



CBM TEACHING PLATFORM

The integrated student and teacher learning solution
for computational thinking



Now with **CAIT**
(Your Computational **AI** Assistan**T**)

computerbased**math**.org



What is Computer-Based Maths (CBM)?

CBM is a new subject that defines Computational Literacy for everyone. As the use of computation and AI becomes more central to every activity and every innovation, computational problem-solving skills are increasingly critical for individuals and organizations. As computers have become more intelligent, including with GenAI, the need for human understanding is accelerated and deepened, not reduced. Unlocking ever-more-insightful answers means driving the computer with new computational thinking skills described by modern computerbasedmath.org/outcomes.

Why adopt the CBM Teaching Platform?

PROBLEM-BASED TEACHING MODULES FOR ALL ABILITIES

Using a new curriculum, written from the ground up, teach your students to problem solve in modern contexts using industry-standard techniques and tools.

A UNIQUE COMPUTATIONAL THINKING ENVIRONMENT

Students create their own solutions within the modules, whilst using primers to learn new skills, concepts and tools as they solve the problems. All resources are written in Wolfram Notebooks, the world-leading computational software used by industries and universities.

OPEN-ENDED PROJECTS AND FURTHER ENRICHMENT OPPORTUNITIES

As well as optional research activities, each module has a supplementary project to allow students to demonstrate their newly learnt skills.

QUESTIONING AND CLASS COLLABORATION TOOLS

Teachers can remotely monitor responses and react to students' misconceptions in real time. Anonymous or named responses can be used as teaching points as the course progresses.

INSTRUCTOR AND STUDENT SUPPORT AT POINT OF NEED

Supporting teachers as they learn is as important as supporting the students. Modules are written with the inexperienced teacher in mind, giving them direction and helpful supplemental resources at the point where they need them, now with CAIT-integrated AI support.

ASSESSMENT AND LEVELS OF CERTIFICATION OF ACHIEVEMENT

Students' progress can be tracked against the CBM outcomes. Certificates of achievement can be gained by sitting either a module test (Level 1) or by submitting project reports (Level 2).

Example activity from a module—teacher view

Module: M01: How fast could I cycle the race stage?

Chapter 1: What are models and what can they tell us about cycling?

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ACTIVITY 4

WHAT IS THE PRECISE QUESTION TO TACKLE?

To complete step one, "Define the question", you need to state the precise question that you are going to work on. In that way you will have a clear path to follow and also keep a record of the steps you have taken in your solution so that it is documented and can be followed by others who may like to use your work.

PURPOSE

Guide the reasoning behind the precise question that we are going to develop in Chapters 2, 3 and 4.

STEPS

Now that you have considered all the information about cycling a race stage, you are ready to complete the "defining the question" step by stating your precise question that you are going to explore. Here you will learn how to write a precise question that can be tackled in the rest of the module.

WHAT TO SAY

The basic physical principle of cycling is to use some energy from your body to produce a forward force that moves you.

TECHNICAL MANUAL

→ Read this primer on [forces, work, energy and power](#) to learn about the equations you are going to use in your mathematical model.

ANSWERS

→ Answer this question.

OUTCOMES

1 – Drag each label to its correct position on the cyclist diagram.

GUIDED DISCUSSION

Teacher • Whole class • 10 minutes

As force and velocity are both vector quantities (they have a direction as well as a size), we need to be consistent about the direction that is understood to be positive from here on.

→ Use the above answers to form a precise question for the module. Complete your question.

Question **Responses**

6 – Complete this description of your precise question: (Points will be given for including the method, variables and assumptions) (3 Points)

How can I build a model of my cycling power in order to ...

Enter answer

Send and check answer

Question **Responses**

6 – Complete this description of your precise question: (Points will be given for including the method, variables and assumptions) (3 Points)

How can I build a model of my cycling power in order to ...

predict the time taken to cycle a race stage, assuming a constant velocity of small linear gradients using the equation $P=Fv$

Great job starting your model! To improve your answer, consider mentioning how you'll break the course into segments or the specific forces impacting your cycling. This will add more detail to your method and assumptions.

2 points

Try again

Quick review: Have you understood the equation that you have based your precise question upon? Are you clear about the two directions of force involved and how they must be equal in order for you to use your equation?

Why must they be equal?

