Multi-Variable Linear Equations: Weekly Planning for Teachers (Online)

Chapter 5, Multi-Variable Linear Equations · November 2026 · draft for review · all four weeks written

How the chapter runs

This plan covers Chapter 5, Multi-Variable Linear Equations, taught online after Chapters 3 and 4: 13-year-olds with five maths lessons a week of about 55 minutes, each student working on a device in the course pages. It takes 4 weeks (20 lessons): 15 teaching lessons, 3 mixed practice and review days, the chapter check and a buffer lesson at the end.

The chapter is about systems of equations: two facts, two letters, and one pair of numbers that makes every equation true. Every method in it ends with a one-letter equation from Chapter 3, and substitution starts from solving for one letter, Chapter 4's MV10. Week 1 builds the idea of a system and substitution; week 2 elimination; week 3 word problems; week 4 three letters and the chapter check.

Every day is a normal lesson. Monday to Friday, each lesson teaches one skill (or half of a harder one) with the same 55-minute plan. When a skill is finished, its mastery check is the last part of that lesson. The page marks the check straight away.

Below the pass mark is "not yet", never a fail. The student practises that skill again, then retakes the check with new questions at the end of a later lesson. The mixed days and the buffer lesson have time for retakes built in.

Two routes. The mandatory route is 12 skills for every student; the chapter is mastered when all of them are. The advanced route has five optional skills (systems in disguise, finding a constant for no or infinitely many solutions, parameters, shortcuts in big systems, and identities), still to be written.

Week	Focus	Lessons
1	Two letters, and substitution	SY01, SY02, SY03, SY04
2	Elimination	SY05, SY06, MX09, SY07
3	Word problems with two letters	SY08, SY09, SY10, SY11, MX10
4	Three letters, and the chapter check	SY12, MX11, CH5, BUF5

Numbering. Skills are numbered SY01 to SY17 (systems); LE stays Chapter 3 and MV Chapter 4. Mixed practice and review days are numbered MX09, MX10 and MX11, after Chapter 4's MX07 and MX08: they practise several skills at once and have no mastery check of their own, so they are not skills. CH5 is the chapter check and BUF5 the buffer lesson.

Answers are typed as pairs. A solution of a system is a pair of numbers, so students type each value in its own box: x in the x box, y in the y box. Fractions such as 7/2 and decimals such as 3.5 are both fine, and "x = 5" is read as 5. The right numbers in the wrong boxes are diagnosed (the order of a pair), and a pair with one value still missing gets a reminder to put the value back, not a mark.

What you do

- In each lesson: lead the Learn part with the class, then walk round while students practise. There is nothing to prepare, print or mark.
- After each lesson, five minutes in the class view: who is "not yet" on today's check, and the mistakes each student makes most often (see The class view after each lesson).
- Use what you see there in the next lesson's warm-up.

A normal lesson

Every lesson, Monday to Friday, follows the same four parts, so students know what to expect and you never plan from scratch.

Minutes	Part	Students	You
0 to 8	Warm-up	Answer one or two quick questions on earlier skills, in the page	Read the answers out in a minute. Add the mistake the class view showed most often yesterday, if there was one
8 to 20	Learn	Open the day's lesson and follow it together: the narrated video (a minute or so), the explanation, and the activity (step-by-step systems: which letter, swap it in, solve)	Lead it from the front on your own screen. Ask "why is that step allowed?" more than "what is the answer?", and "does the pair work in both equations?"
20 to 45	Practise	Work through the practice, easiest first. Each answer gets instant feedback that names the mistake. Hints are there when stuck. Students who finish early do the two extra exercises	Walk round. Look for the mistakes listed in the day's plan and stop the class if you see one several times
45 to 55	Exit	If the skill finishes today: its mastery check (about 10 minutes), plus any retakes. Otherwise: redo, without hints, the hardest practice question they got right	Make sure everyone submits before the bell. The page marks the checks and gives every student different questions

A student who finishes the practice early may take the mastery check before the Exit.

