Problem Solving Project

There are 4 activities for you to choose from this week. The theme this week is problem solving. You don't need to complete all of them, but choose those that interest you the most. All of the tasks will require you to think outside the box and try different ideas to solve them. They have varying degrees of difficulty so if you think one is too easy, move on to the next one to complete.

Why is this so important? Other than for the satisfaction of solving something tough, why do we problem solve?

Check out this video for a bit of inspiration https://youtu.be/uAfEVtYGfkM

If you are in Year 7 or 8 and Mrs Strudwick is your teacher, I would recommend activities 1 or 2. For those of you who find maths easier, then the more difficult puzzles in Task 2 and some of the Brian teasers in Task 3. If you are doing tasks together then you could compete on Task 4 to see who gets there first!

> Task 1: BBC Bitesize Weekly Challenges
> Task 2: Puzzle of the Week Competition
> Task 3: Brain Teasers
> Task 4: Maths Murder Mystery Code Breaker

Task 1: BBC Bitesize Problem Solving

These are challenges from the BBC and are designed for students aged 7 to 15, so they do get more difficult as you go. If you're stuck, go for trial and error or draw something to help you picture it.

For answers go to: https://www.bbc.co.uk/bitesize/articles/z4jgrj6

If you enjoy these puzzles and would like more, BBC are releasing weekly challenges every Friday at www.bbc.co.uk/bitesize/dailylessons and you can share how you're getting on @bbcbitesize before answers are released every Monday.

Challenge 1

Can you work out the values of each shape?

$$\star + \star = 20$$

$$\heartsuit - \star = 7$$

$$\heartsuit - \heartsuit = \triangle$$

Challenge 2

Tom has six 10p coins and three 5p coins. He buys an apple for 59p and two pencils.

He has no money left. How much does a pencil cost?

Challenge 3

Here are some digit cards.

3 5 8

Amir and Donna each make a three-digit number using all the cards.

Amir notices that when he subtracts his number from Donna's number he gets an answer greater than 300 but less than 400.
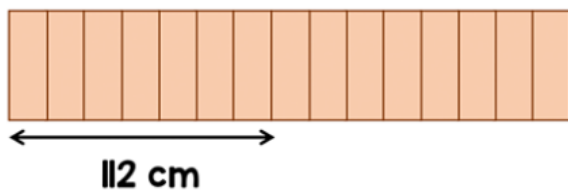
What numbers did they make?

Challenge 4

Five identical rectangles are put together to make a large rectangle.

The width of one rectangle is 4cm. Work out the perimeter of the large rectangle.
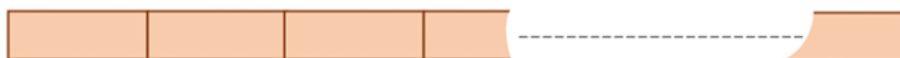
4 cm
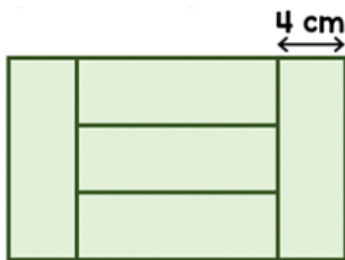
Challenge 5

15 identical blocks are lined up as shown.

112 cm

The length of each individual block is twice the width.

