

Science Sub Plans Week, High School

Week-long sub plans: five days of print and go work for grades 9 to 12, planned Monday to Friday.

PREVIEW

What is included

- Sub binder: notes, the filled-in week plan, a blank schedule, class list, Monday opener (11 pages)
- Science sets for five days (15 pages)
- Calm puzzles and reset sheets (10 pages)
- Science team tasks (9 pages)
- Science games (10 pages)
- Answer keys (12 pages)

How it works

1. Open the week plan. Every set already has its day and page number.
2. Each day: one science set per period (a lesson with worked examples, practice and a challenge), a calm puzzle, a team task and a game for the last 15 minutes.
3. The sub needs no subject knowledge. Every answer is in the key.
4. Print in color or ink-saver black and white, US Letter or A4.

What this preview shows: the filled-in week plan, the note to the substitute, the Monday opener, and all of Day 1 (the science set, the calm block, the team task and the game), one answer-key page and one ink-saver page. Every product page is watermarked. The full kit has 68 pages.





This Week's Plan

Filled in for you: run the day's set in every period you teach. Keep it as it is, or use the blank schedule on the next page for your own order.

WHEN	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
Start of class	Meet Your Sub p. 10 · 15 min, every period	Attendance, voice level	Attendance, voice level	Attendance, voice level	Attendance, voice level
Main work, every period	Science 1 Scientific Method and Data p. 13	Science 2 Cells and Genetics p. 21	Science 3 Chemical Reactions p. 30	Science 4 Forces, Energy and Work p. 39	Science 5 Ecology and Climate Data p. 48
Early finishers or a loud moment	Word Search and Reset Sheet p. 16	Sudoku and Grounding Sheet p. 24	Secret Codes and Control Sheet p. 33	Maze and Brain Dump p. 42	Word Ladders and Three Good Things p. 51
Block period or extra time	The Powers of Ten Lineup p. 18	The Science Night Lineup p. 26	The Paper Rotor Fair Test p. 35	The Unlabeled Culture p. 44	Beavers for Willow Creek p. 53
Last 15 minutes, if earned	Whiteboard Jeopardy p. 19	Paper Password p. 28	Class Feud p. 37	Classroom Millionaire p. 46	Mystery Box p. 55

How to use this plan

- Page numbers point to the first page of each set. Copy one per student.
- The calm block is always allowed: a period that runs short, a loud class, or anyone who finishes early.
- The game is the reward. Skip it on a day the class has not earned it.



Note to the Substitute

Grades 9 to 12 · five days · every set runs from the printout alone

Thank you for covering my classes this week

Everything you need is in this binder. The front pages (important information, weekly schedule, class list) are filled in for this week. After them come the work sets, one per day: **Science 1** is Monday's set, **Science 2** is Tuesday's, and so on to **Science 5** on Friday. Run the day's set in every period you teach that day. Each set is one period (45 to 55 minutes), stands alone, and has its own answer key at the back of the binder, so you never have to make anything up or know the subject. The first page of every set tells you what to say. Every set ends with a challenge, so it stretches to a 90-minute block when you need it.

After the subject sets come the shared blocks, one of each per day. The **calm block** is always allowed: for a period that runs short, a loud class, or anyone who finishes early. The **team task** fills a period on its own. The **game** is the reward slot: fifteen minutes, from the script, when a class has earned it.

Each day has

- One Science set (one period, with a challenge to stretch it)
- A calm and quiet block: a puzzle page and a reset sheet
- A team task for groups of four
- A paper game from the script

If the class is loud

- Set a voice level with a number, 0 to 3, and use it all week (the Day 1 opener explains it).
- Switch to the calm block. Nobody needs to move.
- Every set has a challenge at the end, so fast finishers always have something.
- If a set is not working, stop it and use the calm block or the team task. Every set starts cold.

At the end of each day

Please fill in that day's line on the "How it went" page. It takes two minutes and I read every word.

Did this kit work well for your class? A quick review helps other teachers find it and earns you TpT credits. Thank you!



Meet Your Sub

Day 1 opener, 15 minutes at the start of every period on Monday, before the set. Nothing to prepare.

