Preparing for September

A Webinar for Maths Teachers

August 2020

Jo Morgan

@mathsjem

We'll start at 3pm.

Have a go at this while you wait!

Can you find six consecutive integers that will fit into these boxes in order?

Prime	Factorial	Square	Even	Cube	Triangle

What about these six boxes...?

Cube	Prime	Odd	Square	Fibonacci	Factorial

Today…

✓Pandemic Pedagogy

✓Lesson planning processes
✓Resources
✓Getting organised

✓Questions!

If you find the chat distracting, you can move the chat window off your screen.

If you have a question for me at the end please put it in the Q&A, not the chat.

What classes you'll be teaching?

What topics you're starting with?

Before we start, do you know...

What new routines and restrictions will be in place?

Where you'll be teaching?

‘Nomadic’ teachers

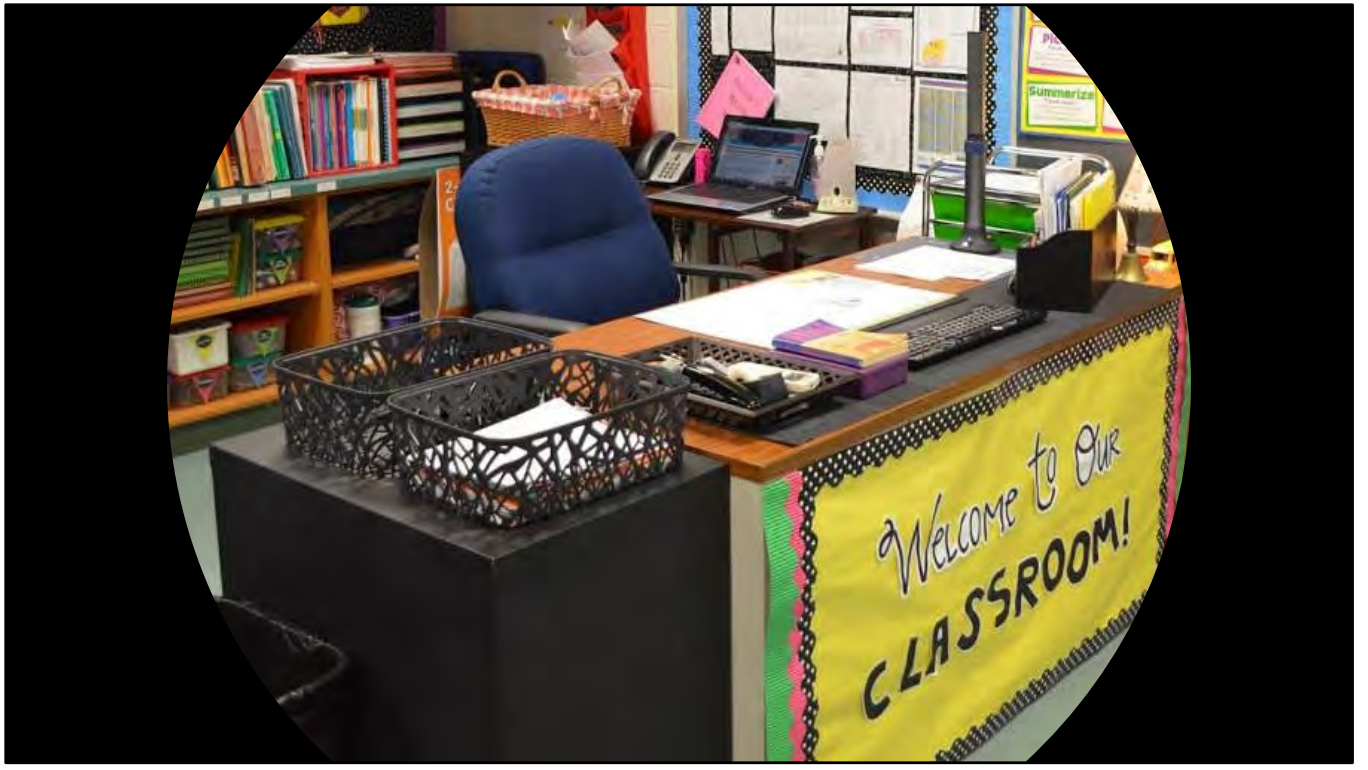
Supporting at a distance

What’s different?

Curriculum?

Groupings

Handouts?


Summarize
Welcome to Our
CLASSROOM!

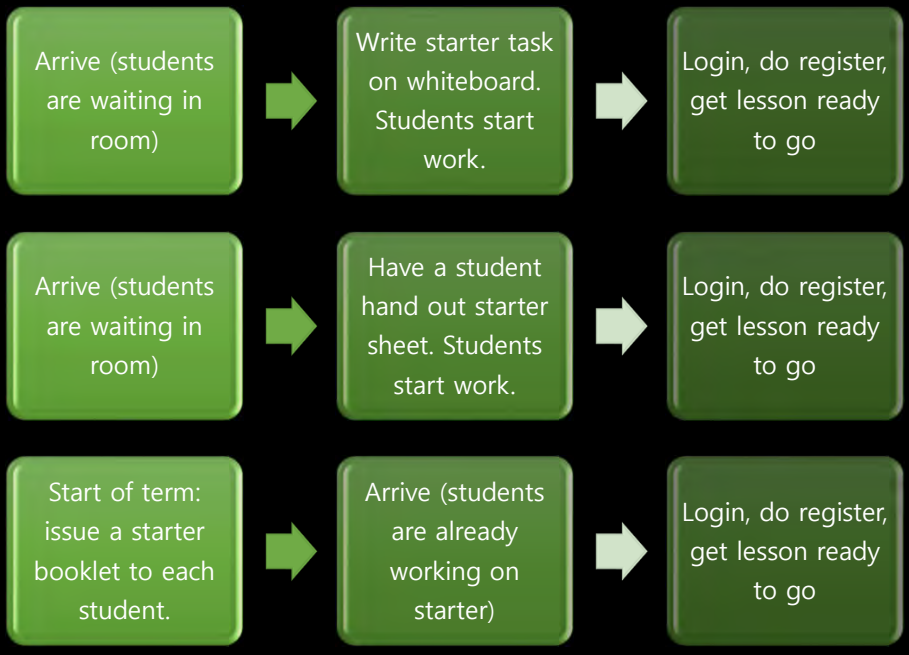
edding 360

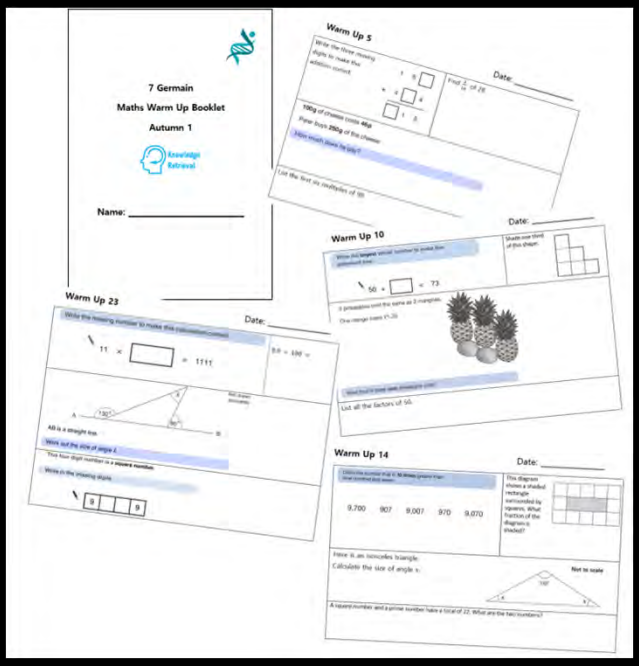
MATHS
AWESOME WORK!