The forces must be equal because when cycling at a constant velocity, the net force acting on the cyclist is zero. This means that the forward force generated by the cyclist must exactly balance out the drag forces (such as air resistance and friction). By having these forces equal, the cyclist maintains a constant speed, allowing us to use the equation $\text{power} = \text{force} \times \text{velocity}$ to model performance accurately. This equation is valid when the forces do not change, which is the case when cycling at a steady speed or on a flat road segment.

Activity introduction.

Activities are broken up into sections. Each modality follows one of the four problem-solving steps:

D Define **A** Abstract
C Compute **I** Interpret

Students are frequently set questions to check understanding. These can be answered individually or in groups, depending on the activity.

Open-ended questions are assessed by CAIT against a rubric of possible answers.

CAIT is always available to give assistance to the learner when they need help.

Tabs at the top of each modality offer teacher guidance.

PURPOSE

The aim of the modality.

STEPS

A step-by-step guide through the modality.

WHAT TO SAY

A list of probing questions to ask the students.

TECHNICAL MANUAL

Instructions for the tools; links to further material.

ANSWERS

Answers to the questions.

OUTCOMES

CBM outcomes for the modality.

BRAINSTORM

Teacher • Whole class • 10 minutes

Modality type, who leads the modality, group size, estimate of time needed.

Learners will...

- Gain computational thinking skills for further study and AI-age careers.
- Apply computation in all subjects—from life and social sciences to economics and business to traditionally mathematical subjects like physics and engineering.
- Be able to analyse data, interpret key findings and communicate effectively.
- Have confidence to approach real problems with a systematic process.
- Be motivated to learn through context-based problems.
- Be supported by an industry leader in computation.



Questions and answers about the CBM Teaching Platform

Q: Can you teach remotely using this platform?

A: Yes, the inbuilt class collaboration makes this ideal for remote delivery either in real time or asynchronously. Additional software (Zoom, Teams, Blackboard, etc.) is required for audio and video sharing.

Q: Can the materials be adapted or edited by teachers?

A: Yes. The text in the Wolfram Notebooks provided is editable. Interactive elements like questions or manipulatives can be deleted, but not edited. Teachers may add their own interactives—for example, those from the Wolfram Demonstrations Project site.

Q: Does every student need access to a computer?

A: For students receiving face-to-face teaching in classrooms, lessons can be run successfully with two students to one computer. Teachers and students must install Wolfram technology* and the CBM resources to get the best out of the computation power and collaborative tools.

Q: Do students need to know how to code before they start?

A: No. The modules provide introductory guidance on the use of simple code applicable to the problem in Wolfram Language. Teachers are provided with full solutions whenever necessary and also have access to the AI assistant CAIT. Further guidance and courses on Wolfram Language can be found at Wolfram U.

Q: How much teacher training is required?

A: An introductory course covers three main areas:

- 1) The CBM approach and philosophy
- 2) Using the CBM Teaching Platform and Wolfram Language basics
- 3) Individual module orientation

This can be achieved in approximately four to six hours.

Q: What is the minimum hardware required?

A: CBM lessons require typed responses, so a keyboard and mouse on a desktop or laptop are required. Further specifications can be found at wolfram.com/mathematica/system-requirements.html.

Q: Is the internet required?

A: Yes. The Teaching Platform runs in a browser, preferably Google Chrome. Custom-built offline versions are available.

Q: Is there technical support?

A: Yes, Wolfram Customer Service provides installation assistance by phone and email. CBM assistance is available through the CBM Teaching Platform's menu.

*Wolfram|Alpha Notebook Edition, Mathematica, Wolfram Player, Wolfram Desktop

Available modules (as of 2026)

Teacher-led, fully supported learning resources

To commission new modules customised to your organisation's needs or find out about other services we offer, visit computationalthinking.org/services.

Data Science

Approx 70 hours

MODULES	THEMES	CBM LEVEL
Am I normal?	Collecting data and understanding expected norms	Beginner
How happy are people in my country?	Judging reliability of sources and measuring subjective data	Intermediate
How can I convince you?	Understanding unethical techniques that are used to present information	Intermediate
Can I trust a survey?	Sampling methods and identifying bias; fair and unfair questioning techniques	Intermediate
Are girls better at maths?	Sample size and comparison of datasets	Intermediate
Do I know what I don't know?	Reliability of models; making explicit assumptions	Intermediate
Should I insure my laptop?	Risk and methods to protect against unexpected loss	Intermediate
Cause or correlation?	Identifying dependent variables and understanding causation	Intermediate
Will it rain tomorrow?	Making predictions based upon data and chosen preconditions	Proficient
How many words do I know?	Making predictions and estimating their reliability	Proficient
Can I spot a cheat?	Understanding random events and their significance	Proficient
How tall is the tallest woman in your country?	Estimating population parameters based upon samples and their reliability	Proficient

