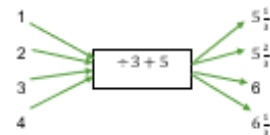
- a) (words) 3, 4, 7, 11, 18, 29...  
b) (table)  $y = 80 - 3x$   
c) (number sentence)

Input	1	2	3	4	5
Output	2	4	6	8	10

d) (flow diagram)

Input	1	2	3	4	5
Output	$3\frac{1}{2}$	$4\frac{1}{2}$	$5\frac{1}{2}$	$6\frac{1}{2}$	$7\frac{1}{2}$

e) (formula)



- f) (formula)  $\_\_\_ = 8x \_\_\_ + 2$   
g) (words)  $\_\_\_ = 5 + \_\_\_ + 2$   
h) (flow diagram)  $y = 36 + x$   
i) (table)  $y = 4 \times x - 5$   
j) (number sentence)

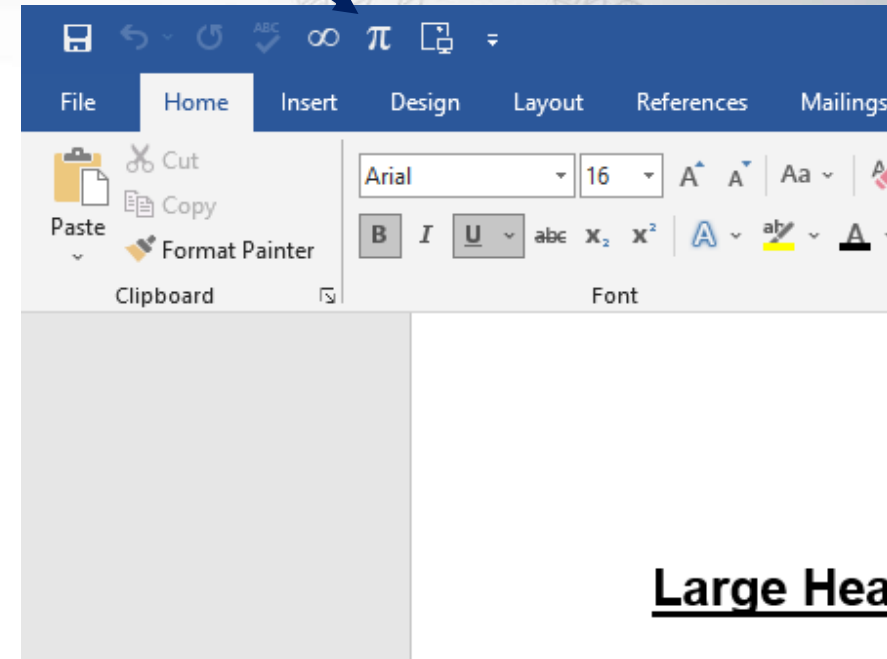
Input	1	2	3	4	5
Output	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$

k) (flow diagram and formula)

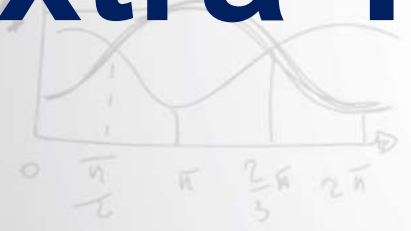
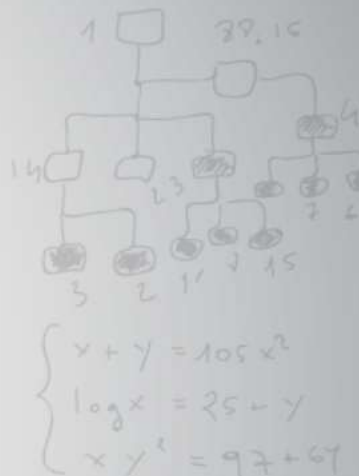
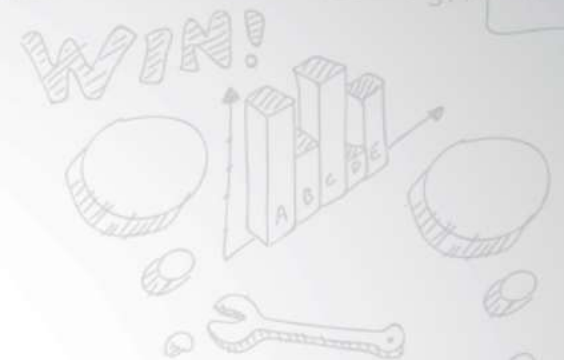
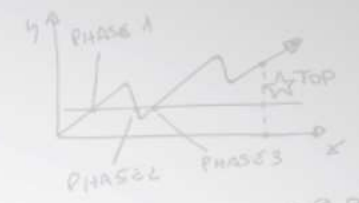
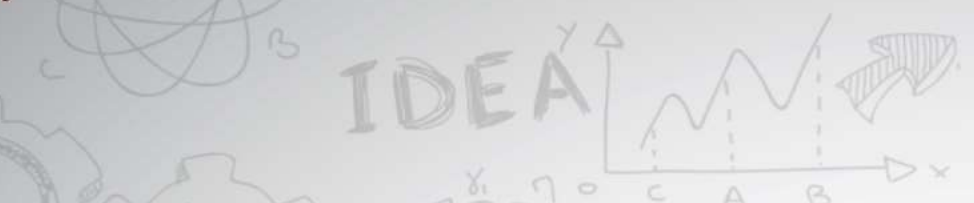
Input	1	2	3	4	5
Output	2.51	2.52	2.53	2.54	2.55

