

High School Science Sub Plans, 2 Weeks

Two complete week binders of high school science, grades 9 to 12: one topic a day, on paper. Every day has individual work and a team task, and every task has a "say this" script.

PREVIEW

What is included

- Week 1 binder (71 pages) and Week 2 binder (71 pages): 142 pages
- 26 front pages: binder cover, important information, note to the sub, the week plan filled in, schedule, set index, class list, how it went, Monday opener
- 20 solo blocks (10 science sets, 10 calm blocks) and 10 team tasks for groups of four
- Every science set lists the NGSS performance expectations it practices
- A "say this to the class" script for all 42 tasks: 2 or 3 sentences the sub reads out
- A core task and a ★ challenge in every science set and team task
- 10 optional games, each on that day's lessons, a fun way to end the class
- Answer keys for everything; color and ink-saver B&W, US Letter and A4

How it works

1. Leave both binders out. Each has its own filled-in plan with page numbers.
2. The sub reads the "say this" box out, then runs the day's science set in every period; students work on their own. Everyone does the core task, early finishers go on to the ★ challenge.
3. Calm block for any gap, team task for a block period or extra time, game for the last 15 minutes.
4. No prep and no tech: paper and pencil, print and go.

The 10 days: a science set, a team task and a game each day

1. **Day 1:** Scientific Method and Data · Team: The Paper Pack Audit **Whiteboard Quiz Game**
2. **Day 2:** Cells and Genetics · Team: The Unlabeled Culture **Paper Password**
3. **Day 3:** Chemical Reactions · Team: The Mass Balance Relay **Class Feud**
4. **Day 4:** Forces, Energy and Work · Team: The Elevator Bid Review **Classroom Millionaire**
5. **Day 5:** Ecology and Climate Data · Team: Beavers for Willow Creek **Mystery Box**
6. **Day 6:** Measurement, Units and Precision · Team: The Estimate Build **Whiteboard Quiz Game**
7. **Day 7:** Cell Transport and Homeostasis · Team: Membrane Border Control **Paper Password**
8. **Day 8:** Decay and Half-Life · Team: The Darrow Bend Dig **Class Feud**
9. **Day 9:** Gravity and Orbits · Team: The Orbit Planner **Classroom Millionaire**
10. **Day 10:** Plate Tectonics and Earth's Interior · Team: The GPS Plate Map **Mystery Box**

What this preview shows: the note to the substitute, the Week 1 plan, more front pages, one page of every daily part, a full science set with its answer key, a calm block, a team task, the game types and one ink-saver page. Product pages are watermarked. Full product: 142 pages.



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 weekly plan is filled in for you. I fill in the important information page and the class list before you arrive; if anything there is still blank, please fill in what you can. After the binder pages come the five days in order, Monday to Friday. Monday starts with a short opener (about 15 minutes), then each day has its work sets: **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. Every task starts with a short **Say this to the class** box under its title: read it out, and the class knows what to do and how to start.

Every science and team page has a core task first, then a ☆ challenge. Every student does the core task. Students who finish early go on to the ☆ challenge; it fills a few extra minutes, and nobody has to finish it.

Each day's work set is followed by that day's calm block, team task and game. The **calm block** is always allowed: for time left at the end, a loud class, or anyone who finishes early. The **team task** fills a period on its own. The **game** is optional: a fun way to end the class, or something for extra time. Fifteen minutes, from the script; items marked (calm) or (team) can be skipped if the class did not do that part.

Every science set lists the standards it practices on a small line under its title (for you, not the students): the high school performance expectations of the Next Generation Science Standards (NGSS). A sub plan set practices part of a standard; it is review and practice, not a full assessment of it. Every set is a self-contained reading with its own data, so it works in any science class: biology, chemistry, physics, earth and space, or environmental science.

Each day has

- One Science set (one period, core task + ☆ challenge on every page)
- A calm and quiet block: learn 8 terms from the day's topic, then a quiet self-test
- 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.
- 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.

For the teacher who bought this kit: if it worked well for your class, leaving a review where you bought it, on TpT or classroomreview.games, helps other teachers find it. Thank you!

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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. 11 · 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. 14	**Science 2** Cells and Genetics p. 23	**Science 3** Chemical Reactions p. 32	**Science 4** Forces, Energy and Work p. 41	**Science 5** Ecology and Climate Data p. 52
Early finishers or a loud moment	**Learn and Test: Measurement Terms** p. 17	**Learn and Test: Cell and Heredity Terms** p. 26	**Learn and Test: Reaction Terms** p. 35	**Learn and Test: Force and Machine Terms** p. 45	**Learn and Test: Climate and Life Terms** p. 56
Block period or extra time	**The Paper Pack Audit** p. 19	**The Unlabeled Culture** p. 28	**The Mass Balance Relay** p. 37	**The Elevator Bid Review** p. 47	**Beavers for Willow Creek** p. 58
Last 15 minutes (optional): a fun way to end the class, or for extra time	**Whiteboard Quiz Game** p. 21	**Paper Password** p. 30	**Class Feud** p. 39	**Classroom Millionaire** p. 50	**Mystery Box** p. 60

How to use this plan

- Page numbers point to the first page of each set. Copy work sets and calm blocks one per student. Team tasks: copy them as the copy line on each task's first page says (per group or per student), plus any cards or sheets it asks for. Copy any page that gets torn apart (role cards, game cards) one-sided, on its own sheet, so the page on its back stays whole. Game scripts are for you only (do not copy them). Game boards: copy the board page one-sided and tape up the copy, never the binder page (the page on its back is still needed).
- The calm block is always allowed: time left at the end, a loud class, or anyone who finishes early.
- On Monday the opener takes the first 15 minutes, so stop the set where the bell falls; finish page 3 as early-finisher work on Tuesday or leave it for another day.
- The game is optional: a fun way to end the class, or something for extra time.

