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Supporting the Professiona Learning of School Leaders and Teachers

Leaving Certificate Computer Science

National Workshop 3

Day 1

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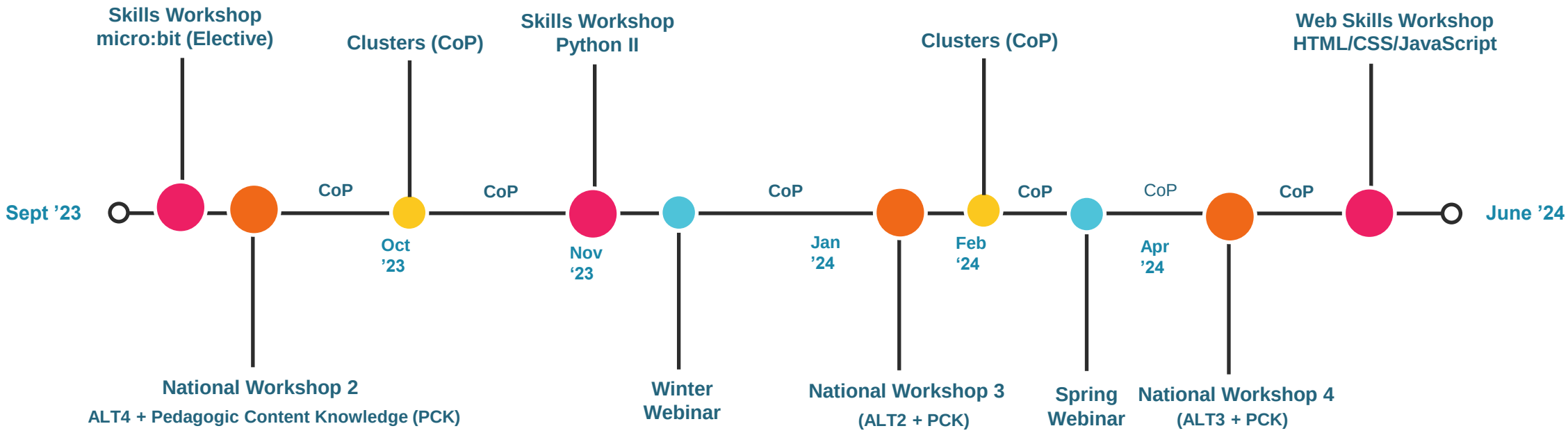
Workshop Overview

Session 1 10:00 - 11:30	Computational thinking III
Tea/Coffee 11:30 – 12:00	
Session 2 12:00 - 13:30	Algorithms I
Lunch 13:30 - 14:30	
Session 3 14:30 - 16:30	Computer systems II

Dates for your Diary for 2024



Next CPD event: Community of Practice collaboratives - February

Supports Provided by Oide

National Workshops	Webinars	School Support	Scoilnet
Skills Workshops	Collaboratives	Oide website	CompSci

Mentoring

- A mentor is not an instructor; a mentee is not a student
- Mentoring involves talking about teaching & learning, strategies and successes
- It offers support (beyond the technical!)… wellbeing, planning, reflective… an ear to listen
- It can lead to WOW conversations (Wins, Obstacles, Wonderings)

Purpose for the Day

To allow Phase 5 LCCS teachers to engage with the core concepts of Computational Thinking and Computer Systems.

To experience ALT2 through the eyes of the student by engaging with the Design Process.

Key Messages

Leaving Certificate Computer Science aims to develop and foster the learner's creativity and problem-solving, along with their ability to work both independently and collaboratively

Computing technology presents new ways to address problems and computational thinking is an approach to analyse problems, design, develop and evaluate solutions.

The ALTs provide opportunities for students to develop their theoretical and procedural understanding of the course.

The externally assessed coursework will be based on all learning outcomes, with those of strand 3 being particularly relevant.

Digital technologies can be used to enhance collaboration, learning and reflection.

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NW3 Session 1: Computational Thinking III

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Overview of the session

Part 1	Warm-up activities
Part 2	Computational thinking: thoughts and models
Part 3	Further activities

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Warm Up Activities

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By the end of this session..