# Tips and Tricks

- Set your equation editor shortcut
- Make sure your font is easy to read, and big enough to read
- For your memo, copy the worksheet across
- Remember the worksheet is yours, so add what you need

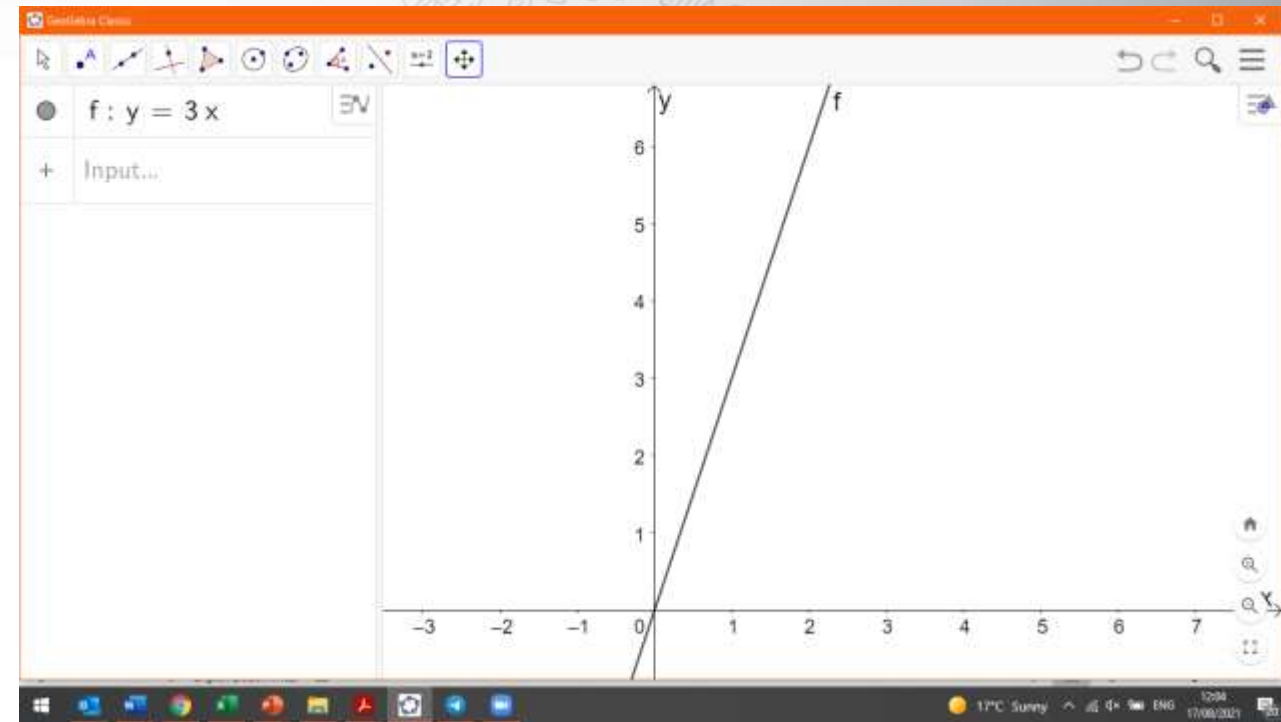


# Extra Tools



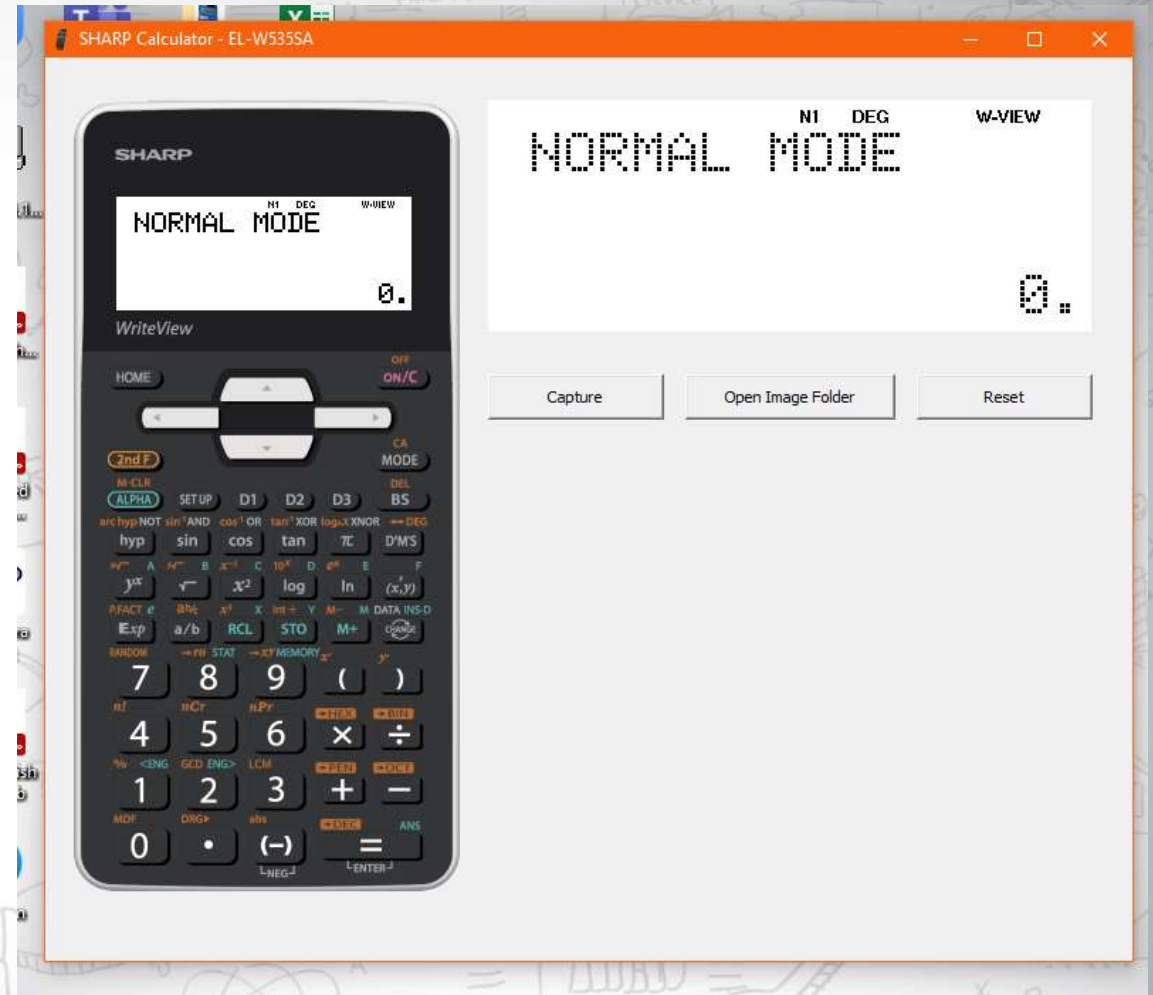
# Geogebra

- Great for drawing graphs and for geometry questions
- Lots of different ways to use it.
- Change your settings to increase the size of the font
- Make sure to label your axes
- Use the setting to add parallel lines and equal lines notation.
- [Video tutorial](#)