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HS SCIENCE SUB PLANS WEEK 1

High School Science, Any Course, 5 Days of Print and Go Work

Teacher _____

Room _____

Grade and classes _____

Week of _____

Everything a sub needs for five days is in this binder: a filled-in weekly plan, a blank schedule, the class list, and for every day one Science set, a calm block, a team task and a paper game. Each set is one period, stands alone, and has its own answer key. Nothing needs subject knowledge, a login or a projector.



Important Information

The page the sub reads first. Fill it in once and keep it current.

People to call

Office _____

Teacher next door _____

Nurse _____

Principal / admin _____

Tech help _____

Emergency procedures

Fire: exit and meeting point _____

Lockdown _____

Severe weather _____

Medical _____

Where the first aid kit is _____

Helpful students

_____

_____

_____

Students who need extra support

_____

_____

_____

Where things are

Attendance / how to take it _____

Paper, pencils, supplies _____

Hall passes _____

Copier, if the sub may use it _____

Class routines

Start of class _____

Bathroom _____

Phones _____

End of class _____

Weekly Schedule (Blank)

Your own order: write the set for each period (Monday: Science 1, Tuesday: Science 2, and so on) and the class next to each period. Cross out or rename periods to match the school day.

PERIOD / CLASS	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
Period 1 ____ · ____ Class: _____					
Period 2 ____ · ____ Class: _____					
Period 3 ____ · ____ Class: _____					
Period 4 ____ · ____ Class: _____					
Period 5 ____ · ____ Class: _____					
Period 6 ____ · ____ Class: _____					
Period 7 ____ · ____ Class: _____					

How to fill it in

- One set per period. Each set runs 45 to 55 minutes; if a period runs longer, the ☆ challenges fill a few minutes, or add that day's team task.
- Same subject all day? Write the day's set in every period you teach. Planning, lunch and duty periods: cross them out.
- On Monday the opener (15 minutes) comes first in every period, then the set.
- The game is optional: put it in the last 15 minutes of any period as a fun way to end the class, or use it for extra time. The calm block goes in any gap.

Set naming

Sets are named by subject and day: **Science 1** is Monday's set, **Science 2** is Tuesday's, and so on to **Science 5** on Friday. The set index lists every set with its minutes and page.

Set Index (1 of 3)

Every set in the binder with its length and page. Day = the weekday it is written for. Any science set works on any day; each game reviews its own day's set.

DAY	SET	WHAT IT IS	MINUTES	PAGE
SCIENCE, DAYS 1 TO 5				
1	**Science 1: Scientific Method and Data**	**Reviews:** hypotheses, independent, dependent and controlled variables, mean and range of trials, and the shape of a graph. Variables and controls, a 5 by 3 trial data set to average, a graph to finish, computed questions, a star challenge on every page. Key included.	50	p. 14
2	**Science 2: Cells and Genetics**	**Reviews:** genes and alleles, genotype and phenotype, Punnett squares with ratios and percents, incomplete dominance, codominance and blood type. Alleles and inheritance, eight key terms, four Punnett squares with ratios, five questions, a star challenge on every page. Key included.	50	p. 23
3	**Science 3: Chemical Reactions**	**Reviews:** conservation of mass, balancing equations with coefficients, and sorting reactions into five types. Conservation of mass and the five reaction types, eight equations to balance and classify, two atom tally proofs, harder equations. Key included.	50	p. 32
4	**Science 4: Forces, Energy and Work**	**Reviews:** force, work, power and energy calculations with units, and how speed changes kinetic energy. Seven formulas, four worked examples, sixteen practice calculations, six word problems, a braking distance challenge. Key included.	50	p. 41
5	**Science 5: Ecology and Climate Data**	**Reviews:** the carbon cycle, the carbon dioxide record and its rate, carrying capacity, limiting factors and predator and prey cycles. The carbon cycle and carrying capacity: a sixty year carbon dioxide record to graph, a made-up island survey, computed questions. Key included.	50	p. 52
MONDAY OPENER				
1	**Meet Your Sub**	Fifteen minutes at the start of every period on Monday: sub sheet, three questions, the agreement and voice levels. Spare: a keyed Testable or Not?	15	p. 11

Class List and Dismissal

Names, what a sub must know, and how every student goes home. Copy one per class.

(B) bus (write the number) (W) walks (P) picked up (write who) (A) after-school program (O) other

☆ in the notes: a student who finds the core task easy may start with the challenge

#	STUDENT NAME	NOTES (allergies, needs, helpful, leaves early)	HOME	BUS # / PICKED UP BY / PROGRAM
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				

How It Went

For the substitute. One line per day, two minutes at the end of each day. Check the boxes and go.