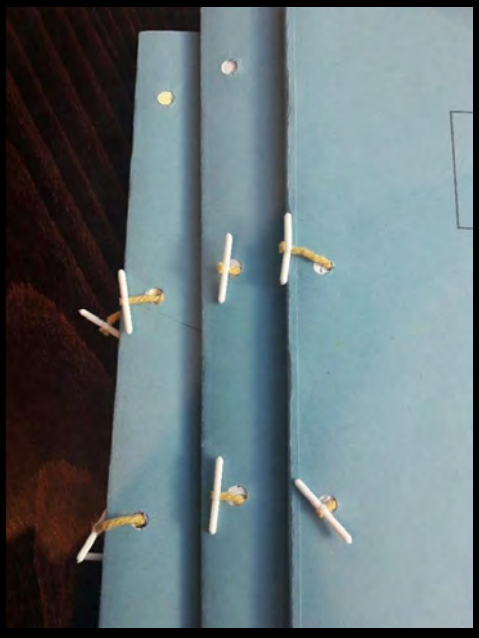
Leave classrooms tidy!

Wipe the board before you leave.

Starting lessons







https://www.resourceaholic.com/2020/07/warm-up-booklets.html

Name: _____ 5-a-day Higher Plus

28th July

Here are the first 5 terms of a quadratic sequence

24 30 38 48 60

Find an expression, in terms of n, for the nth term of this quadratic sequence

A solid sphere has a diameter of 12cm.
The sphere is made from glass.
The density of the glass is 2.97g/cm

Find the mass of the glass sphere.

Solve

$x^2 + 9 > 10x$

A circle has equation $x^2 + y^2 = 196$

Work out the length of the diameter.

A group of scientists want to estimate the number of eels in a lake.
They catch and ring 400 eels.
They return the 400 eels to the lake.
They then catch 700 eels.
Of these, 16 are ringed.

Estimate the number of e
lake.

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Name: _____ 5-a-day Higher

28th July

There are 5 red and 5 green counters in a bag.

Kellie takes out a counter, replaces it and takes out another.

What is the probability of two reds?

On the grid, clearly label the region which satisfies all three inequalities below

$x > 0$ $y \geq \frac{1}{2}x$ $x + 2y < 4$

A is a point on two circles.
The smaller circle is inside the larger circle.

The difference between the area of the smaller circle and the larger circle is $20cm^2$.

The radius of the smaller circle is r cm
The radius of the larger circle is 2cm greater than the radius of the smaller circle.
Show that the radius of the smaller circle is $\frac{5}{\pi} - 1$ cm

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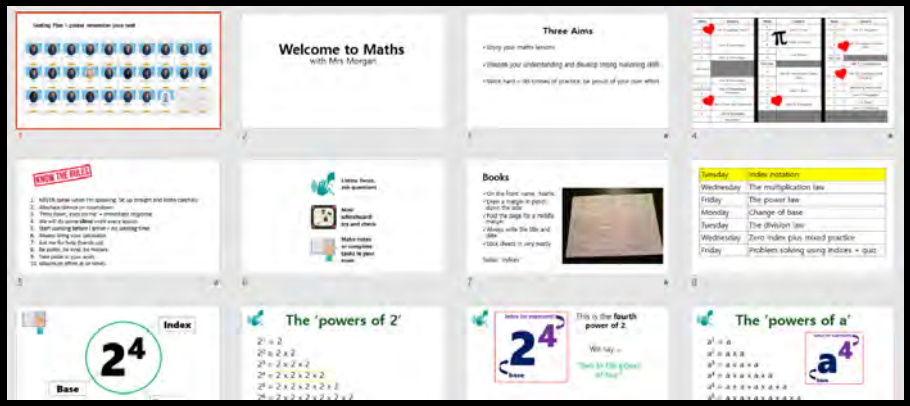
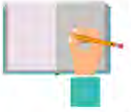
First lessons

- Introductions
- Hand out books and starter packs
- Establish expectations and routines
- Quick overview of the year ahead
- Maths!



Listen, focus, ask questions

Mini-whiteboard: try and check



Make notes or complete tasks in your book

Seating Plans

"Miss, can I sit next to my friend? I'll work better"

Ask last year's teacher

Consider tutor group, gender (seat boy/girl), behaviour, attainment

Read this: https://www.sec-ed.co.uk/best-practice/nqt-special-edition-get-your-seating-plans-right/
Watch this: https://www.tes.com/teaching-resource/seating-plans-6344141

Desirable Routines

- ✓When you arrive they have their equipment and books out and they are all working. They know exactly what to do and where to do it.
- ✓Students indicate when they need support during the lesson, and an appropriate process is in place for this.
- ✓If you need any materials handed out (and you're allowed to do so), it's highly efficient and ensures minimal movement around the room.

If you want this, you need to explicitly teach it and practise it

Watch: https://teachlikeachampion.com/blog/eric-snider-installs-turn-talk-routine/

Support

- ✓Sit students who are likely to need to most teacher support in the front row – these may be the only students you can help directly. Change seating plans when required.
- ✓Consider seating confident 'strong' students next to students who they might be able to support.
- ✓Use mini-whiteboards or a visualiser to view workings and give feedback.
- ✓Consider lesson structures: keep the class together, teach in small chunks, reduce any long periods of independent work.

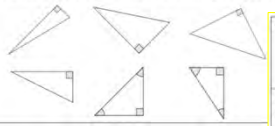
How to use a visualiser: https://www.youtube.com/watch?v=6Jdrx-cv35k

Filling Lockdown Gaps

Evaluate $(11 - 3 \times 2)^2$

The ratio $400g : 1kg$ can be written in the form $1 : n$. Find the value of n.

Label the hypotenuse with the letter 'h' in each of these right-angled triangles.

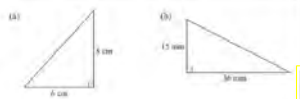


A square number and a prime number have a total of 22. What are th

Find the median: 1, 11, 17, 20

Expand and simplify $(x + 7)(x - 2)$

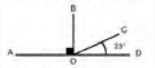
Calculate the length of the hypotenuse in each of these triangles. You may use a calculator.



Find two square numbers that total 45.

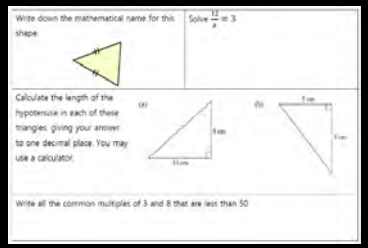
There are 120 males and 180 females in Albany Tennis Club. Write the number of males to the number of females as a ratio in its simplest form.

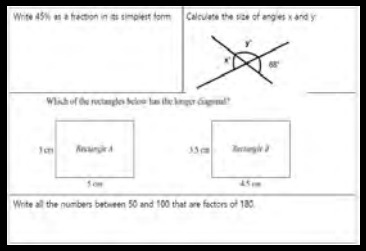
Calculate the acute angle BOC

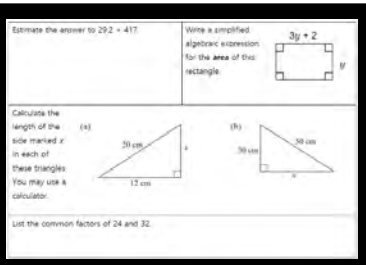


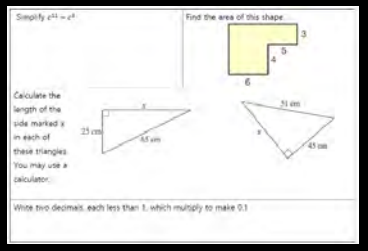
Calculate the length of the hypotenuse in each of these triangles. You may use a calculator.