Opener

Sub script (the same five minutes in every class)

1. **Before first period, fill in the introduction sheet** on the next page, once, for the whole day. Keep it short and honest. A high school class reads a sub in about ten seconds, so give them something real to read.
2. **Introduce yourself from the sheet** in two minutes. Then hold up the Ask the Sub list and take three questions from raised hands. Three, not ten. Say when you are done taking questions.
3. **Read the class agreement out loud** and ask this period to add one line of their own. Write that line on the board for the period. The line they wrote is the one they keep.
4. **Set the voice level with a number** from 0 to 3, using the box at the bottom of the sheet. Say which level today's set needs, and use the same numbers in every class all week.
5. **Start the set** with one sentence: this is today's work, it has a challenge at the end, and the calm block is always allowed when you are finished.

If the room is loud

- Skip the questions. Keep the agreement and the voice level, and say the number out loud.
- Start the set sooner. Work on the desk beats a speech about behavior every time.
- Name the level again after four minutes. A number is easier to follow than a lecture.

If a period runs ten minutes short

- Run Common Ground in groups of four. Six minutes of work, four minutes of reading out.
- Or hand out the reset sheet from the calm block and let the room go quiet early.
- Or have each student write one question they would ask the teacher when they get back.

Monday checklist (before first period)

- ☐ Read the Important Information page: office extension, exits, the nurse, the teacher next door.
- ☐ Check the class list for allergies, medical needs, early releases and students who carry a pass.
- ☐ Find today's set on the weekly schedule and count copies for every period, plus five spares.
- ☐ Fill in the About Your Sub sheet once and post it where the back row can read it.
- ☐ Write the voice levels 0 to 3 on the board and leave them there all week.
- ☐ Keep the answer keys inside the binder, not face up on the desk.



Science Set 1: Scientific Method and Data

Read the four paragraphs, then work through the example and answer the two questions under it. Pencil and paper only.

Science • Day 1

An experiment is a question asked carefully enough that the answer cannot be argued with. It begins with a hypothesis: a testable prediction, usually written as an if and then statement. "If the ramp is steeper, then the car will roll farther" is a hypothesis, because you can set up a ramp and find out. "Steep ramps are better" is not, because nothing about it can be measured.

Every experiment has three kinds of variables. The independent variable is the one thing you deliberately change. The dependent variable is what you measure, and its value depends on what you changed. Controlled variables are everything else you deliberately hold still: the same car, the same floor, the same way of releasing it. If two things change at once, the data cannot tell you which one caused the result. That is why a study with a control group, a group that gets no treatment at all, is so useful: it shows what happens when the independent variable is left alone.

One measurement is never enough. Repeat each condition several times and report the mean, the sum of the trials divided by the number of trials. The range, the highest trial minus the lowest, tells you how tightly the trials agree. A wide range is a warning: something you were not controlling, a nudge on release or a change in surface, was moving your results around. Scientists also expect other people to repeat the whole study, which is called replication.

Data is easier to judge as a picture than as a list. By convention the independent variable goes on the horizontal axis and the dependent variable on the vertical axis, each axis labeled with its unit and scaled in even steps. A graph shows the shape of a relationship: whether the line rises steadily, levels off, or bends. Reading that shape is the point of the graph, so look at it before you write a conclusion.

Worked example

Jonah wants to know whether water temperature changes how fast sugar dissolves. He stirs one sugar cube into 200 mL of water at 20, 40, 60 and 80 degrees Celsius and times how long it takes to disappear. He repeats each temperature three times.

Independent variable: water temperature, in degrees Celsius. **Dependent variable:** the time for the cube to dissolve, in seconds.

Controlled: the same size sugar cube, 200 mL of water every time, the same stirring speed, the same container. Three trials at each temperature let him report a mean and spot a trial that disagrees with the others.

Try it

Write Jonah's hypothesis as an if and then statement.

Jonah times one trial at 80 degrees and gets a result far from the other two. What should he do, and why?



Science Set 1: The Ramp Data

Fill in the mean and the range for each row, then plot the five means on the grid. Two points are plotted for you.