Monday

Sets done: _____ Class was: ☐ Great ☐ Fine ☐ Hard, see notes

Notes / stars of the day: _____

Tuesday

Sets done: _____ Class was: ☐ Great ☐ Fine ☐ Hard, see notes

Notes / stars of the day: _____

Wednesday

Sets done: _____ Class was: ☐ Great ☐ Fine ☐ Hard, see notes

Notes / stars of the day: _____

Thursday

Sets done: _____ Class was: ☐ Great ☐ Fine ☐ Hard, see notes

Notes / stars of the day: _____

Friday

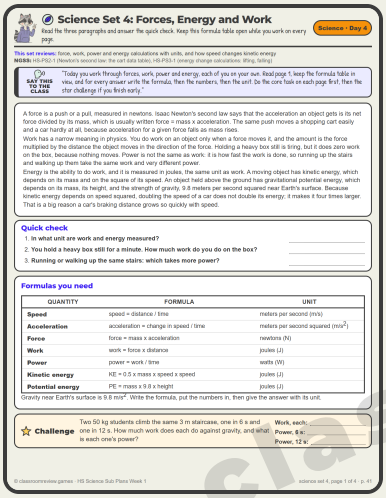
Sets done: _____ Class was: ☐ Great ☐ Fine ☐ Hard, see notes

Notes / stars of the day: _____

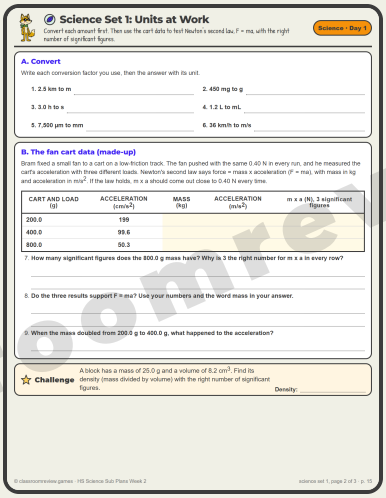
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ONE PAGE OF EVERY DAILY PART

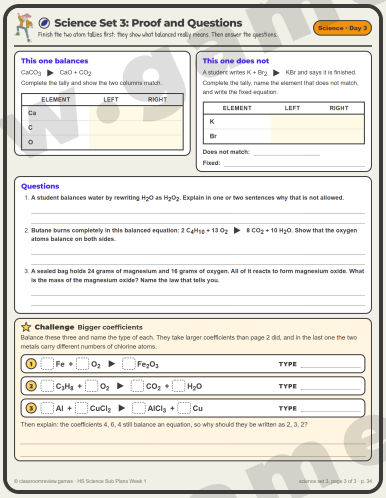
classroomreview.games



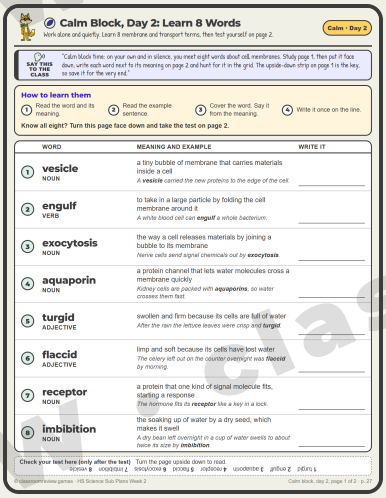
Science set: the lesson, Week 1 (solo)



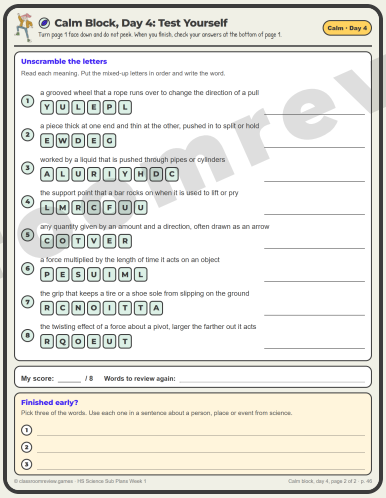
Science set: practice, Week 2 (solo)



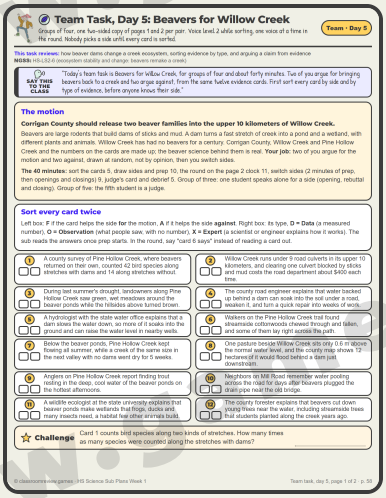
Science set: the third page (solo)