If all 15 blocks are then laid end to end lengthways, what is the total length of the blocks altogether now?
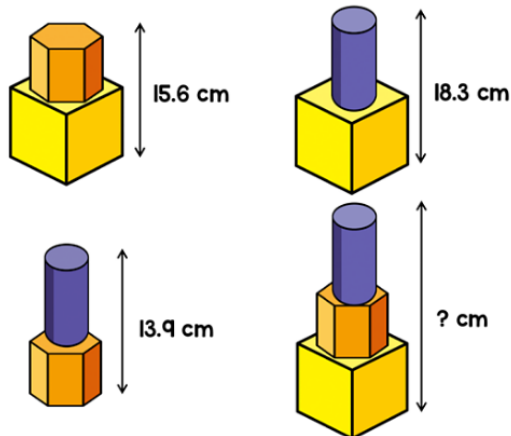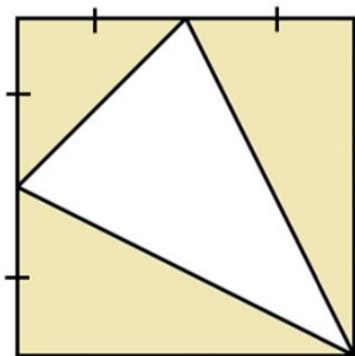
Challenge 6

Liam has these three shapes.

He uses them to make different towers. He measures the height of each tower he makes.

15.6 cm

18.3 cm

13.9 cm

? cm

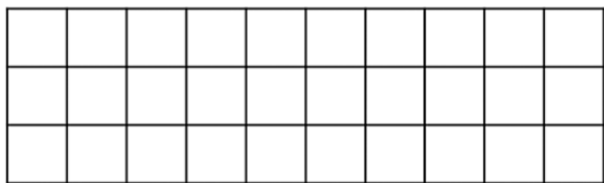Liam stacks all three shapes to make one tall tower. How tall is the tower?

Challenge 7

The diagram shows a square. The square has been divided into 4 triangles. What fraction of the square is shaded?

Challenge 8

Lisa has this squared grid.

She shades some squares green so that the ratio of green squares to white squares is **1:2**.

She shades some more squares green so that the ratio of green squares to white squares is **4:1**.

How many more squares did Lisa need to shade?

Task 2: Puzzle of the Week

Each of these puzzles are part of an international puzzle competition for schools.

You can find this week's live puzzle at www.puzzleoftheweek.com where you can submit your answers and enter Latimer Arts College into the world of competitive problem solving!

If you need a starting point, try drawing the problem out or trying different numbers and see what happens. If your first guess doesn't work, what do you need to change? You don't need to do every one, use the difficulty rating as a guide.

The puzzles also have suggested extensions to get you thinking more deeply especially if you are in year 9 set 1 or 2.

Puzzle Number 119 (Difficulty ★)

PUZZLE OF THE WEEK

Entries open: 09/03/20
Entries close: 15/03/20

puzzle number
119
scan to enter

There are four customers waiting for their drink at a coffee shop.
They each ordered a different drink and paid a different amount.

Zoe paid 50p more than the person who ordered an espresso.

Kate ordered a cappuccino.

Fiona paid more than anyone else.

Fiona paid 50p more than Kate.

Kate paid £3 for her drink.

One person ordered an americano.

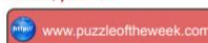Zoe paid £1 less than the person that ordered a latte.

How much did Agron pay for his drink?

Give your answer in pounds (£)

Extension: Can you add a 5th person and their drink and add clues to create your own, harder, puzzle?

🐦 @asharpeducator   Puzzle created by Andrew Sharpe   www.puzzleoftheweek.com

Puzzle Number 126 (Difficulty ★★)

PUZZLE OF THE WEEK

Entries open: 27/04/20
Entries close: 03/05/20

puzzle number
126
scan to enter

Chris builds towers using playing cards. He has one pack of 52 cards.
He only builds towers where every level is complete.

He needs 2 cards to make a tower that is **1 level high**.

He needs 7 cards to make a tower that is **2 levels high**.

He needs 15 cards to make a tower that is **3 levels high**.

How many levels high is the tallest tower Chris could make?

Extension: What if Chris had 5 packs of cards?
Extension²: How many cards does a tower n levels high need?