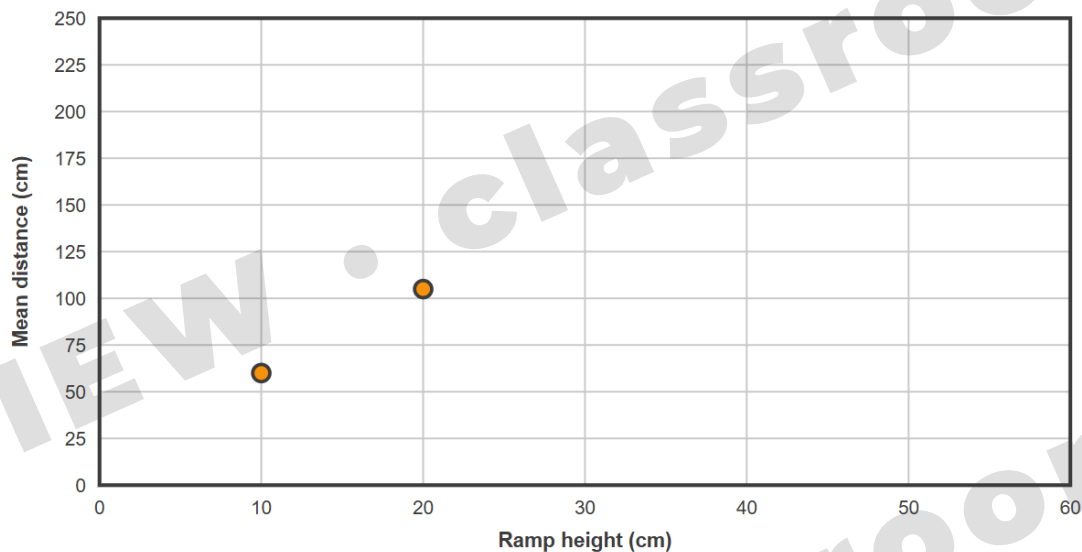
Science • Day 1

Maya's experiment

Maya rolled the same toy car down the same board five times at five different ramp heights and measured how far it rolled past the bottom of the ramp. She ran three trials at every height. All distances are in centimeters.

RAMP HEIGHT (CM)	TRIAL 1	TRIAL 2	TRIAL 3	MEAN (CM)	RANGE (CM)
10	58	60	62		
20	102	106	107		
30	143	144	148		
40	178	180	182		
50	205	210	215		

Mean = the three trials added together, divided by 3. Range = the highest trial minus the lowest trial.



Plot each mean as a dot, then join the dots with a smooth line from left to right. Do not draw a straight ruler line through them; let the data decide the shape.



Science Set 1: Questions and Challenge

Answer from the table and the graph on page 2. Full sentences where the question asks you to explain.

Science • Day 1

Questions

1. Name the independent variable and the dependent variable in Maya's experiment. Give the unit of each.

.....

2. Name three variables Maya had to hold still for this to be a fair test.

.....

3. What is the mean distance for the 30 cm ramp? Show the calculation.

.....

4. Which ramp height had the widest range between trials? Give the range and one reason trials disagree.

.....

5. Between which two ramp heights did the mean distance increase the most? By how many centimeters?

.....

6. The means do not climb by equal steps. Use the pattern to predict the mean for a 60 cm ramp, and explain.

.....

Name the variables

Write the independent variable, the dependent variable, and one controlled variable.

1. Priya gives four identical bean plants 0, 2, 4 or 6 hours of lamp light a day for three weeks and measures the height of each plant at the end.

IV: DV: Controlled:

2. Theo drops the same steel ball into sand from five heights and measures how deep the crater is each time.

IV: DV: Controlled:

3. Nadia keeps the same amount of the same paint on four surfaces for eight hours: one in full sun, one in shade, one under a lamp, one in a dark box, and records how long each takes to dry.

IV: DV: Controlled:

Challenge

Luis wants to know whether a wider tire makes a toy car roll farther. He rolls a red car with narrow tires down a carpeted ramp, then rolls a blue car with wide tires down a wooden ramp, one trial each, and concludes that wide tires are better.

- a. List every reason Luis cannot trust his conclusion. b. Rewrite it so it does test tire width: name the independent and dependent variables and three controlled ones. c. How many trials at each setting, and why?

.....



Calm Block, Day 1: Word Search

Calm • Day 1

Find all 12 science words. Any direction, including backward and diagonal. Pencils only, voices at 0.

Y	N	F	G	L	S	I	S	O	M	S	O	R	A
Y	T	F	E	A	I	S	U	E	L	C	U	N	O
T	H	J	N	U	E	P	O	T	O	S	I	B	Z
I	R	Q	O	N	F	O	S	V	W	D	C	V	S
S	K	D	T	I	C	F	R	A	T	J	Z	E	X
N	M	T	Y	E	E	M	Y	Z	N	E	A	L	F
E	I	S	P	T	K	P	H	O	T	O	N	O	K
D	T	Y	E	O	V	N	A	Y	N	D	L	C	U
M	O	L	K	R	F	Z	W	J	E	I	I	B	
S	S	A	L	P	T	A	X	T	U	F	U	T	A
H	I	T	H	A	C	L	Y	Z	T	F	Z	Y	U
C	S	A	M	K	M	H	N	N	R	C	R	R	X
T	W	C	G	S	C	Z	X	W	O	I	U	T	Z
N	T	C	A	H	U	W	K	P	N	G	F	K	P

CATALYST

VELOCITY

GENOTYPE

NUCLEUS

PROTEIN

ISOTOPE

NEUTRON

OSMOSIS

MITOSIS

DENSITY

ENZYME

PHOTON

Faster than reading every square

- Hunt the rare letters first. Only one word in the list has a Z in it, so every Z in the grid is worth a second look.
- Scan one row at a time for a word's first two letters, then check all eight directions from that square.
- Cross a word off the list the second you circle it, or you will search for it twice.