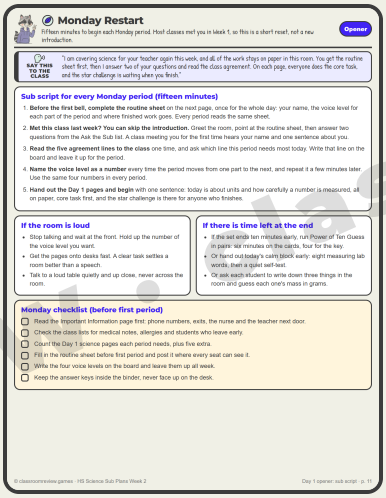
Calm block: learn 8 words (solo)



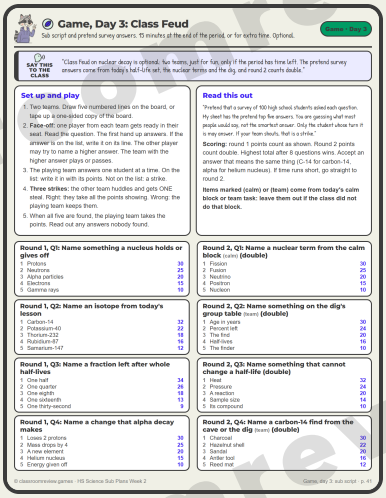
Calm block: test yourself (solo)



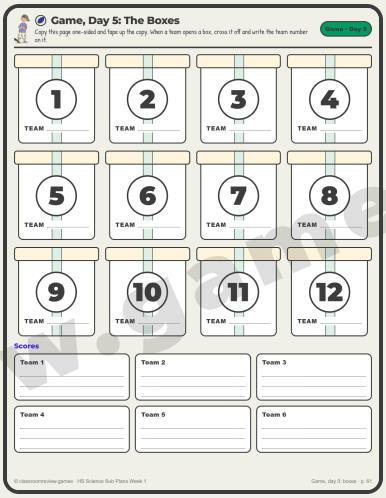
Team task (groups of four)



Monday opener (whole class)



Game: Class Feud (whole class)



Game: Mystery Box (whole class)

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Every day: a science set, a calm block, a team task and an optional game



Science Set 1: Measurement, Units and Precision

Science · Day 1

Read the five paragraphs and the worked example, then do the tasks under them. Pencil and paper only.

This set reviews: SI units and prefixes, conversion factors, significant figures, accuracy, precision and percent error
NGSS: HS-PS2-1 (Newton's second law: the fan cart data)

SAY THIS TO THE CLASS "Today is about how scientists write measurements so that anyone can trust and use them. Read the passage on page 1 first, because pages 2 and 3 use its rules. Do the core task on each page first, then the star challenge when you finish."

Every measurement is a number and a unit. The International System of Units, or SI, is built on seven base units, among them the meter for length, the kilogram for mass, the second for time and the kelvin for temperature. Other units are built from these. The newton, the unit of force, is one kilogram meter per second squared: 1 N = 1 kg·m/s^2.

Prefixes scale a unit by powers of ten. Kilo means one thousand (10^3), centi one hundredth (10^{-2}), milli one thousandth (10^{-3}) and micro one millionth (10^{-6}). To change units, multiply by a conversion factor, a fraction whose top and bottom are equal amounts, such as 1,000 g over 1 kg. Because the factor equals one, the amount does not change; only the unit does. Write the units in every step and cancel them like numbers: if the unit you want is left at the end, the setup is right.

No measurement is exact, so a measured number shows how carefully it was made. Its significant figures are all the digits you are sure of plus one estimated digit. Every nonzero digit counts. Zeros between nonzero digits always count. Leading zeros, as in 0.0042, never count: they only place the decimal point. A zero at the end of a number with a decimal point, as in 55.0 g, counts, because someone measured it. Counted numbers, like 4 trials, are exact.

A calculation cannot be more certain than its least certain measurement. When you multiply or divide, round the answer to the same number of significant figures as the measurement with the fewest. When you add or subtract, round to the fewest decimal places.

Two more words describe a set of measurements. Accuracy is how close a result is to the true or accepted value. Precision is how close repeated results are to each other. A scale can be precise but not accurate if every reading lands in the same wrong place. Percent error measures accuracy: the difference between the measured and the accepted value, ignoring its sign, divided by the accepted value, times 100.

Worked example: a car travels at 72 km/h. How many meters per second is that? 72 km/h x (1,000 m / 1 km) x (1 h / 3,600 s) = 20 m/s. The km and the h cancel, and m/s is left.

How many significant figures?

a. 4.07 g ☐ **b.** 0.0060 L ☐ **c.** 12.50 cm ☐

d. 0.3 s ☐ **e.** 205.0 m ☐ **f.** 7,001 km ☐

Evidence from the reading (circle the best answer)

1. **Which sentence explains why a unit change leaves the amount itself the same?**
   - (A) "Every measurement is a number and a unit"
   - (B) "Prefixes scale a unit by powers of ten"
   - (C) "Counted numbers, like 4 trials, are exact"
   - (D) "Because the factor equals one, the amount does not change"
2. **Which words describe a measuring tool whose readings agree but are all wrong?**
   - (A) "Accuracy is how close a result is to the true or accepted value"
   - (B) "No measurement is exact"
   - (C) "every reading lands in the same wrong place"
   - (D) "round to the fewest decimal places"

Challenge A garden snail glides at 1.5 mm/s. How many meters per hour is that? Write the conversion factors.