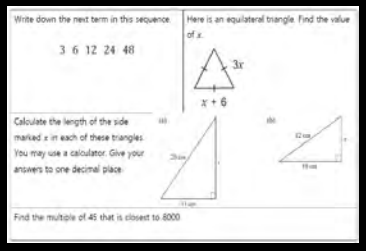
Write all the factors of 30 which are also factors of 20.

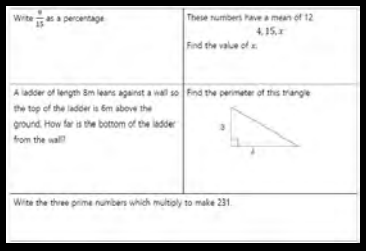


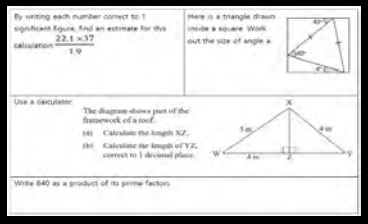












We will use starters to re-teach our 'lockdown' topics

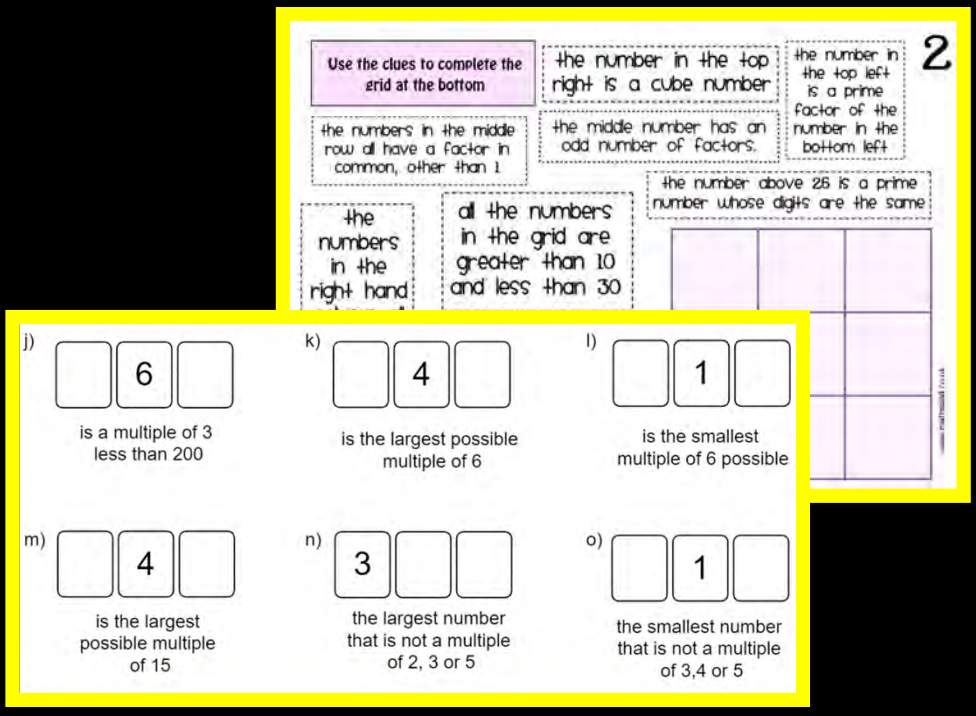
Stretch

- ✓For all classes, including any 'mixed attainment' classes, always have extension work ready.
- ✓Extension work should provide challenge through greater depth, not 'more of the same' and not 'acceleration onto the next topic'.
- ✓Great sources of extension material shown on the next few slides…

MathsPad

(subscription required)

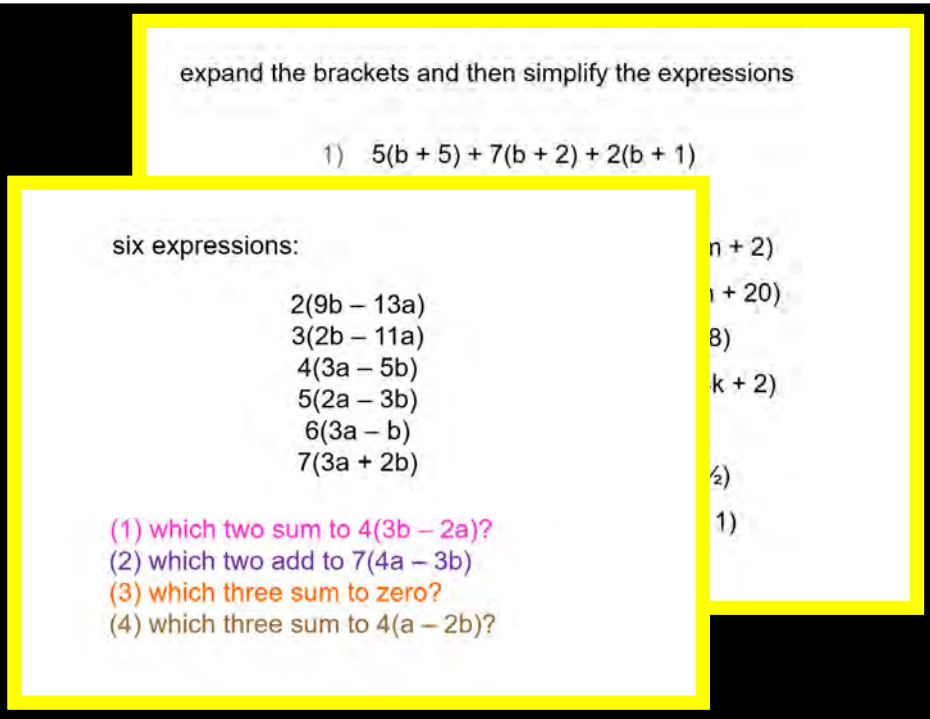
Mystery Grids and other puzzle-based resources



Median Don Steward

(free)

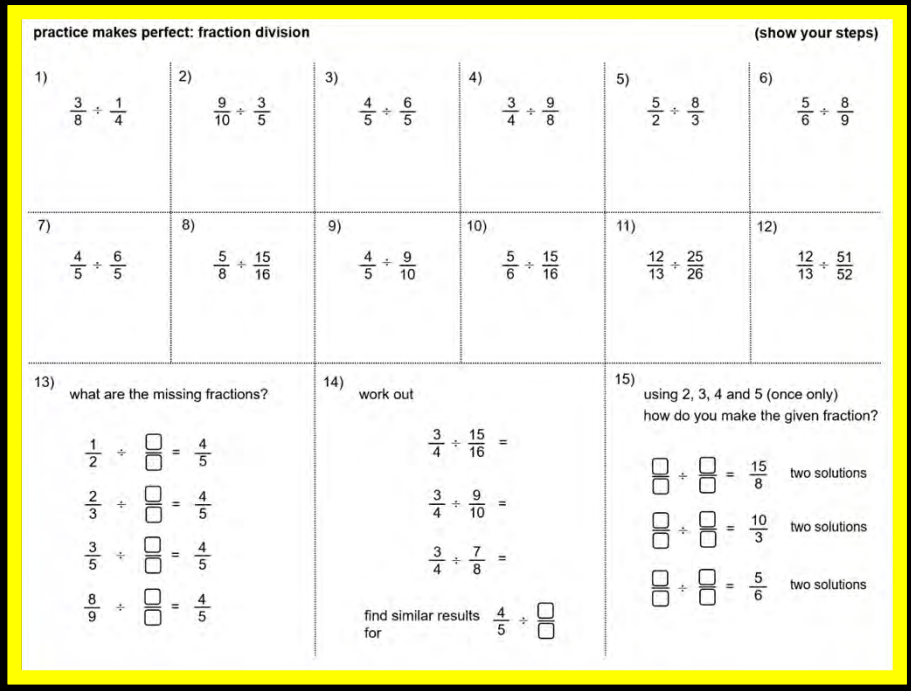
Fluency tasks combined with rich thinking tasks