Mastery checks and retakes

1. **Check at the end of the skill.** On the day a skill finishes, its mastery check takes the last 10 minutes of the lesson. The page builds a new set of questions for every student and every attempt, so there is nothing to copy.
2. **The page marks it.** Students see their score, which rows they missed and why, straight away. A row counts only when it is exactly right and finished. The result appears in the class view at the same moment.
3. **Below the pass mark: "not yet".** The student practises that skill again (the lesson's practice and its extra exercises), then retakes the check at the end of a later lesson, with new questions. The mixed practice days (Thursday of week 2, Friday of week 3, Wednesday of week 4) end with retakes, and in week 4 every check of the chapter can be retaken on the week 4 page.
4. **The chapter check has no pass mark.** On Thursday of week 4 it shows, skill by skill, what each student still knows. Every skill a student misses goes on their review list for Friday's buffer lesson.

Some students cannot get online at home. Let them practise and retake in a lunchtime or after-school session on the school's devices.

The four weeks

Week 1: Two letters, and substitution

Monday students check and find pairs that make one equation in two letters true; Tuesday they find the one pair that makes a whole system true. Wednesday and Thursday teach substitution: get one letter alone, swap it into the other equation in brackets, solve, put it back (part 2: choose the letter that avoids fractions, and keep fractions exact). Friday tidies messy systems first: letters lined up, fractions and decimals cleared. Solutions are typed as pairs, one box per letter.

Day	Lesson	Warm-up	Exit	Watch for
Mon	SY01 Solutions of an equation in two letters "Pairs That Make It True"	solve any linear equation (LE13, Chapter 3); evaluate with several letters (MV02, Chapter 4)	SY01 check (5 of 6)	Swapping the order in an ordered pair ((11, 5) read as y = 11, x = 5). Putting in only one of the two values, or checking only one side

Day	Lesson	Warm-up	Exit	Watch for
Tue	SY02 A system and its solution “One Pair for Both”	SY01	SY02 check (4 of 5)	Checking a pair in one equation only. Taking a solution of one equation as a solution of the system
Wed	SY03 Solve by substitution (part 1 of 2) “Swap It In”	solve for one letter in terms of the others (MV10, Chapter 4); expand and subtract with several letters (MV06, Chapter 4)	Hardest practice question (check on Thursday)	Substituting back into the equation the expression came from (it gives 4 = 4: no new information). Dropping the brackets when substituting (−2·4 − 3y instead of −2(4 − 3y))
Thu	SY03 Solve by substitution (part 2 of 2) “Choose What to Swap”	SY03	SY03 check (4 of 5)	Substituting back into the equation the expression came from (it gives 4 = 4: no new information). Dropping the brackets when substituting (−2·4 − 3y instead of −2(4 − 3y))
Fri	SY04 Tidy the system first “Tidy Up, Then Solve”	clear fractions with the LCD (LE12, Chapter 3)	SY04 check (4 of 5)	Multiplying only some terms by the LCD or by 10. Moving a term across the equals sign without changing its sign

Week 2: Elimination

Students eliminate a letter by adding or subtracting the equations, then multiply first when nothing cancels (two days). Thursday is mixed practice: choose substitution or elimination for each system. Friday covers systems with no solution or infinitely many.

Day	Lesson	Warm-up	Exit	Watch for
Mon	SY05 Eliminate by adding or subtracting “Add or Subtract to Cancel”	expand and subtract with several letters (MV06, Chapter 4)	SY05 check (4 of 5)	Adding when the coefficients are equal, or subtracting when they are opposite, so the letter doesn’t cancel. Subtracting only the first term of the second equation (sign errors on the rest)
Tue	SY06 Multiply, then eliminate (part 1 of 2) “Multiply One, Then Cancel”	SY05; expand and subtract with several letters (MV06, Chapter 4)	Hardest practice question (check on Wednesday)	Multiplying the letter terms but not the constant. Making the coefficients equal and then adding (or opposite and then subtracting)
Wed	SY06 Multiply, then eliminate “Multiply Both”	SY06	SY06 check (4 of 5)	Multiplying the letter terms but not the constant. Making the coefficients equal and then adding (or opposite and then subtracting)
Thu	MX09 Which method? Mixed practice (covers SY03 to SY06). Mixed practice on weeks 1 and 2: substitution, tidying, adding and subtracting, multiplying first, all mixed “Which Method?”	SY03; SY05; SY06	Hardest practice question; retakes	Using one method for every system, even when it brings fractions the other method avoids