Factors: .....

m/h: .....

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Science Set 1: Units at Work

Convert each amount first. Then use the cart data to test Newton's second law, F = ma, with the right number of significant figures.

Science · Day 1

A. Convert

Write each conversion factor you use, then the answer with its unit.

1. 2.5 km to m _____
2. 450 mg to g _____
3. 3.0 h to s _____
4. 1.2 L to mL _____
5. 7,500 µm to mm _____
6. 36 km/h to m/s _____

B. The fan cart data (made-up)

Bram fixed a small fan to a cart on a low-friction track. The fan pushed with the same 0.40 N in every run, and he measured the cart's acceleration with three different loads. Newton's second law says force = mass x acceleration (F = ma), with mass in kg and acceleration in m/s^2. If the law holds, m x a should come out close to 0.40 N every time.

CART AND LOAD (g)	ACCELERATION (cm/s^2)	MASS (kg)	ACCELERATION (m/s^2)	m x a (N), 3 significant figures
200.0	199			
400.0	99.6			
800.0	50.3			

7. **How many significant figures does the 800.0 g mass have? Why is 3 the right number for m x a in every row?**

8. **Do the three results support F = ma? Use your numbers and the word mass in your answer.**

9. **When the mass doubled from 200.0 g to 400.0 g, what happened to the acceleration?**

Challenge A block has a mass of 25.0 g and a volume of 8.2 cm^3. Find its density (mass divided by volume) with the right number of significant figures.

Density: _____

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Science Set 1: Accepted Values Check

A made-up class measured four quantities. Compare each class value with its accepted value from a reference table.

Science · Day 1

The accepted values come from reference tables: aluminum has a density of 2.70 g/cm^3, a falling object near Earth's surface speeds up at 9.80 m/s^2, sound travels at 343 m/s in air at 20 °C, and a US nickel coin has a mass of 5.00 g.

QUANTITY THE CLASS MEASURED	CLASS VALUE	ACCEPTED VALUE	DIFFERENCE (ignore the sign)	PERCENT ERROR	WITHIN 5%? (yes or no)
Density of an aluminum block	2.58 g/cm^3	2.70 g/cm^3			
g from a falling ball	9.43 m/s^2	9.80 m/s^2			
Speed of sound from an echo	318 m/s	343 m/s			
Mass of a new US nickel	5.21 g	5.00 g			

Percent error = difference / accepted value x 100. Use the page 1 rules: the difference keeps the fewest decimal places, and the percent keeps as many significant figures as the difference has.

10. **How many significant figures does each difference have? So how many does each percent error keep?**

11. **Which class value is furthest from its accepted value? Give one likely cause from how it was measured.**

12. **Which class value is closest to its accepted value, and by what percent?**

    Row: .....

    Percent error: .....

13. **A classmate says a row within 5% is perfect. Use the word accuracy to explain why that is not quite right.**

☆ Challenge A better tool

Which row would improve most with a better tool? Name the tool, and explain how it would bring the class value closer to the accepted value.

Row: .....

Tool: .....

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Answer Keys (1 of 10)

Day 1. Teacher copy. Keep these pages out of the student sets.

Day 1 opener: Power of Ten Guess, answers

1. 400 x 1,000 = 400,000 = 4 x 10^5 (power 5). **2.** 365 x 24 = 8,760 = 8.76 x 10^3 (power 3). **3.** 1,000 x 1,000 = 1,000,000 = 1 x 10^6 (power 6). **4.** 1,500 x 1,000 = 1,500,000 = 1.5 x 10^6 (power 6). **5.** 30 x 10,000 = 300,000 = 3 x 10^5 (power 5). **6.** 100 x 365 = 36,500 = 3.65 x 10^4 (power 4). **7.** 2 x 1,000 x 1,000 = 2,000,000 = 2 x 10^6 (power 6). **8.** 42 x 1,000 x 100 = 4,200,000 = 4.2 x 10^6 (power 6).

One point for each right power guessed before calculating, one more for each right calculation. Score: 16 points at most.

Science Set 1: Measurement, Units and Precision

Significant figures: a. 4.07 g: 3; b. 0.0060 L: 2; c. 12.50 cm: 4; d. 0.3 s: 1; e. 205.0 m: 4; f. 7,001 km: 4 (the zeros in 0.0060 before the 6 are leading zeros; its final 0 counts; the 0 in 7,001 is between nonzero digits). **Evidence:** 1. D ("Because the factor equals one, the amount does not change"); 2. C ("every reading lands in the same wrong place"). **Page 1 star challenge:** 1.5 mm/s x (1 m / 1,000 mm) x (3,600 s / 1 h) = **5.4 m/h** (accept 5 m/h).