Median Don Steward

(free)

Fluency tasks combined with rich thinking tasks



practice makes perfect: fraction division **(show your steps)**

1) $\frac{3}{8} \div \frac{1}{4}$

2) $\frac{9}{10} \div \frac{3}{5}$

3) $\frac{4}{5} \div \frac{6}{5}$

4) $\frac{3}{4} \div \frac{9}{8}$

5) $\frac{5}{2} \div \frac{8}{3}$

6) $\frac{5}{6} \div \frac{8}{9}$

7) $\frac{4}{5} \div \frac{6}{5}$

8) $\frac{5}{8} \div \frac{15}{16}$

9) $\frac{4}{5} \div \frac{9}{10}$

10) $\frac{5}{6} \div \frac{15}{16}$

11) $\frac{12}{13} \div \frac{25}{26}$

12) $\frac{12}{13} \div \frac{51}{52}$

13) what are the missing fractions?

$\frac{1}{2} \div \frac{\square}{\square} = \frac{4}{5}$

$\frac{2}{3} \div \frac{\square}{\square} = \frac{4}{5}$

$\frac{3}{5} \div \frac{\square}{\square} = \frac{4}{5}$

$\frac{8}{9} \div \frac{\square}{\square} = \frac{4}{5}$

14) work out

$\frac{3}{4} \div \frac{15}{16} =$

$\frac{3}{4} \div \frac{9}{10} =$

$\frac{3}{4} \div \frac{7}{8} =$

find similar results for $\frac{4}{5} \div \frac{\square}{\square}$

15) using 2, 3, 4 and 5 (once only) how do you make the given fraction?

$\frac{\square}{\square} \div \frac{\square}{\square} = \frac{15}{8}$ two solutions

$\frac{\square}{\square} \div \frac{\square}{\square} = \frac{10}{3}$ two solutions

$\frac{\square}{\square} \div \frac{\square}{\square} = \frac{5}{6}$ two solutions

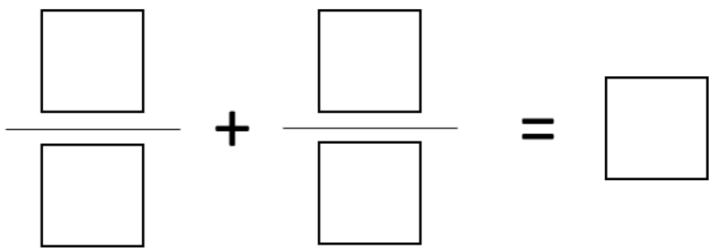
Open Middle

(free)

Rich tasks that require understanding and deeper thinking

ADDING FRACTIONS TO MAKE A WHOLE NUMBER

Directions: Using the digits 1-9, fill in the blanks to make a whole number sum. Use each digit only at most one time. Can you make all whole numbers from 1 to 9?

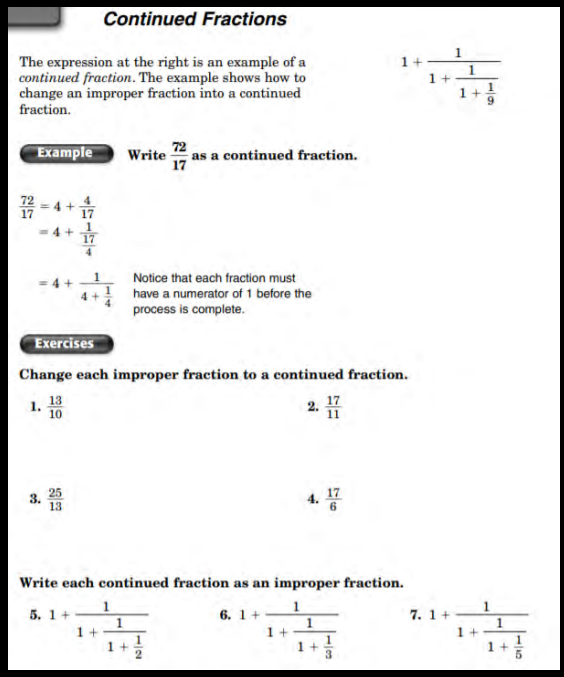


Problem Pages

(to purchase from the MA's website for £5 each)

Always ready to use – helpful for when you have one or two students in the class who always need extension work

Check resourceaholic.com resource libraries for free resources, including many suitable for extension work.



Continued Fractions

The expression at the right is an example of a *continued fraction*. The example shows how to change an improper fraction into a continued fraction.

$$1+\cfrac{1}{1+\cfrac{1}{1+\frac{1}{9}}}$$

Example Write $\frac{72}{17}$ as a continued fraction.

$$\frac{72}{17} = 4+\frac{4}{17}$$
$$= 4+\cfrac{1}{\frac{17}{4}}$$
$$= 4+\cfrac{1}{4+\frac{1}{4}}$$

Notice that each fraction must have a numerator of 1 before the process is complete.

Exercises

Change each improper fraction to a continued fraction.