Day	Lesson	Warm-up	Exit	Watch for
Fri	SY07 None, one or infinitely many solutions “None, One or Infinitely Many”	spot no-solution & all-solution cases (LE14, Chapter 3)	SY07 check (5 of 6)	Reporting (0, 0), or a letter equal to 0, when the letters cancel. Swapping the two cases (0 = 0 read as no solution)

Week 3: Word problems with two letters

Word problems with two unknowns: two letters with meaning, two equations, check in the story, answer the question asked. Value and weight problems, ages of two people, and finding just what is asked; Friday mixes the stories.

Day	Lesson	Warm-up	Exit	Watch for
Mon	SY08 Two letters, two equations “Two Letters, Two Facts”	write expressions with several letters (MV01, Chapter 4)	SY08 check (3 of 4)	Using one letter for both unknowns, or a vague letter (“c = Cougars”). Writing only one equation from a story with two facts
Tue	SY09 Value and weight problems “Count Times Value”	money, cost & value problems (LE23, Chapter 3); SY04	SY09 check (3 of 4)	Adding counts to values (n + q = 9.15). Mixing units, such as cents in one place and dollars in another
Wed	SY10 Ages of two people “Same Shift for Both”	age problems (LE22, Chapter 3)	SY10 check (3 of 4)	Using the letters for ages then in one equation and ages now in another (the book’s bogus solution). Shifting only one person’s age
Thu	SY11 Find just what is asked “Just What Is Asked”	SY08	SY11 check (3 of 4)	Giving one letter’s value when the question asks for a combination. Dividing only part of the combined equation (3e + 3m = 723 → e + m = 723)
Fri	MX10 Mixed word problems (covers SY08 to SY11). Mixed word problems: numbers, values, ages and combinations, in a random order “Every Kind of Story”	SY08; SY09; SY10	Hardest practice question; retakes	Skipping or blurring the definition of the letters when the kind of story is not announced

Week 4: Three letters, and the chapter check

Three equations in three letters over two days (substitute, or eliminate the same letter from two pairs). Wednesday reviews the whole chapter, Thursday is the chapter check, Friday is the buffer lesson.

Day	Lesson	Warm-up	Exit	Watch for
Mon	SY12 Three equations, three letters (part 1 of 2) “Three Letters: Swap One In”	SY06; solve for one letter in terms of the others (MV10, Chapter 4)	Hardest practice question (check on Tuesday)	Eliminating different letters from the two pairs, so the new pair still has three letters. Using the same pair of equations twice
Tue	SY12 Three equations, three letters “Three Letters: Cancel the Same One Twice”	SY12; SY05	SY12 check (3 of 4)	Eliminating different letters from the two pairs, so the new pair still has three letters. Using the same pair of equations twice

Day	Lesson	Warm-up	Exit	Watch for
Wed	MX11 Chapter review (SY01 to SY12: every skill of the chapter). A review of the whole chapter in no particular order, like tomorrow's chapter check "Which Skill? Chapter Review"	SY02; SY05; SY07	Hardest practice question; retakes	Doing well when the skill is announced, but stalling or guessing when it is not
Thu	CH5 Chapter check: one or two questions from every mandatory skill, mixed (whole lesson)	None	None: the check is the whole lesson	Shows what each student still knows weeks later, skill by skill; it makes each student's review list for Friday
Fri	BUF5 Buffer lesson: warm-up, your review list from the chapter check, retakes	SY03; SY06; SY08	Retakes	Teach again any skill where many students missed the chapter check; then review lists and retakes

The lesson videos

Each teaching lesson opens its Learn part with a short narrated video; 15 videos in all. Every video has captions, a storyboard (one picture for each step, to print for students) and a teacher script (what to say and write on the board), so a class without screens can follow the same lesson. All of them are in Lesson videos on the course home.