A. Convert: 1. 2.5 km = 2,500 m; 2. 450 mg = 0.450 g; 3. 3.0 h = 1.1 x 10^4 s (2 significant figures; accept 10,800 s or 1.08 x 10^4 s); 4. 1.2 L = 1,200 mL; 5. 7,500 µm = 7.5 mm; 6. 36 km/h = 10 m/s. Accept any correct setup of factors. **B. Table:** 200.0 g = 0.2000 kg, 199 cm/s^2 = 1.99 m/s^2, m x a = 0.398 N; 400.0 g = 0.4000 kg, 99.6 cm/s^2 = 0.996 m/s^2, m x a = 0.398 N; 800.0 g = 0.8000 kg, 50.3 cm/s^2 = 0.503 m/s^2, m x a = 0.402 N. 7. Four (the final 0 after the decimal point counts); every acceleration has 3 significant figures and every mass 4, so each product keeps 3, the fewest. 8. Yes: all three products are within about 0.01 N of the 0.40 N push, so a bigger mass gets a smaller acceleration and m x a stays equal to the force. 9. It fell to about half (1.99 to 0.996 m/s^2). **Page 2 star challenge:** 25.0 / 8.2 = 3.049, rounded to 2 significant figures (8.2 has two): **3.0 g/cm^3**.

Table: Density of an aluminum block: difference 0.12 g/cm^3, percent error 4.4%, yes; g from a falling ball: difference 0.37 m/s^2, percent error 3.8%, yes; Speed of sound from an echo: difference 25 m/s, percent error 7.3%, no; Mass of a new US nickel: difference 0.21 g, percent error 4.2%, yes. Accept percents with one more figure (for example 4.44%) if the student explains the rule. 10. Two each (0.12, 0.37, 25, 0.21), so each percent error keeps 2 significant figures. 11. Speed of sound from an echo (7.3%): accept a sensible cause, for example timing the echo by hand (a person's reaction time is large next to the short echo time) or measuring the distance to the wall short. 12. g from a falling ball, 3.8% (compare percents, not raw differences, since the units differ). 13. Within 5% means close to the accepted value, but not exact: there is still some error, and a small percent error means good accuracy, not a perfect result. **Page 3 star challenge:** the speed of sound row (the largest error): an electronic timer or a microphone with a sound recording app, which times the echo far more exactly than a hand stopwatch, so the measured time and the speed come out closer to 343 m/s. Accept any row and tool with a sound reason.

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Calm Block, Day 1: Learn 8 Words

Work alone and quietly. Learn 8 measurement and data terms, then test yourself on page 2.

Calm · Day 1

SAY THIS TO THE CLASS

"For the calm block, each of you works silently on eight measurement and data terms. Study page 1 first; once you know the terms, flip it over and match every term with its meaning on page 2. Last, read the upside-down strip at the bottom of page 1 to score yourself."

How to learn them

1. Read the word and its meaning.
2. Read the example sentence.
3. Cover the word. Say it from the meaning.
4. Write it once on the line.

Know all eight? Turn this page face down and take the test on page 2.

	WORD	MEANING AND EXAMPLE	WRITE IT
1	**calibrate** VERB	to check and adjust an instrument against a known standard *Before each lab, the lab team **calibrated** the scale with a 100 g mass.*	_____
2	**uncertainty** NOUN	the amount by which a measured value may differ from the true value *A length of 12.0 cm with an **uncertainty** of 0.1 cm lies between 11.9 and 12.1 cm.*	_____
3	**systematic** ADJECTIVE	describes an error that pushes every reading off in the same direction *A scale that always reads 2 g too high has a **systematic** error.*	_____
4	**reproducible** ADJECTIVE	giving the same result when other people repeat the same experiment *The result was **reproducible**: three other labs measured the same value.*	_____
5	**interpolate** VERB	to estimate a value that falls between two measured data points *Use the curve to **interpolate** the distance for a ramp height you did not test.*	_____
6	**extrapolate** VERB	to estimate a value beyond the range of the data you measured *It is risky to **extrapolate** ten years of data a hundred years ahead.*	_____
7	**correlation** NOUN	a link in which two variables tend to change together *Ice cream sales and sunburns show a **correlation**, but one does not cause the other.*	_____
8	**magnitude** NOUN	the size of a quantity, often counted in powers of ten *A meter is three orders of **magnitude** longer than a millimeter.*	_____

Check your test here (only after the test) Turn the page upside down to read.

1 correlation 2 extrapolate 3 uncertainty 4 magnitude 5 systematic 6 calibrate 7 reproducible 8 interpolate

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Team Task, Day 2: The Unlabeled Culture

Groups of four. Voice level 2. Copy this page once per group. Copy page 2 on its own sheet (one-sided), then fold and tear apart its four role cards (or the sub tears them before class), one card per student.

Team · Day 2

This task reviews: cell structures that tell bacteria, protists, fungi, algae and animals apart, and pooling test results to identify an organism

SAY THIS TO THE CLASS

"Today's team task is The Unlabeled Culture, for groups of four and about forty minutes. Each of you holds a card with two test results that nobody else has, and only the whole group together can name the organism. Read your own card silently first, then take turns explaining one result at a time."

The situation

You are the four student lab assistants at Pellbrook High, a made-up school. **Tube 7** in the biology prep room has lost its label. The order form says it holds one of the eight organisms below, and yesterday each of you ran different tests on it.

Your job: pool your results, circle the organism, and for every other one write whose card rules it out.