1. $\frac{13}{10}$
2. $\frac{17}{11}$
3. $\frac{25}{13}$
4. $\frac{17}{6}$

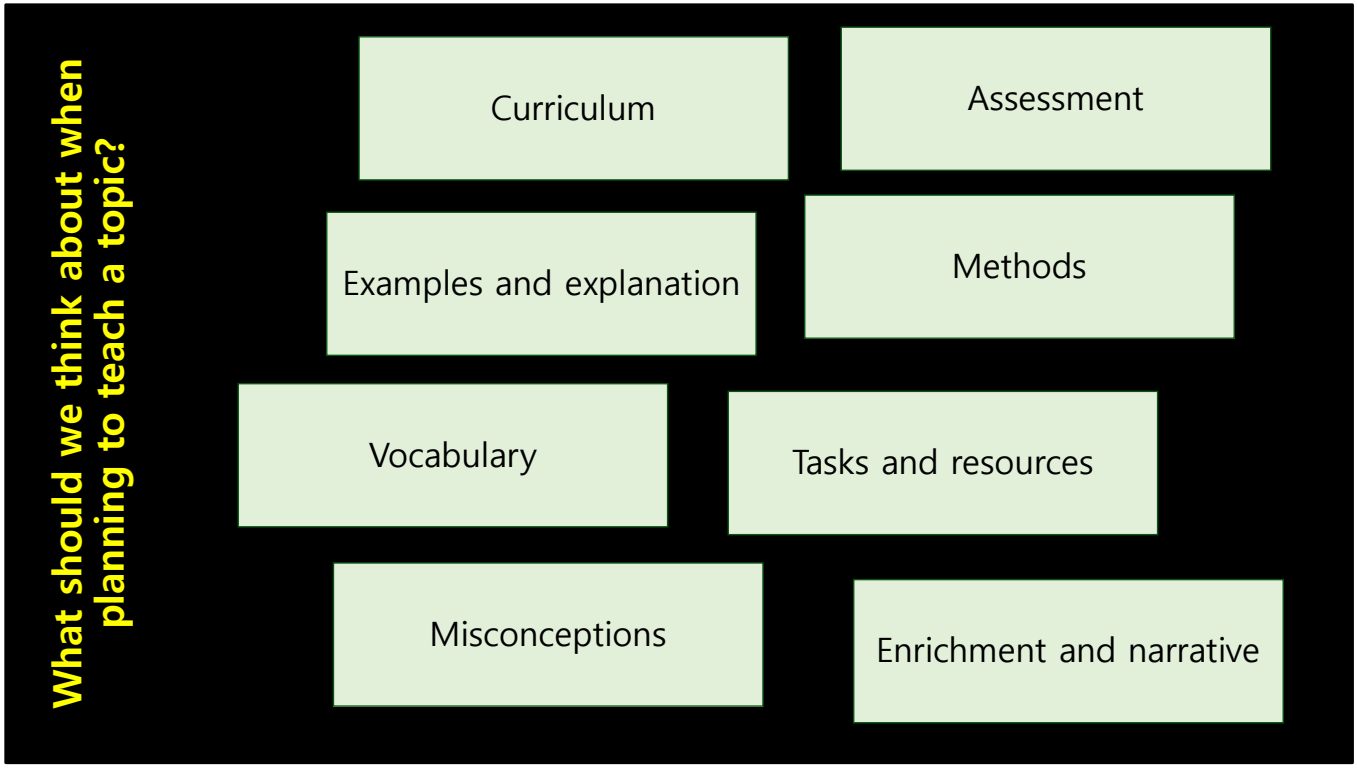
Write each continued fraction as an improper fraction.

5. $1+\cfrac{1}{1+\cfrac{1}{1+\frac{1}{2}}}$
6. $1+\cfrac{1}{1+\cfrac{1}{1+\frac{1}{3}}}$
7. $1+\cfrac{1}{1+\cfrac{1}{1+\frac{1}{5}}}$

Other ideas include UKMT Problems, NRich etc

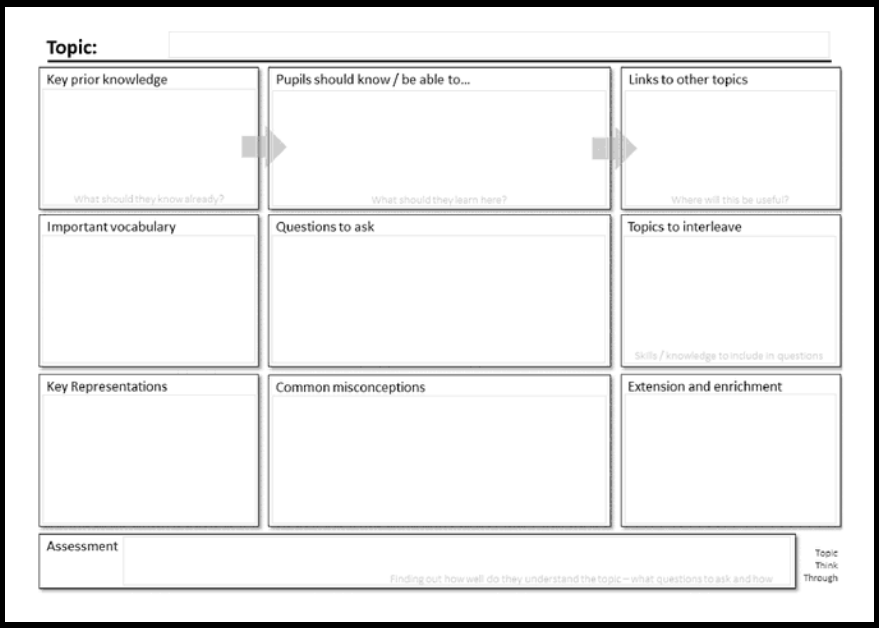
https://drive.google.com/file/d/0B9L2lYGRiK2bVzZBUVBBdnJaMkU/view

‘Normality’



This is what should b in your department meetings

Tom Dolan created a 'topic think through' planning tool to help maths teachers think through a topic or series of lessons before they plan in more detail.



https://beauchampcoll-my.sharepoint.com/:w:/g/personal/tim_dolan_beauchamp_org_uk/EZ9c6bs2lkZCuY91iGwUlnMBaDZVq6kUU6a8g04y6dgubw?rtime=uhgjp9Ig2Eg

Once you've thought through the topic, you can plan out a rough timeline for the sequence of lessons.

Be flexible and responsive to your students – you will need to adapt as you go.

1	Recap surds	8	Method selection: non-RAT
2	Recap right-angled trig	9	3D Trigonometry
3	Exact values: derive	10	½absinC
4	Calculations with exact values	11	Trig graphs
5	Right-angled probs (inc exact values)	12	Exact values & trig graphs
6	Sine Rule	13	Ambiguous case
7	Cosine Rule	14	Consolidation + problems

Monday	Index notation
Tuesday	The multiplication law
Thursday	The power law
Friday	Change of base
Monday	The division law
Tuesday	Zero index plus mixed practice
Thursday	Problem solving using indices
Friday	Quiz and consolidation

https://beauchampcoll-my.sharepoint.com/:w:/g/personal/tim_dolan_beauchamp_org_uk/EZ9c6bs2lkZCuY91iGwUlnMBaDZVq6kUU6a8g04y6dgubw?rtime=uhgjp9Ig2Eg

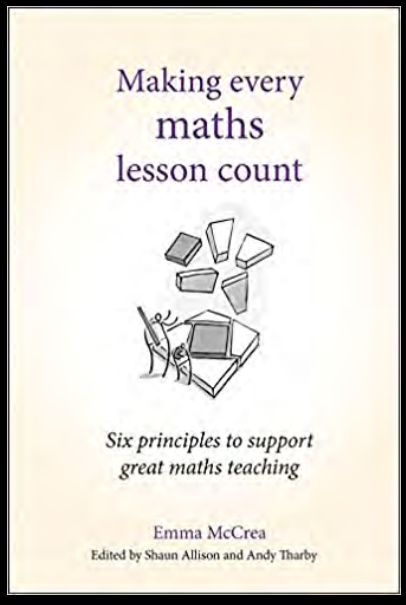
A lesson planning spectrum

1. Download someone else's slides
2. Deliver generic lesson 'blind'

Thought = 1
Time = 1

1. Research the topic in detail
2. Think deeply about how best to teach the topic, drawing on evidence, experience etc
3. Identify the most suitable tasks for your specific students
4. .... etc

Thought = 10
Time = 10



Accessible, succinct and easily digestible, Making Every Maths Lesson Count *neatly summarises the key ideas in maths teaching.*

Jo Morgan, maths teacher and
creator of resourceaholic.com

#MEMLC

Factors in choosing resources…

Does it meet your intended **aims**?

Is it **accessible**, whilst providing **stretch & challenge** ('low floor, high ceiling')?

Practicalities: Is the maths correct? Is the spelling and grammar perfect? Is it print budget friendly? (e.g. A5 black and white). Is it well formatted (clarity, space, font etc) with straightforward instructions? Is cognitive load minimised? (beware clutter).

Are you **looking forward** to using it in class?