Participants will be enabled to…

…work in groups on problem solving

…develop their understanding and experience in using some of the pillars of Computational Thinking

…assess and analyse research in the area of CT

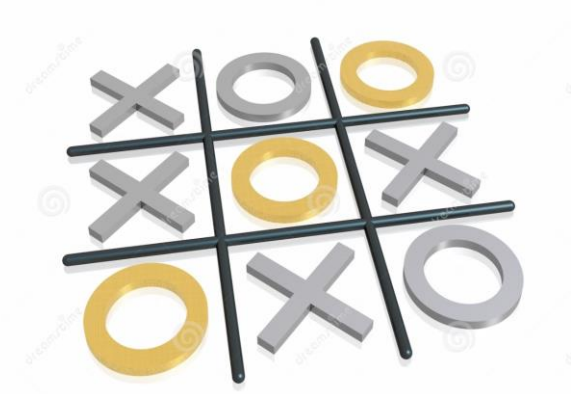
One model of Computational Thinking

- Decomposition
- Pattern recognition
- Abstraction
- Algorithm design

Xs and Os: Developing a winning strategy

Which pillars of Computational Thinking are used?

Abstraction? Decomposition? Pattern Recognition? Algorithm formation?

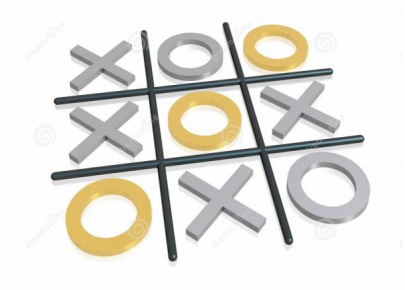


Xs and Os: Developing a winning strategy

Move 1: Go in a corner.

Move 2: IF the other player did not go to opposite corner
THEN go in the opposite corner to move
ELSE
go in a free corner.

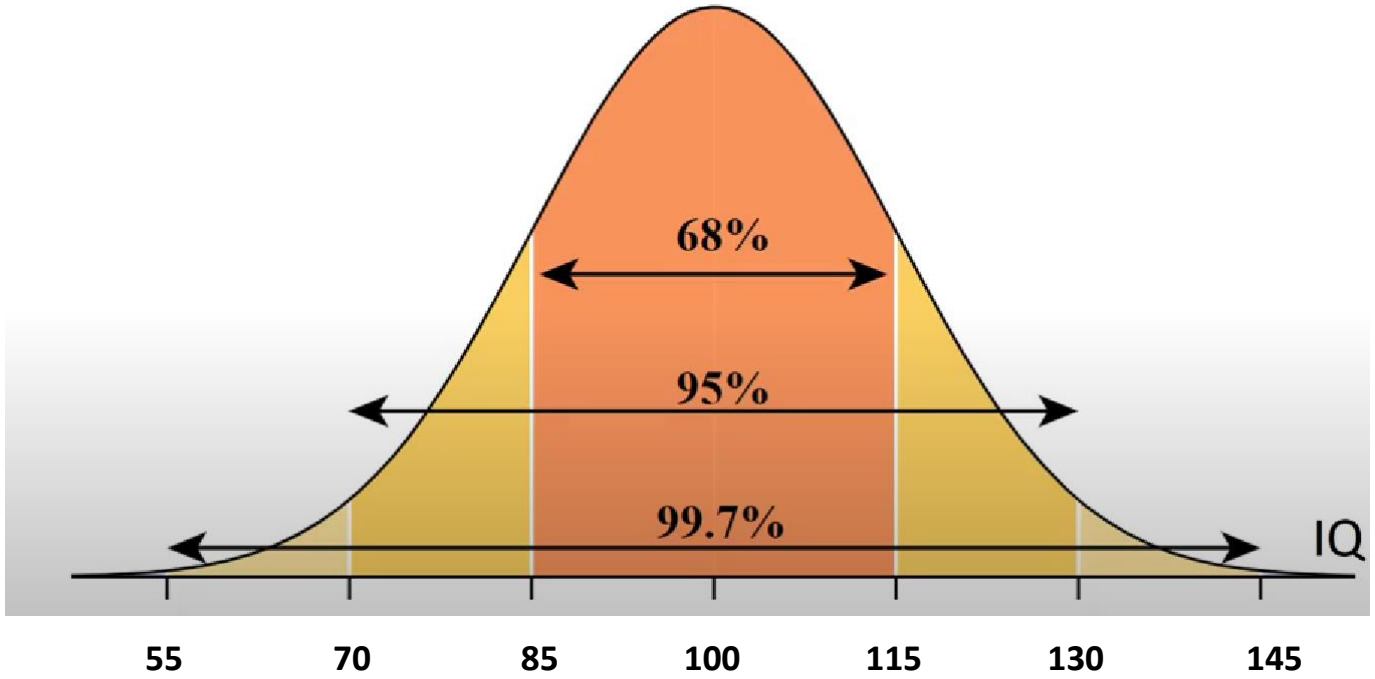
Move 3: IF there are 2 Xs and a space in a line
THEN go in that space.
ELSE IF there are 2 Os and a space in a line
THEN go in that space.
ELSE go in a free corner…..