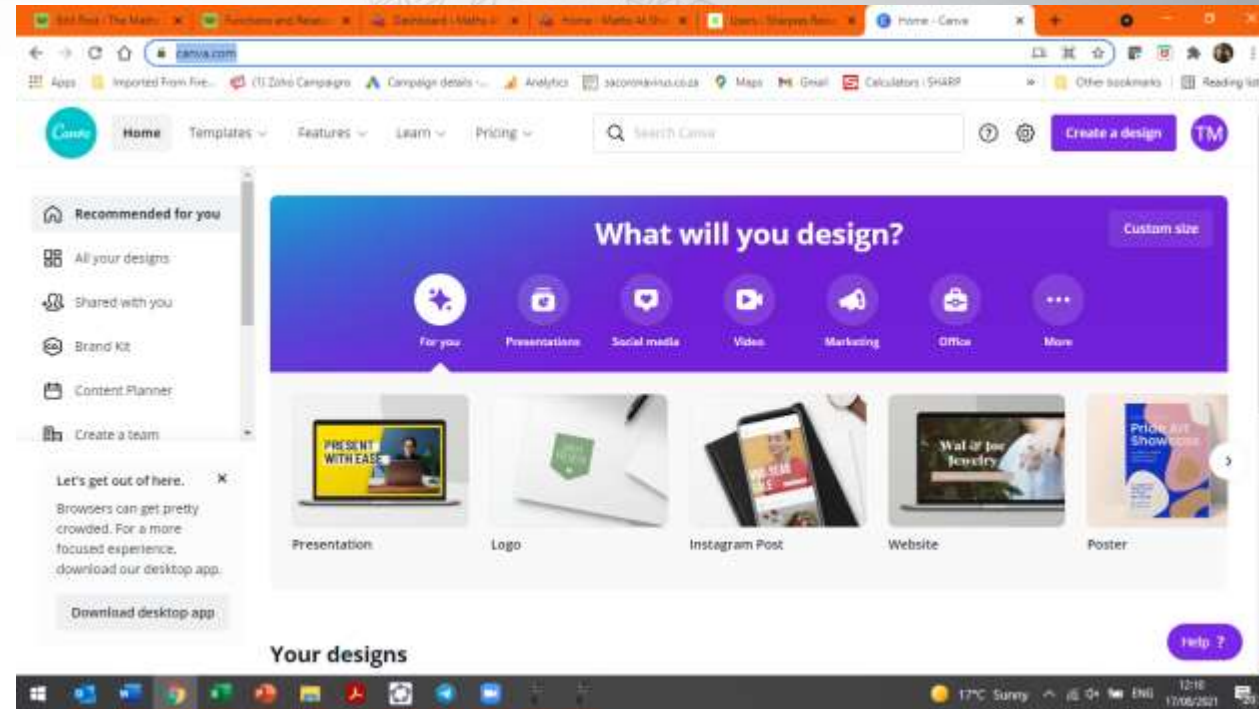
# The Sharp Calculator Emulator

- You can take photos of what you have typed in
  - Open the image folder to access them
  - Press Capture
- Use it to create questions, or check answers.
- (You can also [download the EL-W506T](#) which has an equation solver).