Video	Title	Lesson	Length
SY01-V1	Pairs That Make It True	Monday, week 1: Pairs That Make It True	1:20
SY02-V1	One Pair for Both	Tuesday, week 1: One Pair for Both	1:06
SY03-V1	Swap It In	Wednesday, week 1: Swap It In	1:13
SY03-V2	Choose What to Swap	Thursday, week 1: Choose What to Swap	1:12
SY04-V1	Tidy Up, Then Solve	Friday, week 1: Tidy Up, Then Solve	1:14
SY05-V1	Add or Subtract to Cancel	Monday, week 2: Add or Subtract to Cancel	1:17
SY06-V1	Multiply One, Then Cancel	Tuesday, week 2: Multiply One, Then Cancel	1:04
SY06-V2	Multiply Both	Wednesday, week 2: Multiply Both	0:59
SY07-V1	None, One or Infinitely Many	Friday, week 2: None, One or Infinitely Many	1:28
SY08-V1	Two Letters, Two Facts	Monday, week 3: Two Letters, Two Facts	1:09
SY09-V1	Count Times Value	Tuesday, week 3: Count Times Value	1:12
SY10-V1	Same Shift for Both	Wednesday, week 3: Same Shift for Both	1:10
SY11-V1	Just What Is Asked	Thursday, week 3: Just What Is Asked	1:05
SY12-V1	Three Letters: Swap One In	Monday, week 4: Three Letters: Swap One In	1:04
SY12-V2	Three Letters: Cancel the Same One Twice	Tuesday, week 4: Three Letters: Cancel the Same One Twice	1:16

The class view after each lesson

This replaces marking. Five minutes after each lesson, open the class view at the bottom of the week's page. It is shown to teachers who can edit the course, and lists every student's progress, lesson by lesson, live.

Look at	What it tells you	What to do
Who is “not yet” on today’s check	Who needs to practise that skill again and retake	Next lesson, check that their retake happened
How many are “not yet”	Whether the skill landed	Half the class or more: teach it again the next day (see If the class is behind or ahead)
“Watch for”: each student’s most frequent mistakes	What the class misunderstood, by the mistake behind it	Put one question on it in the next warm-up
Last active, and students two or more lessons behind	Who is falling away from the class	Pair them with a classmate during practice

If the class is behind or ahead

Let the check results decide, not the calendar.

Behind. If half the class or more is “not yet” on a skill, teach it again the next day before moving on, and shift the plan by a day. The buffer lesson in week 4 absorbs one day of delay; beyond that, shorten the chapter review (MX11) to half a lesson and keep the chapter check. Two things never get cut: the two days of substitution (SY03) and of multiplying before eliminating (SY06), and the mastery checks. A student stuck on substitution can redo Chapter 4’s lesson on solving for a letter (MV10).

Ahead. If most students pass first time, use the buffer lesson for the advanced skills. A class that is clearly fast can run a mixed practice day as half a lesson.

Individual students. Nobody waits for the class and nobody is dragged along with it. A student who is behind practises and retakes with new questions; one who is ahead does the extra exercises and the practice sets (on the course home) for the four hardest skills. If a student is two or more lessons behind, pair them with a classmate during practice.

Materials status for the pilot

This plan describes the full chapter online. All content is a draft waiting for review by the maths expert.

Material	Status
Skill graph for the chapter, with the mandatory and advanced routes	Ready
Week 1 to week 4 pages: 20 lessons (SY01 to SY12, the mixed days MX09 to MX11, the chapter check CH5 and the buffer lesson BUF5), each with warm-up, lesson, practice and its mastery check or exit question, and a class view	Ready (prototype)
15 lesson videos, one for each teaching lesson (two each for SY03, SY06 and SY12), each with captions, a storyboard and a teacher script	Ready (draft)
Practice sets for substitution (SY03), multiplying before eliminating (SY06), value and weight problems (SY09) and three letters (SY12): 32 exercises, easy to hard	Ready (draft)
Four exercise exemplars, one for each main type of exercise	Ready (draft)
Advanced skills SY13 to SY17	Not written yet
Catch-up practice set automatically as homework, with the retake opening once it is done	Designed, not built yet
Sign-in for a whole class through the school	Part of the production platform