Assorted STEM

Approx 60 hours

MODULES	THEMES	CBM LEVEL
That's random! Or is it?	Random behaviour and events	Beginner
How long will a hacker take to crack my password?	Multiplication, combinations and exponentiation	Beginner
Where's the plane?	Modelling possible locations and their probability	Intermediate
How do I design controls for my game?	Specification of location and mapping of controls	Intermediate
How can I create natural-looking shapes?	Modelling nature with iteration and recursion	Proficient
How fast could I cycle the race stage?	Power, energy and air resistance; creating personalised models that can be verified	Proficient
What will the population be in 50 years' time?	Fitting a model to data and extrapolating to the future	Proficient
How can I model a human population?	Building a model from individual agents	Advanced

The projects

Teacher-guided, open-ended problems for students to hone their computational thinking skills.

These contain information to get started, a solution framework based on the four-step process and a solution for teachers.

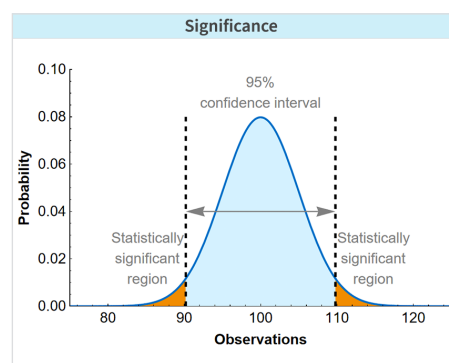
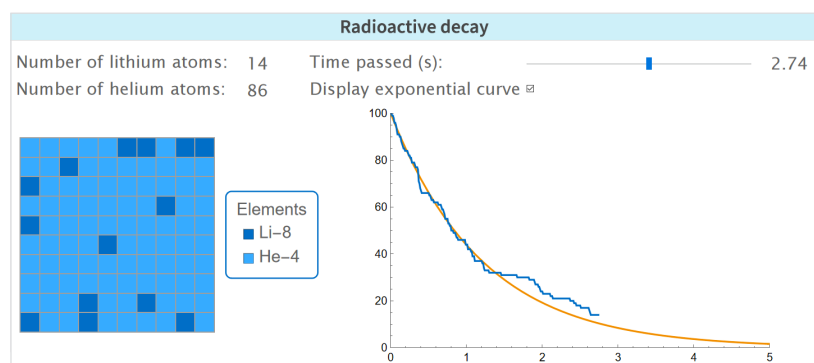
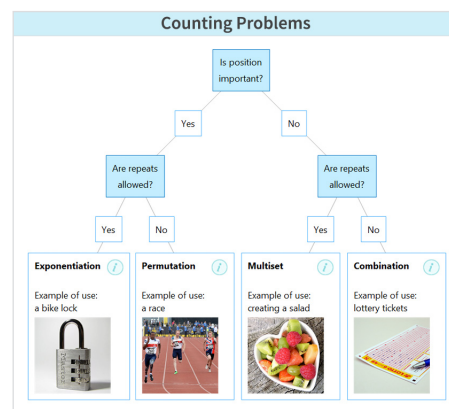
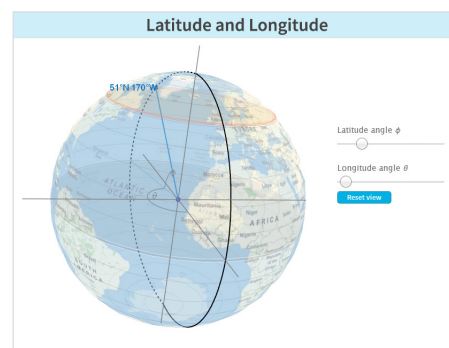
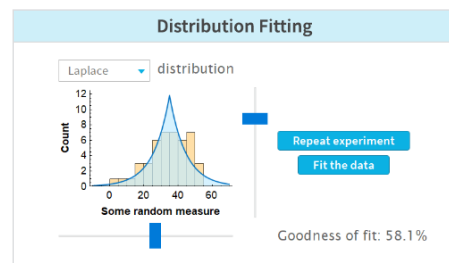
	PROJECTS	THEMES	CBM LEVEL
Architecture of Computation	Can I simulate a slot machine?	Generation of random outcomes, conditional events	Beginner
	Can I simulate a random walk?	Random movements using dimensions and angles	Intermediate
	Can I create a coastline?	Iteration and recursion to generate natural-looking images	Proficient
Data Science	What is normal intelligence?	Collecting data and understanding expected norms	Beginner
	Can I create a profanity filter?	Machine learning and text processing	Intermediate
	Is there evidence that referees are biased?	Significance and hypothesis testing	Proficient
Geometry	Can I create a spot-the-difference game?	Image processing, masking and infill	Intermediate
	Can I create a multi-view anamorphic sculpture?	Cross-sections and 3D views	Proficient
	How far will the shell travel?	Kinematics and modellings	Advanced
Information Theory	How many different teddy bears can you make?	Multiplication and counting problems	Beginner
	Can I create my own identifier system?	Combinatorics and exponentiation	Proficient
	Can I use an API?	Data handling and formatting queries	Proficient
Modelling	Can I create a fitness regimen?	Linear programming to optimise fitness	Intermediate
	What will the future elephant population be?	Model fitting and extrapolation	Proficient
	Can I model the spread of a virus?	SIR agent-based modelling	Advanced