🐦 @puzzleoftheweek   Puzzle created by Chris Smith, used with permission. Find more of his puzzles on his Corona Conundrums YouTube playlist.   www.puzzleoftheweek.com
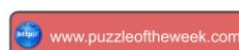
Puzzle Number 123 (Difficulty ★★)

ECPOKAPN YKSOIIQ MN
OUKRON OGL

Hint: What does the logo in the top left normally look like?
Extension: Create your own cipher and send a message to a friend.

Puzzle Number 120 (Difficulty ★★★)

James puts the numbers 1 to 19 into this beehive shape.

	17	
19		11
12		14
	13	

Each row, in all directions, adds to make 38.

Hint: the top row is a good place to start.

What number must go in the red hexagon?

Extension: Can you make your own magic hexagon which is different to James' puzzle?

Puzzle Number 122 (Difficulty ★★★)

Charlie makes different sets of **five positive whole numbers**.
He finds there are only 4 sets whose mean, median and mode are all equal to 3.

1, 2, 3, 3, 6   1, 3, 3, 3, 5   2, 3, 3, 3, 4   3, 3, 3, 3, 3

Definitions

Mean:	The value when you add all the numbers in the set together and then divide by how many numbers there are in the set.
Median:	The number in the middle of the set (when the set is ordered by value).
Mode:	The number which appears more than any other in the set.

How many sets are there whose mean, median and mode are all equal to 5?

Extension: Will there be more or fewer sets whose mean, median and mode are all equal to 6?

Puzzle Number 121 (Difficulty ★★★★)

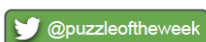Jennifer finds lots of sets of positive whole numbers that add together to make 15.

She then multiplies all the numbers in each set together.
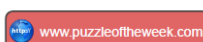
Example 1:   5 + 5 + 5 = 15   and   5 x 5 x 5 = 125

Example 2:   4 + 3 + 7 + 1 = 15   and   4 x 3 x 7 x 1 = 84

What is the largest number she can make when multiplying?

Extension: What if she had a total of 16 or 17? How do the totals increase?

Puzzle Number 124 (Difficulty ★★★★)

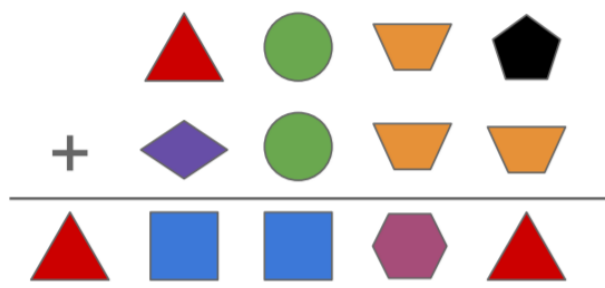A four digit number is added to a different four digit number to make a five digit total.

Each shape represents a digit between 0 and 9.

Each type of shape represents a different digit.

What is the five digit total?

Hint: The red triangle is a good shape to start on.
Extension: Can you add more shapes to the puzzle so that it still works?

Task 3: Brain Teasers

These activities have been designed to wake up your brain! Please spend no more than 10-15 minutes on each one. If you enjoy these tasks, you can find more here:
https://www.transum.org/Software/SW/Starter_of_the_day/Index.asp?M=5

There is one activity for each day of the month, so they are perfect for keeping your brain awake during lockdown!

ODD ONE OUT

30, 25, 55, 35, 40, 15, 35, 45, 10, 55,
45, 55, 25, 25, 50, 25, 50, 25, 25, 40,
15, 45, 10, 55, 25, 25, 15, 35, 15, 25,
45, 55, 40, 10, 20, 15, 50, 55, 45, 43,
10, 50, 45, 40, 45, 40, 50, 10, 40, 25.

Which number is the odd one out? Write down as many reasons as you can think of explaining why that number is the odd one out.

TRANSUM Maths Lesson Starter Of The Day — Sum Square

1 2 3 4 5 6 7 8

☐ + ☐ + ☐ = 21

☐ + ☐ (column)   ☐ + ☐ (column)

☐ + ☐ - ☐ = 5

= 17   = 9

Arrange the numbers one to eight on the yellow tiles to make the four totals correct.