# Canva.com

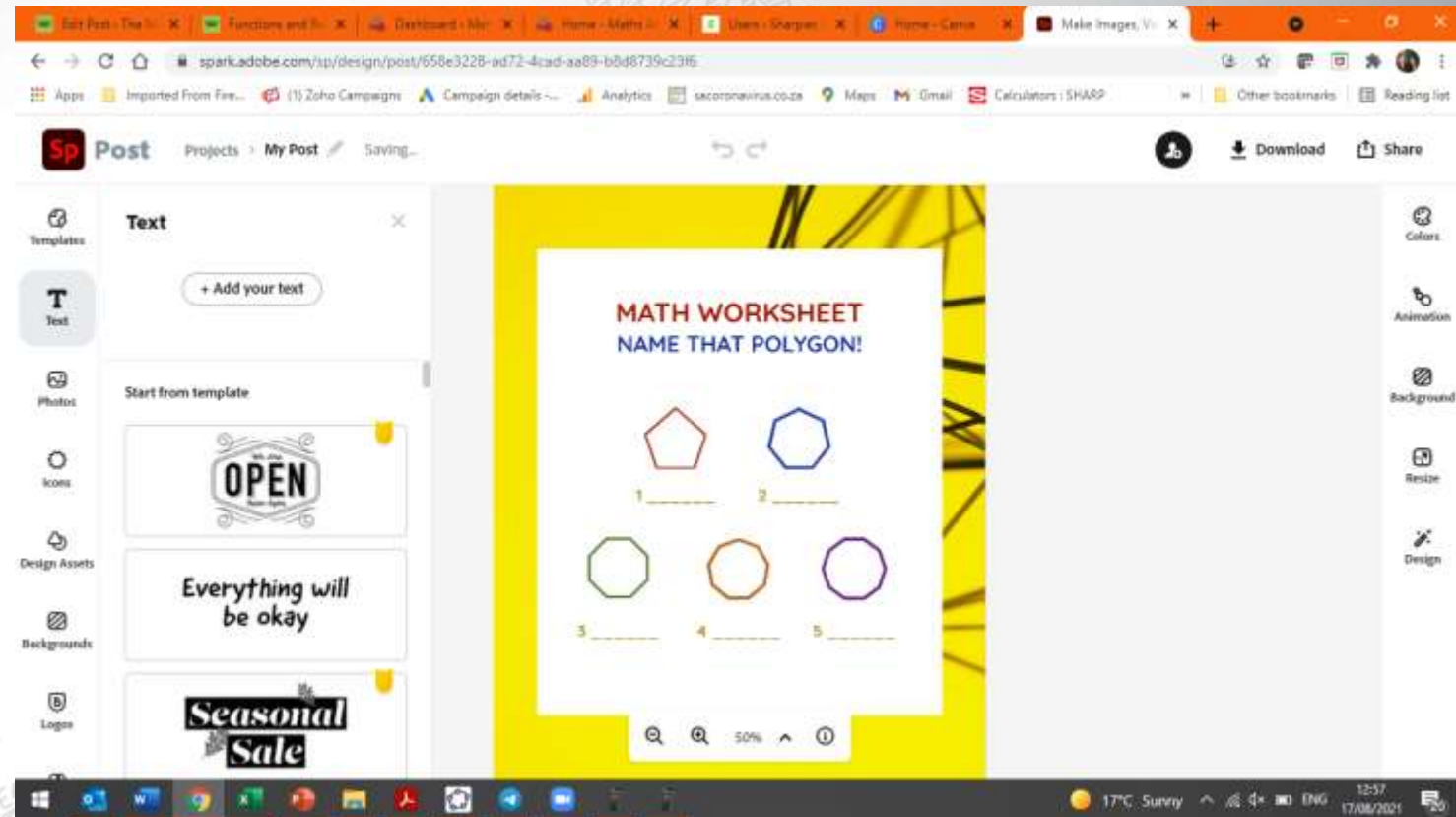
- Epic for pictures and elements
- Also has templates for worksheets, lesson plans and more.
- Use the elements tab to access pictures.
- Sign up for free
  - Can pay \$12.99 monthly if you want access to all the things.





# Other suggestions

- Powerpoint
  - Easy to manipulate
  - Can save templates
- Adobe Illustrate
  - Not free 😞
  - Apparently very easy to use
- [Adobe Spark](#)
  - Similar to Canva.
- Google docs
  - Only the basics are available
- [More suggestions](#)



# Online Fun

- [Kahoot](#)
  - Create your own quizzes and allow your students to answer them
  - Or use existing quizzes
- Non-digital version
  - Each student can create 4 answer cards (for multiple choice)
  - You display / ask the question and they raise their answer cards

The screenshot shows the Kahoot! website homepage. At the top, there's a navigation bar with links for News, School, Work, Home, and Academy. Below this is a yellow banner with a COVID-19 support message. The main content area features four promotional cards: 'Make learning awesome!' with a 'Sign up for free!' button, 'Make remote work more engaging!' with a 'Buy Kahoot! 360 Pro' button, 'New! Host and join kahoots directly within Zoom!', and 'Watch the Kahoot! EDU Summit on-demand'. The bottom of the page has a footer with a link to updated terms and conditions.

# Additional Tips



# Don't be afraid to try

- Readable font
- Don't go to fancy
- Create your memo with your worksheet open
  - Make a digital version (even if it feels like more work now, it will last you for years, and its much easier to change).
- Ask for help
  - Ask a colleague for help with proof reading
  - Leave it for a day or two and come back to it



# Thank you for your valuable time!

Free worksheets and simulator:

[www.mathsatsharp.co.za](http://www.mathsatsharp.co.za)