Aims: revision, understanding, fluency, assessment etc

Don Steward

a large bag of flour weighs 24kg
it costs £21.50

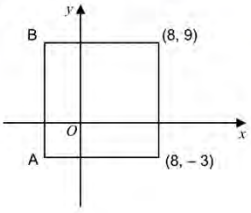
a sponge cake uses
150g of this flour

what are the questions that these calculations find

(a) $\frac{24000}{150}$ (b) $\frac{24}{21.50}$ (c) $\frac{2150}{24}$ (d) $\frac{21.50}{24000}$

squares and coordinates (ii)

(1)



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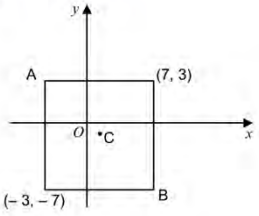

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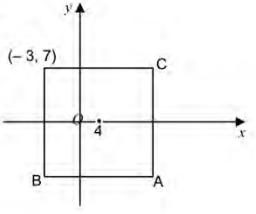

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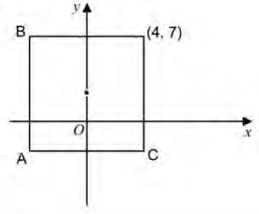


MathsPad

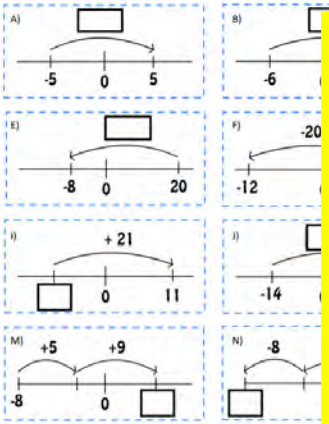
Using prime numbers: true or

Tick the cards that are false...

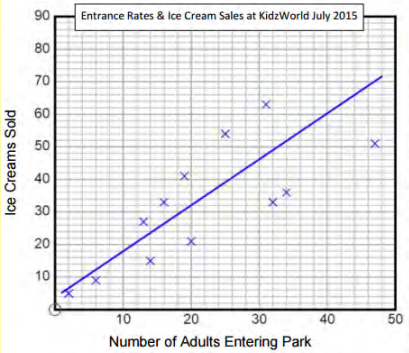
$2 \times 3 \times 13$ is a multiple	$3 \times 15 \times 23$ is a multiple	$2^2 \times 15$ is a multiple	2^{10} is a multiple of 10	16×30 is a multiple
2 is a				
2 is a				
3 is a				
2 is a				

Number Line Journeys

Determine the missing numbers to complete these number line journeys:



Scatter graphs: true or false?



A. From the graph we can use extrapolation to determine the number of ice creams that would be sold when 25 adults enter the park.

B. From these data we can use interpolation to predict that if 10 adults entered the park, 5 ice creams would be sold.

C. From the graph we can reliably extrapolate the number of ice creams sold when 100 adults enter the park.

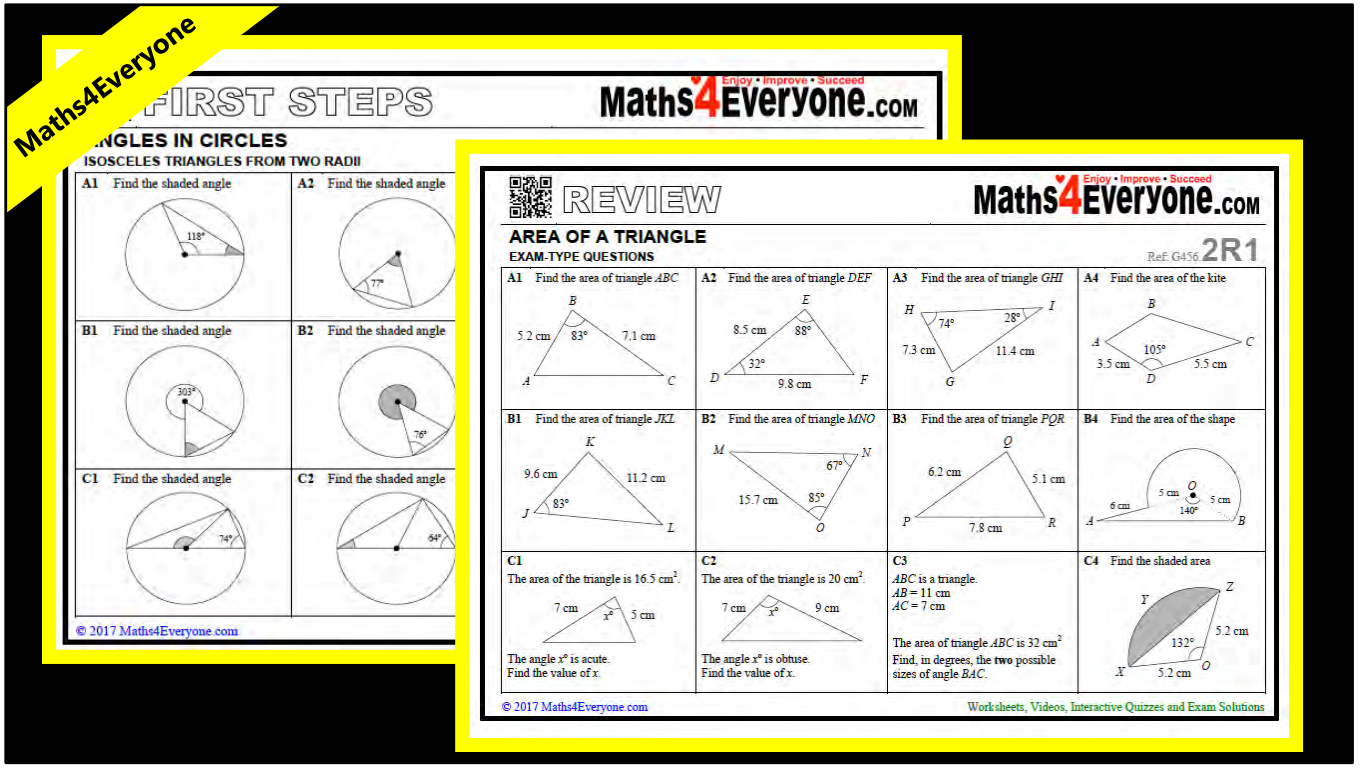
D. We can extrapolate from this data that 50 adults entering the park would lead to 74 ice cream sales.

E. To sell 60 ice creams, we can use interpolation to estimate that 40 adults would need to enter the park.

F. The line of best fit is drawn incorrectly because there are more points below it than above it.

G. The graph shows strong positive correlation.

H. The line of best fit is drawn incorrectly because it should begin at (0,0).



Maths4Everyone on TES

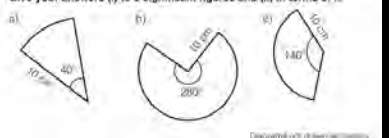
BossMaths.com

Alpha Exercise 1

Find the area of the each sector.
Can you see how the answer to each question is related to the previous one?
Give your answers (i) to 3 significant figures and (ii) in terms of π.

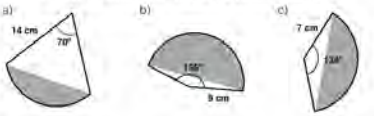
Alpha Exercise 2

Find the area of the each sector.
Can you see how the answer to each question is related to the previous one?
Give your answers (i) to 3 significant figures and (ii) in terms of π.



Gamma Exercise

Each diagram shows a sector of a circle with a segment shaded.
Find the area and perimeter of each shaded segment.
Write your answer correct to to 3 significant figures.