CHIN-UPS

Philip Fitter exercised each weekday.

On Monday he did 9 chin-ups.
On Tuesday he did 10 chin-ups.
On Wednesday he did 7 chin-ups.
On Thursday he did 10 chin-ups.

How many chin-ups did he do on Friday if his average (mean) for the five day week was 10 chin-ups per day?

| Rintin Rep | Barry Blue | Sonia Strong | Hetty Health |

Three Make 1000

Choose three different numbers from the table then add them together.

271	307	179	390
385	477	468	262
270	469	340	377
398	192	261	353

How many different ways are there of making 1000?

Four To Seven

Which of the numbers from one to twenty can you make with the digits:

4, 5, 6 and 7

You can use any mathematical operations but you must use all four digits once in each calculation.
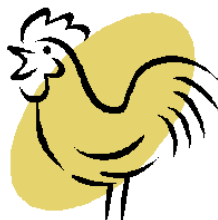
Example 20 = 4(7 - 6) x 5

Connecting Rules

x = 3

y = 4

Find 20 rules connecting x and y
Eg. 5y - 17 = x

Rabbits and Chickens

A farmer has some rabbits and chickens.
Altogether they have 65 heads and 204 feet.
How many rabbits and chickens are there?

Letters in Numbers

Can You Find...

... an even number with an odd number of letters?

... a square number with a prime number of letters?

... a cube number with a triangular number of letters?

... an odd number with an even number of letters?

... a prime number with a square number of letters?

... a triangular number with a cube number of letters?

Extension: Which numbers have the same number of letters as their value?

□□÷□

■ Use 5, 6 and 7 to get as close as possible to a target of 8

□□÷□

■ Use 3, 4 and 5 to get as close as possible to a target of 13

□□÷□

■ Use 6, 7 and 9 to get as close as possible to a target of 11

□□÷□

■ Use 1, 3 and 5 to get as close as possible to a target of 9

□□÷□□

■ Use 5, 6, 7 and 8 to get as close as possible to a target of 4

This exercise is not about getting exact answers,
it is a challenge to get as close as possible to the target.

+999
Nine Nine Nine
STARTER OF THE DAY

Arrange the given digits to make three 3 digit numbers that add up to 999.

□ □ □
□ □ □
+ □ □ □
—————
9 9 9

1 2 3
4 5 6
7 8 9

Clear

OBLONGS

Find the length and width of a rectangle if its perimeter is 34cm and area is 66cm^2.

What are the dimensions of a rectangle whose perimeter is 40cm and area is 91cm^2.

Find the dimensions of a rectangle whose perimeter is 29cm and area is 49.5cm^2.

Find the dimensions of all the rectangles whose perimeters in cm are twice the value of their areas in cm^2.

Task 4: Maths Murder Mystery

On Monday morning, before the children turned up for school, the caretaker discovered three dead bodies in the mathematics department!

Officer PC Wellington is in charge of the case, and has found a number of clues that may lead him to uncovering the identity of the culprit.

Your task is to help him discover:

1) the murderer
2) the room
3) the murder weapon

Work quickly - who knows who could be next!

Possible murder suspects:

1) Mr Urry - who was wearing a white T-shirt with 2 stripes and ripped jeans on the day of the murder.

2) Mrs Caldwell - who was wearing a knee-length green skirt, white blouse and gold watch.

3) Mr Wall - who was wearing a blue Adidas T-shirt with 3 stripes on the sleeves, Bermuda shorts and a baseball cap.

4) Mr Barczewski - who was wearing a black and white pin-stripe suit with shiny black shoes.

5) Mrs Strudwick - who was wearing a blue knitted jumper with a picture of pi on the front, and brown cords.