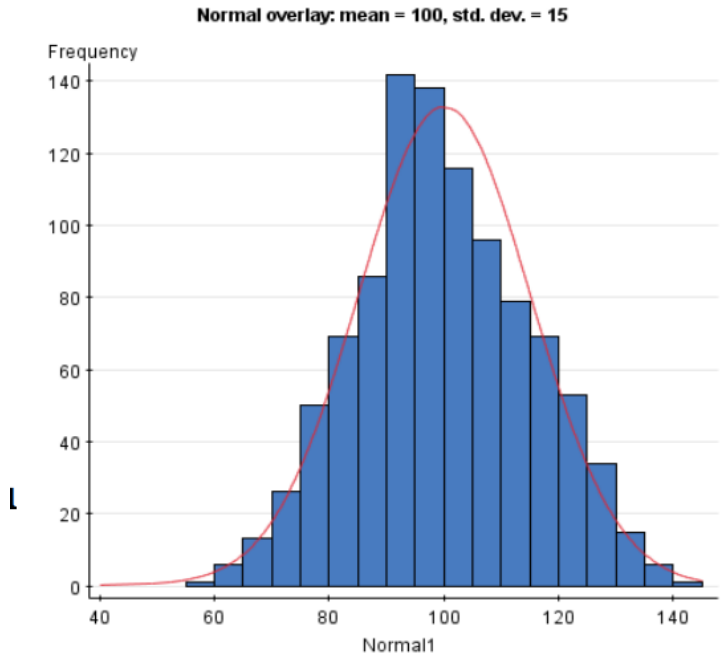


http://www.cs4fn.org/teachers/activities/intelligentpaper/intelligentpaper.pdf

ALT2 – IQ Tests

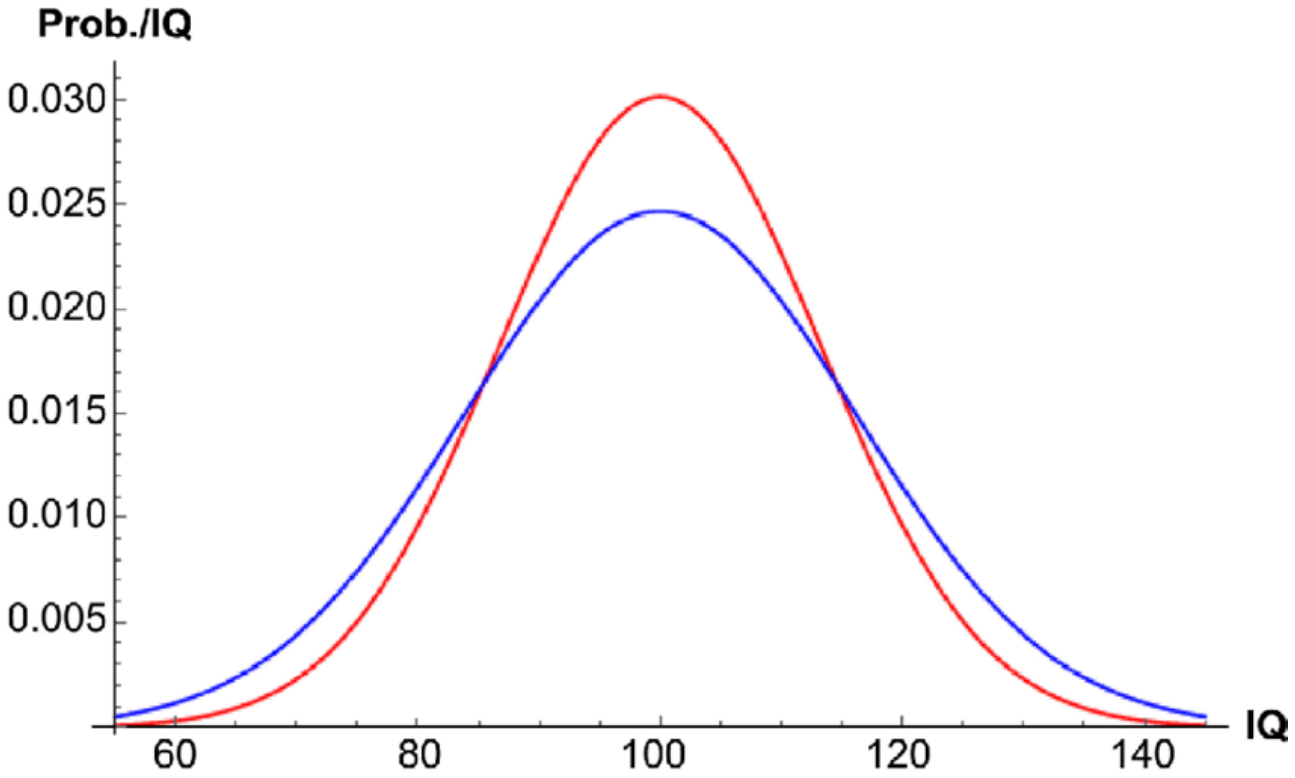
IQ scores are normally distributed with a mean of 100 and a standard deviation of 15