Diagrams not drawn accurately

Explain the mistake

Celia finds the area of the shaded segment as follows:

Area of circle = $\pi \times 6^2 = 36\pi$

Area of sector = $^{120}/_{360} \times 36\pi = ^{36\pi}/_{3} = 12\pi$

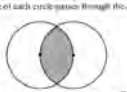
Area of unshaded triangle = $^{1}/_{2} \times$ base $\times$ height = $^{1}/_{2} \times 6 \times 6 = 18$

Area of shaded segment = $12\pi - 18 = -6\pi$

Celia has made two mistakes. What are they?

Challenge

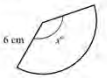
Here are two identical overlapping circles with radius 1. The circumference of each circle passes through the centre of the other.



Show that the shaded area is equal to $\frac{4\pi - 3\sqrt{3}}{6}$

Exam-style question 1

The diagram shows a sector of a circle.



The area of the sector is 14π cm^2.
Find the angle x.

DIAGRAM NOT ACCURATELY DRAWN

Exam-style question 2

The diagram shows a sector of a circle.

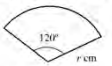


DIAGRAM NOT ACCURATELY DRAWN

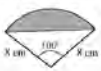
The length of the arc is 6π cm.

a) Find the length r.

b) Hence find the area of the sector. Give your answer in terms of π.

Exam-style question 3

The diagram shows a sector of a circle.



a) Find the area of the shaded segment, rounding your answer to 3 significant figures.

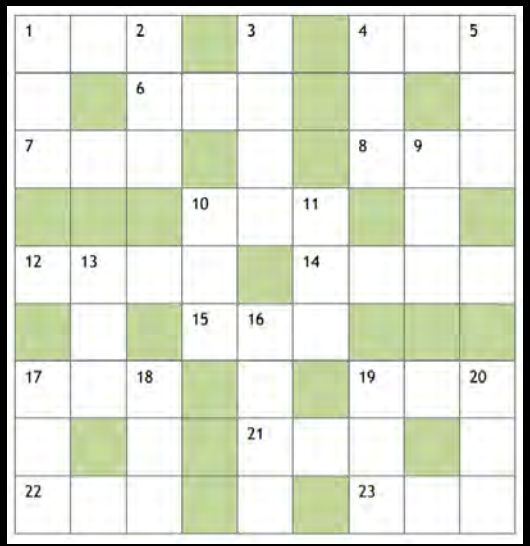
b) Find the perimeter of the shaded segment, rounding your answer to 3 significant figures.

variationtheory.com

$\times 7^2$	Yes / No	$a^7 \times a^2$	Yes / No
$7^3 + 7^2$	Yes / No	$a^a \times a^2$	Yes / No
$7^3 + 6^2$	Yes / No	$a \times a^2$	Yes / No
$7^3 \times 6^2$	Yes / No	$a^0 \times a^2$	Yes / No
$6^3 \times 6^2$	Yes / No	$a^7 + a^2$	Yes
$6^{-3} \times 6^{-2}$	Yes / No	$a^7(a^2)$	Yes
$6^{-3} \times 6^2$	Yes / No	$a^7 \times b^2$	Yes
$6^{0.5} \times 6^{2.4}$	Yes / No	$a^x \times a^y$	Yes
		$x^a \times y^b$	Ye

	Sketch	Radius	Angle	Angle / 360 (simplified)	Circumference of whole circle	Arc length	Area of whole circle	Area of shaded sector
1		6	180°	$\frac{1}{2}$	12π	6π		
2								
3			45°		12π			
4		6		$\frac{3}{4}$				
5		6				2π		

TeachIt Maths



Across		Down	
1.	Smallest 3-digit cube	1.	A palindromic square number
4.	$\sqrt{982081}$	2.	24^2
6.	3^6	3.	$2 \times 10^3 - 2^1$
7.	Largest square number below 200	4.	Biggest 3-digit square number
8.	First 3 digits of $\sqrt{179\,854\,921}$	5.	$(\sqrt{2} \times \sqrt{72})^2$
10.	$\sqrt[3]{5\,929\,741}$	9.	Last three digits of 2^{14}
12.	$2^{10} + 2^7$	10.	A power of 2
14.	$\sqrt{2.25} \times 16^3$	11.	Rearrange the digits of 14^2 to form another square number
15.	Answer to 6 across plus 10^2	13.	Mean of 1 across and 11 down
17.	A palindromic square number	16.	A 7^{th} power
19.	A square, and each digit is square	17.	$10 \times 8^2 + 3^2$
21.	$5^4 + 4^4$	18.	5 squared squared
22.	$(\sqrt{905})^2$	19.	$\sqrt[3]{72\,511\,713}$
23.	3 squared, cubed	20.	11 down plus $\sqrt{900}$

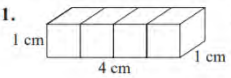
https://www.teachitmaths.co.uk/resources/ks3/indices/power-and-roots-crossword/29567

Others eg https://www.teachitmaths.co.uk/resources/ks3/number/calculator-crossnumber/27986

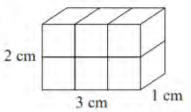
cimt.org.uk

...at is the volume of each of these solids:

1.



2.



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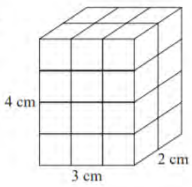
3.



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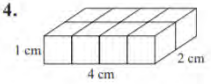

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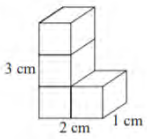
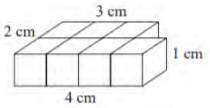
5.



6.



1. $(6 \times 10^4) \times (2 \times 10^5) = (6 \times 2) \times (10^4 \times 10^5)$

$= \quad \times 10^{\square}$

$= \quad \times 10^{\square}$

2. $(8 \times 10^7) \times (3 \times 10^{-2}) = (\quad \times \quad) \times (10^{\square} \times 10^{\square})$

$= \quad \times 10^{\square}$

$= \quad \times 10^{\square}$

3. $(8 \times 10^{16}) \div (2 \times 10^5) = (8 \div 2) \times (10^{16} \div 10^5)$

$= \quad \times 10^{\square}$

4. $(4.2 \times 10^{13}) \div (3 \times 10^4) = (\quad \div \quad) \times (10^{\square} \div 10^{\square})$

$= \quad \times 10^{\square}$

https://www.cimt.org.uk/projects/mepres/book8/bk8_16.pdf

Resourceaholic

Ideas and resources for teaching secondary school mathematics

Blog | Gems | Algebra | Number | Shape | Data | Year 12 Pure | Year 13 Pure | Statistics | Mechanics | Homework | Blog Archive

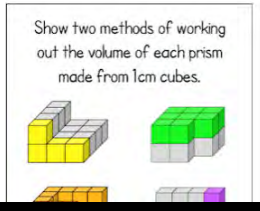
11 May 2019

5 Maths Gems #110

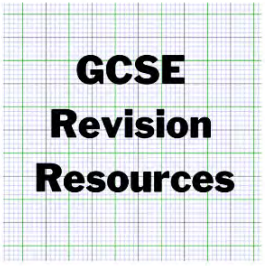
Welcome to my 110th gems post. This is where I share some of the latest news, ideas and resources for maths teachers.

1. TES Author
When we did the latest round of TES Maths Panel reviews, my fellow panelist Damian Watson discovered the wonderful free resources of TES author cparkinson3. This author's PowerPoints are really well designed - they are slick and professional with neatly animated worked examples plus exercises with solutions.