Calm Block, Day 1: Reset Sheet

For one person, at your own pace. Nobody collects this and nobody reads it but you.

Calm • Day 1

Two minutes, then back to it

This is not a mood test and it is not therapy. It is a short routine for the moments when your head is somewhere else and the work in front of you is going nowhere: slow the breath, put a name on the feeling, pick the next five minutes. Work down the page and stop at the bottom.

Step 1: make the breath out longer

Breathe in through your nose while you count to four, then out through your mouth while you count to six. The long breath out is the part that slows your heart rate down. Six rounds, then stop.

Tick a box for each round so you are not counting in your head.

☐ ☐ ☐ ☐ ☐ ☐

Step 2: name it

A feeling you can name gets smaller. Tired, annoyed, behind, worried, bored, flat, wired. One word is enough, and it does not have to be the right word.

Write yours on the first line below.

Name it in one word, then write the sentence your head keeps repeating

.....
.....

What is actually true right now, in this room, that I could check in ten seconds

.....
.....

The next five minutes: what I will do the moment I put this sheet down

.....
.....

What usually helps me

- ☐ Water and a real breath of air
- ☐ Writing the thing down instead of holding it
- ☐ Two minutes of a puzzle or a doodle
- ☐ Starting the smallest piece of the work
- ☐ Standing up and stretching my shoulders
- ☐ Putting my phone face down in my bag
- ☐ Asking one person one question
- ☐ Deciding to deal with it after school

My own line

Something that works for you that is not on that list.

.....
.....

Right now I feel (circle one)

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10

1 = settled, 10 = about to boil over. Check the same number again in ten minutes. Down by one is the whole point.



Team Task, Day 1: The Powers of Ten Lineup

Team • Day 1

Groups of four. Voice level 2. One sheet per group, one person writes, and no number goes down until all four agree.

The situation

A science museum hallway called **The Powers of Ten** shows twelve displays, smallest on the left to largest on the right, but the installer mixed up the labels. Nobody may look anything up.

Your job: rank the twelve things from **1 (smallest)** to **12 (largest)**, using the size named on each row. Work alone for five minutes in "My rank", then agree on one set of group ranks, each rank used once. Then the sub reads out the science department's order and you score the difference.

Group of three: one person both writes and keeps time. Group of five: the fifth person asks "how do you know?" before every rank is written.

WHAT IS ON DISPLAY	MY RANK	GROUP RANK	EXPERT	DIFFERENCE
The Sun, measured across its diameter				
An adult blue whale, nose to tail				
A single flu virus particle, measured across				
One human hair, measured across its width				
The Milky Way galaxy, measured across				
A hydrogen atom, measured across				
A honeybee worker, head to tail				
Earth, measured across its diameter				
A human red blood cell, measured across				
Mount Everest, height above sea level				
An E. coli bacterium, end to end				
The distance from Earth to the Sun				
Total difference (lower is better)				

Units you may need

- 1 kilometer (km) = 1,000 meters
- 1 centimeter (cm) = one hundredth of a meter
- 1 micrometer (μm) = one millionth of a meter
- 1 nanometer (nm) = one billionth of a meter

Scoring

For each row: group rank minus expert rank, and drop the minus sign. Add the twelve numbers up.

- 10 or less: excellent
- 11 to 20: good
- 21 to 32: fair

Defend one choice

Pick the row with your biggest difference. What size did your group guess, and what must it really be?

.....

Challenge

After the reveal: about how many E. coli end to end span one hair? How many Earths span the Sun?

.....



Game, Day 1: Whiteboard Jeopardy

Game • Day 1

Sub script and questions. 15 minutes at the end of the period, or whenever the class has earned it.