NO.	ORGANISM	NUCLEUS	MITO-CHONDRIA	CELL WALL	CHLORO-PLASTS	MAKES FOOD	MOVES	BODY	RULED OUT BY
1	**Staphylococcus** a round bacterium	no	no	yes	no	no	no	single cell	
2	**Amoeba** a pond protist	yes	yes	no	no	no	yes	single cell	
3	**Bread mold** a fungus	yes	yes	yes	no	no	no	threads of cells	
4	**Baker's yeast** a fungus	yes	yes	yes	no	no	no	single cell	
5	**Chlorella** a green alga	yes	yes	yes	yes	yes	no	single cell	
6	**E. coli** a rod-shaped bacterium	no	no	yes	no	no	yes	single cell	
7	**Chlamydomonas** a green alga	yes	yes	yes	yes	yes	yes	single cell	
8	**Hydra** a tiny freshwater animal	yes	yes	no	no	no	yes	many cells	

How the meeting runs

1. Keep your card to yourself. Go around twice: each time, each assistant explains one result in their own words and which organisms it rules out.
2. Decide when at least three of you can explain why your answer is the only fit.

Time plan (40 min): read your own card 3; round 1, one result each 10; round 2, the other results 10; fill in ruled out by and decide 10; hardest result and the star challenges 7. The Culture Assistant writes on this page for the group. Group of three: the Culture Assistant also holds the Slide Assistant's card. Group of five: the fifth person fills in "Ruled out by".

The group's decision

Organism no. _____ Name _____ Assistants who agree _____

The result that was hardest to read, and what it told you:

_____

_____

Challenge Suppose the Imaging Assistant had been absent. Which organisms would still fit all the other results?

Organisms: _____

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Game, Day 1: The Board

Copy this page one-sided and tape the copy to the whiteboard (or draw the grid). Cross squares off as they are played.

Game · Day 1

SI UNITS	SIG FIGS	DATA	TERMS	ESTIMATES
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

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Game, Day 2: Paper Password

Sub script and science word list. 15 minutes at the end of the period, or for extra time. Optional.

Game · Day 2

SAY THIS TO THE CLASS

"For the last few minutes, Password is an optional game for pairs. One partner gives one-word clues for a secret word from today's genetics set, calm block terms or culture team task, and the other guesses."

Set up (2 minutes)

1. Before class, copy the card page one-sided and fold and tear it into four cards, one card per round. Hand each pair only the current round's card; pairs keep each used card and add the four round totals at the end.
2. Partner A is the clue giver in rounds 1 and 3, Partner B in rounds 2 and 4. The guesser never sees the card.
3. Rounds last 2 minutes, with 30 seconds between them to swap roles. One-word clue, then ONE guess; wrong means another clue.
4. After five clues without a right guess, the word scores 0. Say "Go" and "Stop" for each round.

Read this out

"Your clue is one word only. You may not say the secret word or any part of it. If the word is snowman, you cannot say snow or man. No gestures, no spelling, no rhymes. Break a rule and that word scores zero."

Scoring: guessed on clue 1 = 5 points, clue 2 = 4, clue 3 = 3, clue 4 = 2, clue 5 = 1. The clue giver circles the number on the card. After round 4, pairs add their round totals. Highest total wins.

Words marked (calm) or (team), here and on the cards, come from today's calm block or team task. If the class skipped that block, pairs leave them out (and any round left empty).

Referee calls

Two words glued together ("sunlight") count as one clue only if they make a real word. No plurals or "-ing" forms of the secret word. A disputed clue scores zero. Each example clue below is allowed, and a good first clue.

Timing (15 minutes)

0:00	2:00	4:30	7:00	9:30	12:00
Set up, rules	Round 1, Partner A	Round 2, Partner B	Round 3, Partner A	Round 4, Partner B	Add totals, winners

Round 1: Partner A gives clues

POLYGENIC	example clue: many
BLEND	example clue: pink
DOMINANCE	example clue: masks
ALLELES	example clue: versions
CHANCE	example clue: probability

Round 2: Partner B gives clues

PARENTS	example clue: mother
COPIES	example clue: duplicates
PAIRS	example clue: couples
TALL	example clue: height
SEEDS	example clue: plant

Round 3: Partner A gives clues

GAMETE (calm)	example clue: egg
DIPLOID (calm)	example clue: double
LOCUS (calm)	example clue: place
CARRIER (calm)	example clue: silent
HYBRID (calm)	example clue: mixed

Round 4: Partner B gives clues

FUNGUS (team)	example clue: mushroom
AMOEBA (team)	example clue: blob
PROTIST (team)	example clue: kingdom
CHLORELLA (team)	example clue: green
HYDRA (team)	example clue: tentacles

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Game, Day 4: Classroom Millionaire

Sub script and the 12 questions. 15 minutes at the end of the period, or for extra time. Optional.

Game · Day 4

SAY THIS TO THE CLASS

"Classroom Millionaire is an optional, fun climb for the whole class. Questions come from the gravity set, the orbit terms and the Orbit Planner."