For example check out the two lessons on volume of prisms - one for Foundation tier and one for Higher tier.



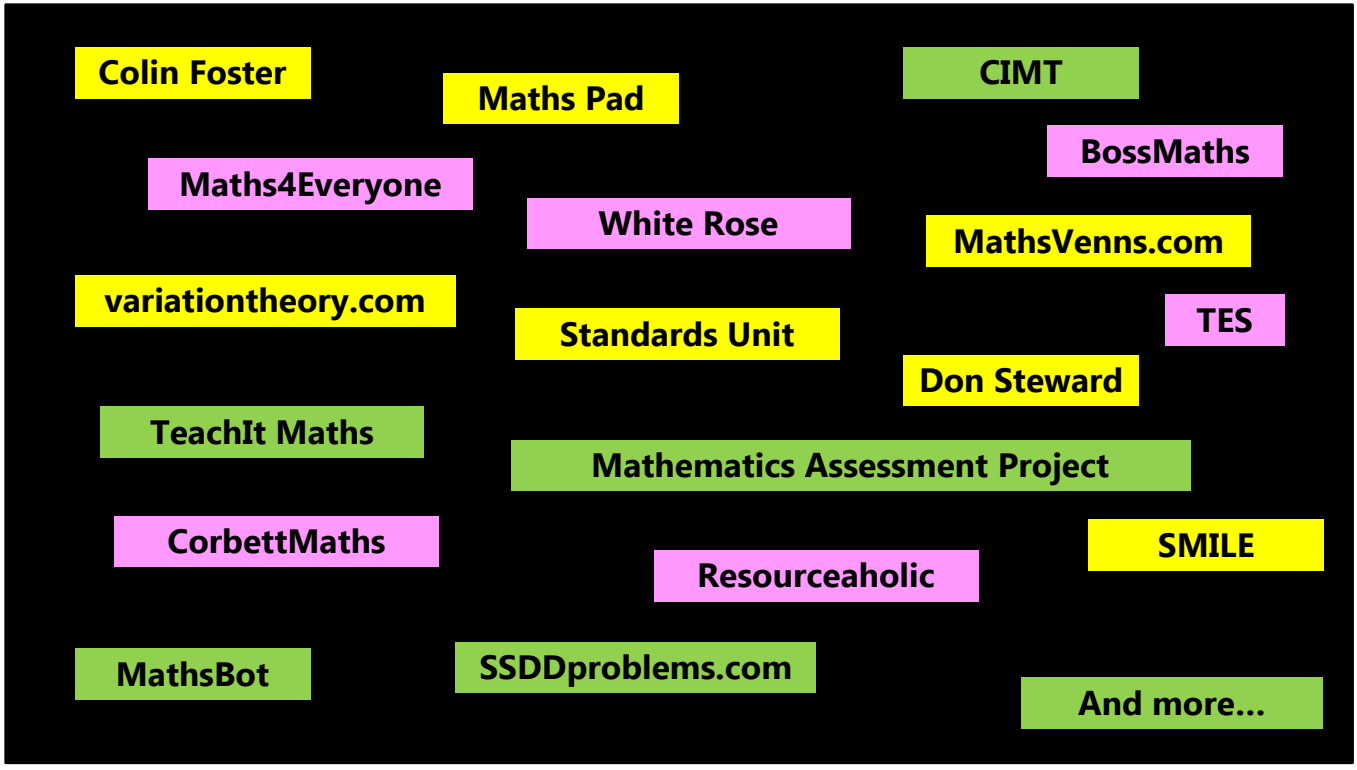
Revision Collection



Extras

Blog archive
Topics in depth project
Topic posts
Gems index

Resources
Resource library



+ Nrich + lots more etc

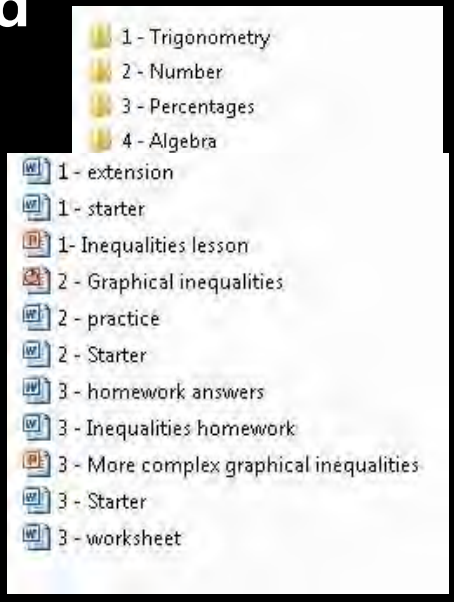
Resources Overload

Save it when you see it!

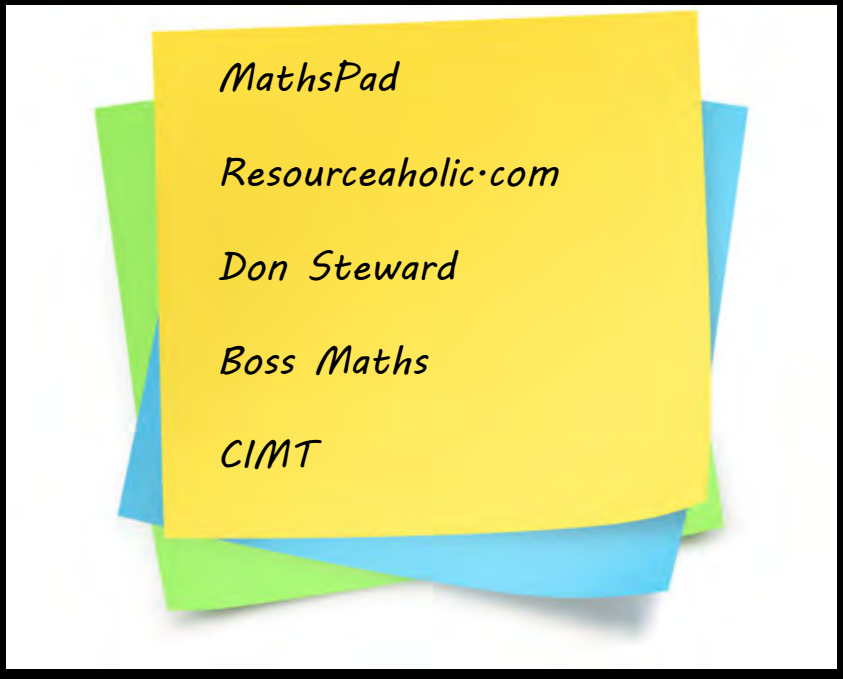
If you have to work out answers, take a photo to save time next year.

Organise your files well (numbered lessons).

Choose a few 'go to' websites.



http://www.symbaloo.com/home/mix/mathsresourcewebsites?quickstart=1


MathsPad
Resourceaholic·com
Don Steward
Boss Maths
CIMT

General advice

- ✓Pace yourself!
- ✓Don’t be afraid to ask
- ✓Don’t plan too far in advance
- ✓Priorities: behaviour + explanations
- ✓Enjoy!

What questions do you have?

What next?	
Follow me on Twitter	**@mathsjem**
Buy me a drink!	**buymeacoffee.com/mathsjem**
Join the MA	**m-a.org.uk**

100 min lessons question:
https://twitter.com/mrsdenyer/status/1297626759869988866?s=20 and
http://taylorda01.blogspot.com/2016/08/after-year-of-one-hundred-minute-lesson.html