Set up (2 minutes)

1. Draw a 5 by 5 grid on the board, or tape up the board sheet. Write the five category names across the top and the values 100 to 500 down each column.
2. Teams of four to six. Team 1 picks a category and a value.
3. Read the question. The team gets 15 seconds and one answer. Right: they take the points and pick again.
Wrong: the next team may steal, then play moves on.
4. Cross the square off. Highest total when time is up wins.

Read this out

"One voice per team: pick a captain who says the final answer. Shouted answers do not count and the square is dead. Team 1, choose a category and a value."

Keep the running score in a corner of the board. If a team argues a call, the script wins and the game moves on. The bold answer is the one to accept, but take a clear equivalent too (mitochondria for mitochondrion, 9.8 for about 9.8).

Biology

- 100 Which organelle is called the powerhouse of the cell?
The mitochondrion
- 200 How do plants turn light energy into chemical energy?
Photosynthesis
- 300 Which organelle builds proteins?
The ribosome
- 400 What cell division produces egg and sperm cells?
Meiosis
- 500 Which molecule is the cell's main energy carrier?
ATP

Physics

- 100 What is the SI unit of energy?
The joule
- 200 A car goes 150 meters in 10 seconds. What is its speed?
15 m/s
- 300 What is gravity's acceleration at Earth's surface, in m/s squared?
9.8
- 400 What net force gives a 5 kg mass an acceleration of 4 m/s squared?
20 newtons
- 500 A 2 kg ball moves at 3 m/s. What is its kinetic energy?
9 joules

Genetics

- 100 What molecule carries genetic information?
DNA
- 200 Which base pairs with adenine in DNA?
Thymine
- 300 What is an organism with two different alleles called?
Heterozygous
- 400 In an Aa by Aa cross, what fraction of offspring is aa?
1/4
- 500 What is a three-base mRNA sequence for one amino acid?
A codon

Earth

- 100 What is molten rock beneath Earth's surface called?
Magma
- 200 Which rock type forms from compressed layers of sediment?
Sedimentary
- 300 What is the innermost layer of Earth?
The inner core
- 400 Which scale ranks minerals by hardness?
The Mohs scale
- 500 Which supercontinent began to break apart about 200 million years ago?
Pangaea

Chemistry

- 100 What is the chemical formula for table salt?
NaCl
- 200 What is the atomic number of carbon?
6
- 300 Which group fills the far right column of the periodic table?
The noble gases
- 400 What bond forms when atoms share electrons?
Covalent
- 500 What is the mass of one mole of water, to the nearest gram?
18 grams

Final Wager: Space

Play this when the board is clear, or when two minutes are left. Announce the category, then every team writes a secret wager of up to the points it already has. Read the question. Teams get 60 seconds of silent writing, then hold their answers up together.

Light travels about 150 million kilometers from the Sun to Earth. To the nearest minute, how long does that trip take?

8 minutes

Right: add the wager. Wrong: subtract it. That is the final score.



Game, Day 1: The Board

Tape this to the whiteboard or copy it. Cross squares off as they are played.

Game • Day 1

BIOLOGY	GENETICS	CHEMISTRY	PHYSICS	EARTH
100	100	100	100	100
200	200	200	200	200
300	300	300	300	300
400	400	400	400	400
500	500	500	500	500

Scores

Team 1

.....

.....

.....

Team 2

.....

.....

.....

Team 3

.....

.....

.....

Team 4

.....

.....

.....

Team 5

.....

.....

.....

Team 6

.....

.....

.....

Final Wager: Space

Write your wager before you hear the question. A team may bet any amount up to the points it already has. Right answer: add the wager. Wrong answer: subtract it.

Team 1

WAGER

ANSWER

Team 2

WAGER

ANSWER

Team 3

WAGER

ANSWER

Team 4

WAGER

ANSWER

Team 5

WAGER

ANSWER

Team 6

WAGER

ANSWER



Answer Keys (1 of 12)

Teacher copy. Keep these pages out of the student sets.

Science Set 1: Scientific Method and Data

Try it: 1. Accept any testable if and then sentence, for example "If the water is hotter, then the sugar cube will dissolve in less time." 2. Keep the odd trial in the data but run more trials and look for a cause; one strange result should not be deleted just because it is inconvenient.

Table: 10 cm: mean 60, range 4; 20 cm: mean 105, range 5; 30 cm: mean 145, range 5; 40 cm: mean 180, range 4; 50 cm: mean 210, range 10. **Graph:** the plotted curve rises steeply at first and then flattens; the gains are 45, 40, 35, 30 cm.