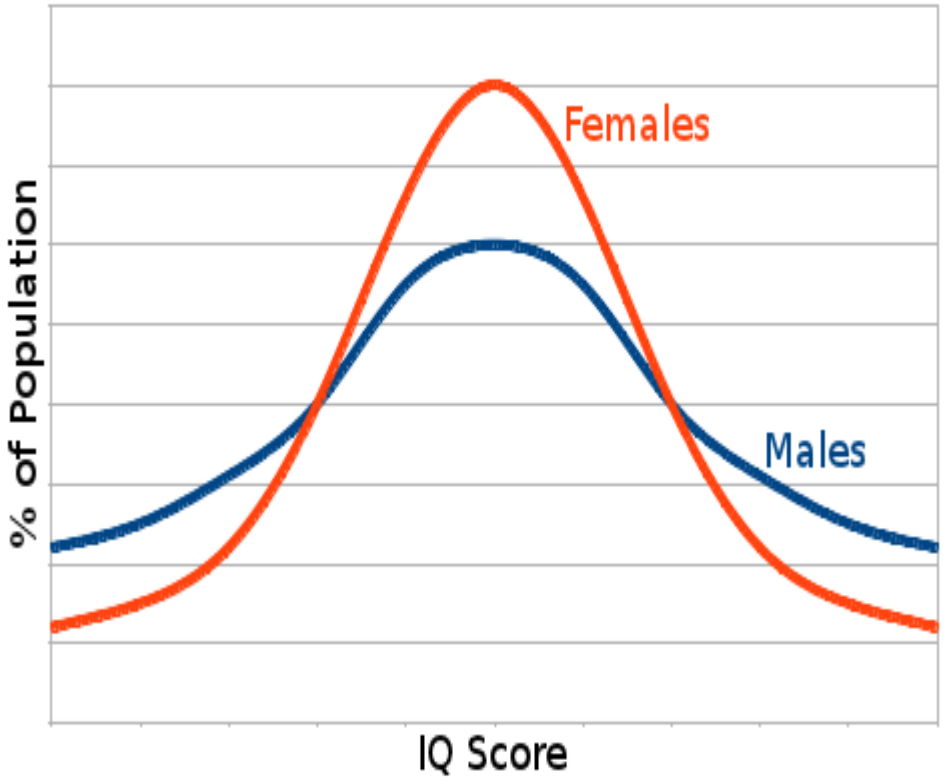




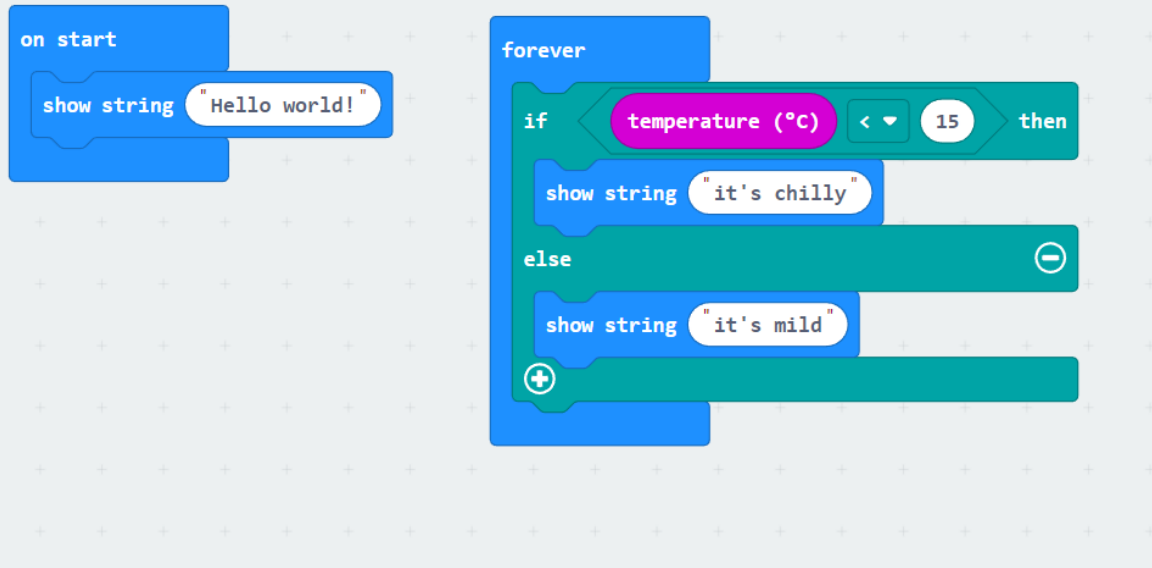
ALT2 – Mean and Median

Test the assertion (hypothesis) “Females are more intelligent than males”, by considering median, mean, mode and spread in the graph shown.





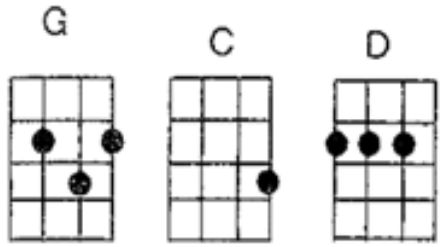
Microbit




```
1   basic.showString("Hello world!")
2   basic.forever(function () {
3       if (input.temperature() < 15) {
4           basic.showString("it's chilly")
5       } else {
6           basic.showString("it's mild")
7       }
8   })
```

Music: 3-chord trick

Robert Zimmerman



G C G C G D
How many roads must a man walk down, before he is called a man? *
G C G C D
How many seas must the White Dove sail, before she sleeps in the sand? *
D G C G C D
And how many times must a cannonball fly, before they are forever banned?

D C D G C
The answer my friend, is blowin' in the wind,
C D G
The answer is blowin' in the wind.

Changing key and the 3-chord trick

A	B	C	D	E	F	G		

A B C D E F G

3-chord trick – pick a letter (no 1) – choose no 4, 5
So for A, the other two are D, E

What are the other 2 chords for C?
And for G?

Unplugged activity – give the general solution to change key

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CT Thoughts and Models

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Wing V Denning

Read both viewpoints and consider the following questions

- What is computational thinking?
- Is Computational Thinking good for everyone?
- How does Computational Thinking relate to programming
- How does Computational Thinking relate to other subjects?
- How can Computational Thinking be assessed?
- How might you approach this aspect of the course with your students / do you think Computational Thinking is best taught or learned?

Jeanette Wing

"Computational thinking is the thought processes involved in formulating problems and their solutions so that the solutions are represented in a form that can be effectively ***carried out by an information-processing agent***."

Peter Denning

"Computational thinking (CT) is a popular phrase that refers to a collection of computational ideas and habits of mind that people in computing disciplines **acquire through their work** in designing programs, software, simulations, and computations performed by machinery."