We have more than 50 teaching projects of varying difficulty to choose from. Find out more about the projects in the **Computer-Based Maths Teaching Platform** at computerbasedmath.org/inside-module.

The primers

Non-contextual introductory information about a concept and its associated tools.

Causality
 Combinations
 Combinatorics
 Conditional probability
 Confidence interval
 Correlation coefficient
 Data
 Dependence and independence
 Distribution fitting
 Empirical distribution
 Estimation error
 Expected value
 Exponentiation
 Hypothesis test
 Insurance
 Mathematical model
 Model fitting
 Multisets
 Parameter estimation
 Permutations
 Population and sample
 Probabilistic model
 Probability
 Probability distribution
 Random
 Risk
 Sample space
 Sampling bias
 Significance
 Statistic of distribution
 Utility function
 2D coordinate systems
 3D coordinate systems
 Angles in a right-angled triangle
 Code controls
 Data density
 Dimensions of space
 Function transformations
 Latitude and longitude
 Loci operations
 Mapping
 Monte Carlo simulations
 Orientation
 Similar triangles
 Specification
 Speed
 Agent-based model
 Coding associations
 Coding function definitions
 Energy conservation
 Work and power
 Recursion and iteration
 Fractal dimensions
 Exponential change



What technology is implementing CBM?

WOLFRAM COMPUTATIONAL PLATFORM + AI-ASSISTED LEARNING

The diagram illustrates the integration of Wolfram Computational Platform and AI-Assisted Learning into CBM resources. It features three overlapping screenshots of CBM resources:

- MODULES: CAN I SPOT A CHEAT?**: A module summary page with a game interface and a probability distribution plot.
- PROJECTS: IS THERE EVIDENCE THAT REFEREES ARE BIASED?**: A project page with a football referee image and a data analysis task.
- PRIMERS: COMBINATORICS: ENUMERATION PROBLEMS**: A primer page with a tree diagram and a table of counting problems.

	Name	Formula	Other terms	Relevant Wolfram Language Functions
Ordered	Exponentiation	a^b	7^5 , P^2 , $P \times 10, 5$	<code>Power</code> , <code>^</code> , <code>Tuples</code>
	Permutation	$\frac{n!}{(n-k)!}$		<code>FactorialPower</code> , <code>Permutations</code>
Unordered	With repeats	$\frac{n!}{k_1! k_2! \dots k_r!}$		<code>Permutations</code> , <code>FactorialPower</code>
	Without repeats	$\frac{n!}{k_1! k_2! \dots k_r!}$		<code>Permutations</code> , <code>FactorialPower</code>

Wolfram Research are pioneers in deploying AI technology and computation for teaching and learning. CBM resources are built upon Wolfram Technology, utilising the ease and convenience of notebooks to enable learners of all abilities to access the power of modern computation. Directly linked to the knowledge of Wolfram|Alpha and capabilities of AI, CBM resources provide a unique creative environment for learners to become computationally literate.

Moreover, these technologies are widely used in higher education, industry and government around the world, so by learning them students will gain an extra, marketable skill. But the CBM philosophy is not dependent on any one technology base—including Wolfram's.

See full reasons at: computerbasedmath.org/technology

CBM is keen to gain support for this fundamental maths education shift that's so vital to your community and others. If you can help, whether by lending support, contributing ideas or sponsoring, or you just want to find out more, go to computerbasedmaths.org or contact us at info@computerbasedmath.org