Possible rooms:

1) The Canteen
2) The Tuck-shop
3) Room 20
4) Room 18
5) Room 17
6) Room 7
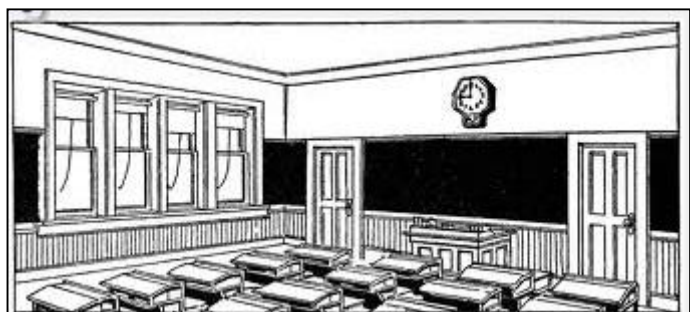
Possible murder weapons:

1) A wooden metre ruler
2) A large metal stapler
3) A dusty trundle wheel
4) A sharp compass
5) A large maths textbook
6) An oversized calculator

Clue number 1:

PDA NKKI PDA IQNZAN PKKG LHWYA EJ EO W JQIXAN.

Hint: Maybe some frequency analysis would help crack this Caesar Cipher?

Clue number 2:

Ht me ru ed er hr da ta po no ht ta ah sd rt pi se
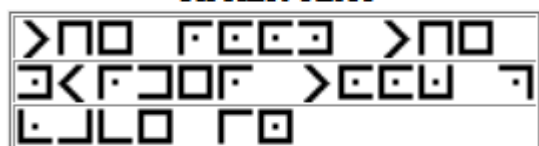
Hint: maybe letters could be swapped around somehow?
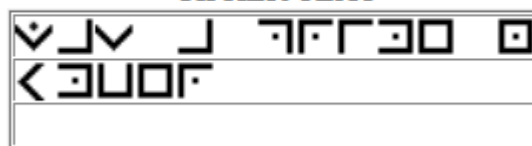
Clue number 3:

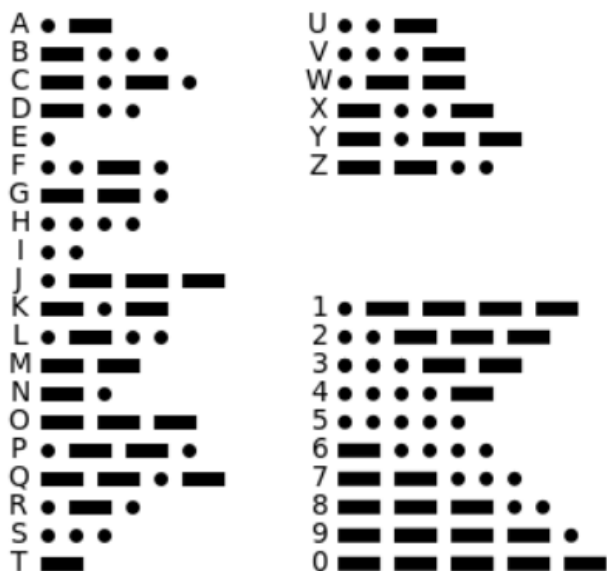tcejbolatematonsawnopaewredrumeht

Clue number 4:

CIPHER TEXT

CIPHER TEXT

Clue number 5:

1 0000 0 0101 0 00 000 01 1 0 1001 1 1000 111 111 101 11 00 000 000 00 10 110

Clue number 6:

TRTURKCIURYPODUHOHRTPESMMPLNECIOEDOLIABAEESRKSMMEOANNENOCILY

Hint: Could splitting this into 4 lines of equal length help?

Clue number 7:

FHXTMDDXYWDWTZOQAKPFSTKVMEEKZ

Hint - Go along the M row and find F. What letter is above it on the top row? Now perhaps go to the second row.....

Clue number 8:

rebmun emirp neve na si siht no sedirts no eht f siht is an even prime number