One model of Computational Thinking

- Decomposition
- Pattern recognition
- Abstraction
- Algorithm design

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Further CT Activities

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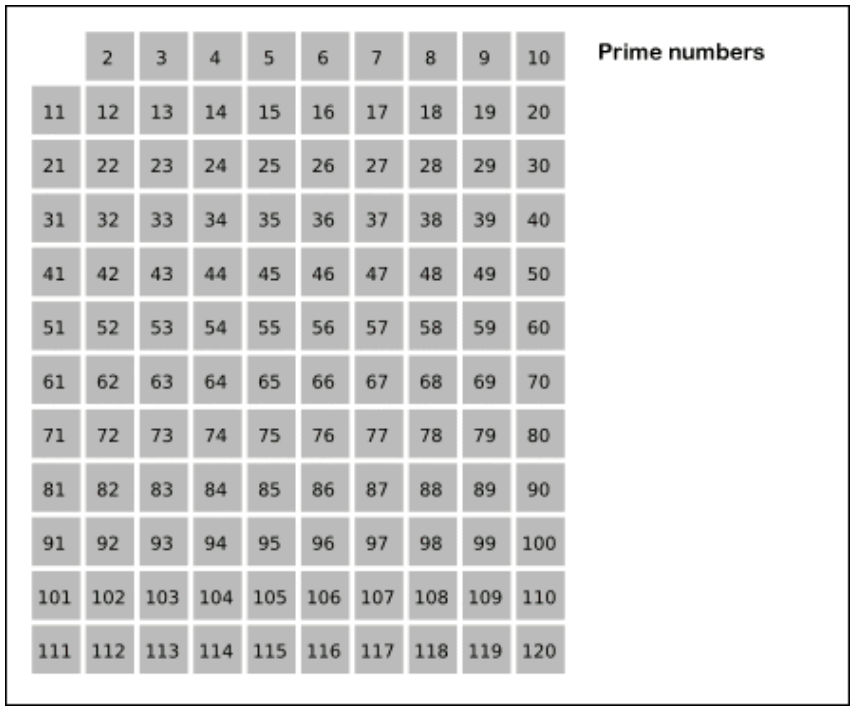
Sieve of Eratosthenes

List the prime numbers between 1 and 100

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100



https://www.w3resource.com/w3r_images/Sieve_of_Eratosthenes_animation.gif

Mining Cryptocurrencies: Factors of Semi-Primes

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Semi –prime number only has two other factors, apart from itself and 1 (eg. 35)

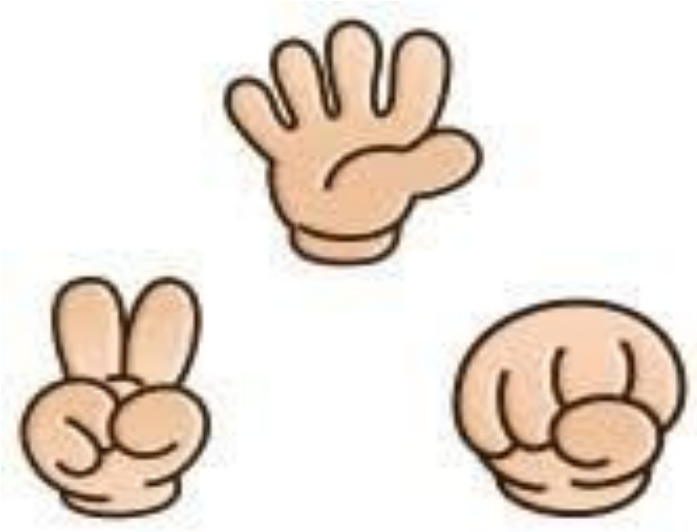
Finding the factors of (really big) semi-primes was one way to harvest cryptocurrencies

323 is a semiprime – what are the factors?

- Develop a general solution (English/pseudocode/code) to semi-prime problems
- Use Computational Thinking to enhance your solution
  (Remember the semi-primes are huge – hundreds of digits so efficiency is important)

Rock-Paper-Scissors

- Write code/pseudocode to determine the winner
- Make the code more efficient
- Develop a winning strategy



Group Activity: Breakout

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An Roinn Oideachais
Department of Education

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