How it works

1. Tape up a one-sided copy of the ladder page. The whole class is one player. Pick a student for the hot seat (a new student for every question).
2. Read the question and the four options, then read the options again. The hot seat may listen to quiet advice, then says "final answer" and a letter.
3. Right: the class climbs one rung. Before hearing the next question, the class may vote to walk away and keep what it has.
4. Wrong: the climb ends. Rungs 4 and 8 are safe: the class keeps the last safe amount it passed.
5. Time left over? Play the questions again as a team quiz.

Three lifelines (one use each)

Ask the class: everyone shows 1, 2, 3 or 4 fingers at once for A, B, C or D. The hot seat looks, then decides.

50/50: read out the two wrong options listed under the question. Cross them off.

Phone a friend: the hot seat picks one classmate, who has 30 seconds to say what they think out loud.

"Only the hot seat's final answer counts. Shout an answer and the class loses a lifeline."

Items marked (calm) or (team) come from today's calm block or team task: leave them out if the class did not do that block.

Rungs 1 to 4, rung 4 is safe

1. $100 Whose law of universal gravitation was it?
A. Galileo B. Kepler C. Copernicus D. Newton
Answer: D. Newton (50/50 removes A and B)

2. $250 A planet's closest point to the Sun? (calm)
A. Perihelion B. Aphelion C. Apogee D. Zenith
Answer: A. Perihelion (50/50 removes C and D)

3. $500 One mass doubles. The pull does what?
A. Halves B. Doubles C. Stays the same D. Triples
Answer: B. Doubles (50/50 removes C and D)

4. $1,000 Planner base orbit: how many minutes? (team)
A. 24 B. 60 C. 365 D. 97
Answer: D. 97 (50/50 removes A and C)

Rungs 5 to 8, rung 8 is safe

5. $2,500 Which Jupiter moon has the shortest period?
A. Callisto B. Europa C. Io D. Ganymede
Answer: C. Io (50/50 removes A and D)

6. $5,000 Which term means orbiting backward? (calm)
A. Retrograde B. Parabola C. Slingshot D. Apogee
Answer: A. Retrograde (50/50 removes C and D)

7. $10,000 Who first measured G accurately?
A. Hooke B. Cavendish C. Halley D. Brahe
Answer: B. Cavendish (50/50 removes C and D)

8. $25,000 Far from Earth, its gravity does what?
A. Switches off B. Gets stronger C. Never hits zero D. Turns around
Answer: C. Never hits zero (50/50 removes B and D)

Rungs 9 to 12

9. $50,000 About how far is it to Earth's center?
A. 9,800 km B. 1,798 km C. 384,400 km D. 6,371 km
Answer: D. 6,371 km (50/50 removes A and C)

10. $100,000 What is the path of a launched object? (calm)
A. Trajectory B. Barycenter C. Aphelion D. Orbit time
Answer: A. Trajectory (50/50 removes B and C)

11. $500,000 At 3 Earth radii, gravity is what share?
A. A third B. A sixth C. A ninth D. A twelfth
Answer: C. A ninth (50/50 removes A and D)

12. $1 MILLION 9 times as far out: how many times as long?
A. 9 B. 27 C. 18 D. 81
Answer: B. 27 (50/50 removes A and D)

If the class misses

Wrong on rung 1 to 4	**class keeps $0**
Wrong on rung 5 to 8	**class keeps $1,000**
Wrong on rung 9 to 12	**class keeps $25,000**
Walk away before a question	**class keeps the amount of the last rung it climbed**

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Science Set 3: Changes in the Nucleus

Use the element card and the rules for alpha and beta decay on page 1. The first row is done for you.

Science · Day 3

Element card: atomic number = number of protons

1 hydrogen · **2** helium · **3** lithium · **6** carbon · **7** nitrogen · **36** krypton · **37** rubidium · **38** strontium · **60** neodymium · **61** promethium · **62** samarium · **78** platinum · **82** lead · **88** radium · **89** actinium · **90** thorium

What each decay makes

ISOTOPE	PROTONS	NEUTRONS	DECAY	PROTONS AFTER	MASS NUMBER AFTER	NEW ISOTOPE
carbon-14	*6*	*8*	*beta*	*7*	*14*	*nitrogen-14*
thorium-232	90		alpha			
rubidium-87	37		beta			
samarium-147	62		alpha			
hydrogen-3	1		beta			

1. **In which rows did the mass number stay the same? Explain why, using what happens inside the nucleus.**

Evidence from the reading (circle the best answer)

2. **Which words from the reading explain why a carbon-14 age tells when a plant or animal stopped taking in carbon?**

Ⓐ "no new carbon-14 comes in" Ⓑ "the same as a helium nucleus"
Ⓒ "the mass number stays the same" Ⓓ "the numbers of protons and neutrons do not change"

3. **Which words from the reading show that a half-life can be trusted as a steady clock?**

Ⓐ "each decay is a random event" Ⓑ "Most nuclei are stable and stay the same"
Ⓒ "heat, pressure or chemical reactions do not change it" Ⓓ "the atom becomes a different element"

☆ Challenge A whole decay chain

Thorium-232 (90 protons) decays step by step until it becomes lead-208 (82 protons), which is stable. Every step is an alpha decay or a beta decay. How many alpha decays and how many beta decays must the chain contain? Hint: only alpha decay changes the mass number.

Alpha decays:

Beta decays:

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



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