Questions: 1. independent: ramp height in centimeters; dependent: distance the car rolled, in centimeters; 2. any three of: the same car, the same floor surface, the same ramp board, releasing the car from the top without a push, measuring from the same starting line; 3. $(143 + 144 + 148) / 3 = 145$ cm; 4. the 50 cm ramp, range 10 cm; at the steepest setting a small difference in how the car is released has a bigger effect, and the car may drift off a straight path; 5. between 10 cm and 20 cm, an increase of 45 cm; 6. about 235 cm; the gains are 45, 40, 35, 30 cm, shrinking by about 5 cm each step, so the next gain is about 25 cm.

Name the variables: 1. IV hours of lamp light per day; DV plant height after three weeks; controlled, any one of: same species and starting size of plant, same pot and soil, same water each day, same room temperature. 2. IV the drop height; DV the depth of the crater; controlled, any one of: the same ball, the same sand packed the same way, the same container. 3. IV the light condition of the surface; DV the drying time; controlled, any one of: the same paint and amount of it, the same surface material, the same room temperature and airflow.

Challenge: a. three problems: two variables change at once (tire width and the ramp surface), the cars themselves are different, and there is only one trial at each setting, so there is no mean and no range. b. Accept any plan where the only thing that changes is tire width: IV tire width, DV distance rolled, controlled, three of: same car body, same ramp and surface, same release height, no push, same measuring line. c. At least three trials per setting, so a mean and a range can be reported and one odd trial does not decide the result.



Science Set 1: The Ramp Data

Fill in the mean and the range for each row, then plot the five means on the grid. Two points are plotted for you.

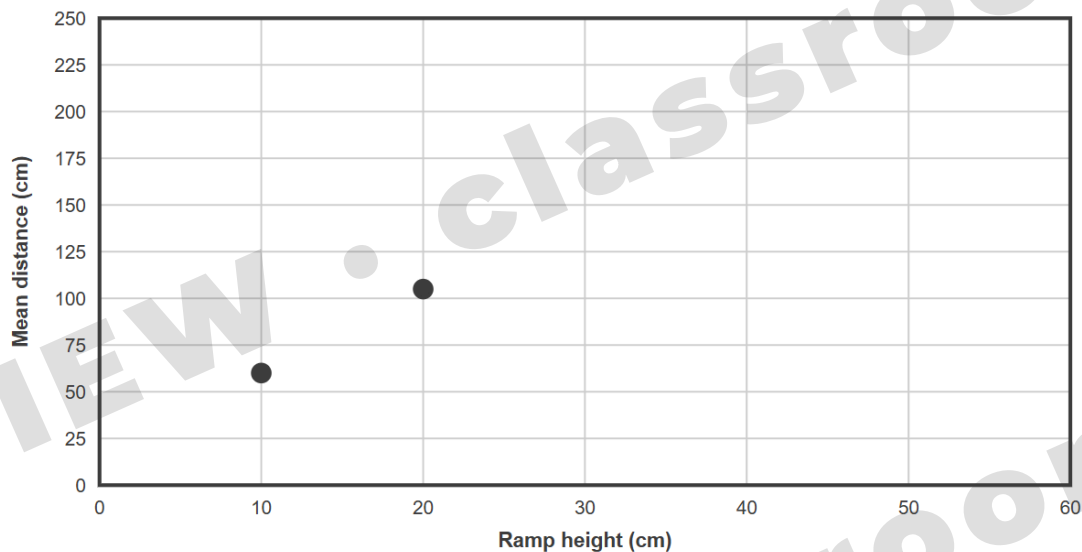
Science • Day 1

Maya's experiment

Maya rolled the same toy car down the same board five times at five different ramp heights and measured how far it rolled past the bottom of the ramp. She ran three trials at every height. All distances are in centimeters.

RAMP HEIGHT (CM)	TRIAL 1	TRIAL 2	TRIAL 3	MEAN (CM)	RANGE (CM)
10	58	60	62		
20	102	106	107		
30	143	144	148		
40	178	180	182		
50	205	210	215		

Mean = the three trials added together, divided by 3. Range = the highest trial minus the lowest trial.



Plot each mean as a dot, then join the dots with a smooth line from left to right. Do not draw a straight ruler line through them; let the data decide the shape.

In the full kit

Five days, planned and ready to print.

68 pages in color and ink-saver
B&W, US Letter and A4

5 days, each with its own sets, calm
puzzle, team task and game

15 pages of science sets with
worked examples

12 answer-key pages, every answer
checked

Thank you! If this works for your class, a quick review helps other teachers find it, and earns you TpT credits.

