Grade 8 math syllabus (USA): the five domains as a checklist

The Common Core year that turns arithmetic into algebra. Tick each skill when the student can do it without help; the three marked * are the ones Algebra 1 assumes completely.

Domain	Skills to tick	Where marks are lost
The number system	[ ] rational and irrational numbers [ ] decimal expansions [ ] estimate square roots of non-squares [ ] place root 2 or pi on a number line	calling 0.333... irrational; estimating root 50 as 'about 25'
Expressions and equations 1	[ ] integer exponents and laws, including negative and zero [ ] square and cube roots [ ] scientific notation and operations in it	2^-3 is 1/8, not -8; adding in scientific notation with different exponents
Expressions and equations 2	[ ] proportional relationships as lines through the origin [ ] slope as a rate* [ ] y = mx + b* [ ] equations with the variable on both sides, none or infinitely many solutions [ ] systems by graphing, substitution, elimination*	slope from two points in the wrong order; a system 'solved' by finding only x
Functions	[ ] one output for each input [ ] compare functions given as tables, graphs, equations, words [ ] linear against non-linear [ ] build a linear function from a situation [ ] describe a graph qualitatively	treating every relation as a function; rate confused with starting value
Geometry	[ ] translations, reflections, rotations, dilations [ ] congruence and similarity through transformations [ ] parallel lines and a transversal; angle sum [ ] Pythagorean theorem and its converse; distance on the plane [ ] volume of cylinders, cones, spheres	which coordinate changes sign in a reflection; Pythagoras when the given sides are not legs
Statistics and probability	[ ] scatter plots and their pattern [ ] line of best fit by eye, its equation as a rate [ ] two-way tables and relative frequencies	'positive' without saying what increases with what; frequencies off the wrong total

The standard year, month by month

Month	Unit	Check at home
Aug to Sep	real numbers, exponents, roots, scientific notation	0.00045 in scientific notation; why 5^0 is 1
Oct	linear equations, variable on both sides	solve 3(x - 2) = 2x + 7; what 2x + 3 = 2x + 5 means
Nov	proportion, slope, y = mx + b	slope and equation from two points
Dec	functions	from a table: a function? linear?
Jan	systems	substitution, then check in both equations
Feb	transformations, congruence, similarity, angles	coordinates after a 90 degree rotation about the origin
Mar	Pythagoras, distance, volume	distance between (1, 2) and (4, 6)
Apr	scatter plots, best fit, two-way tables	read a best-fit line as 'about 3 more for every 1 more'
May	review and the state test	the state's released test, timed, once

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The end-of-Grade-8 check, the accelerated option, and CBSE Class 8

Twelve questions (no calculator)

1. Write 3^-2 as a fraction.
2. Write 0.00072 in scientific notation.
3. Between which two whole numbers does root 40 lie?
4. Solve 4(x + 3) = 2x - 6.
5. Slope of the line through (2, 5) and (6, 13)?
6. Equation of the line with slope -2 through (0, 7).
7. Solve y = 2x + 1 and y = -x + 7.
8. Is {(1, 4), (2, 5), (1, 6)} a function? Why?
9. (3, -2) reflected in the y-axis lands where?
10. A right triangle has legs 9 and 12. The hypotenuse?
11. Volume of a cylinder, radius 3, height 10, in terms of pi?
12. A scatter plot of hours studied against score rises to the right. In one sentence, what does it show?

Answers

1. 1/9. 2. 7.2 x 10^-4. 3. 6 and 7. 4. x = -9. 5. 2. 6. y = -2x + 7. 7. x = 2, y = 5. 8. No: input 1 has two outputs. 9. (-3, -2). 10. 15. 11. 90 pi. 12. Students who studied more tended to score higher. Ten or more right: ready for Algebra 1. Seven to nine: ready, with the missed topics in the first month. Fewer than seven: spend the summer on Grade 8, because Algebra 1 assumes all of it.

The accelerated option

[ ] About a third of US students take Algebra 1 in 8th grade; the Grade 8 content is compressed into Grade 7, and the track reaches AP Calculus in 12th

[ ] Placement is decided in Grade 6 or 7 by a test, a recommendation or both

[ ] The five skills that decide it: fractions, negative numbers, proportional reasoning, two-step equations, turning a sentence into an expression

[ ] Accelerated students usually sit the Algebra 1 end-of-course exam instead of the Grade 8 test, and the score follows them onto the transcript

US Grade 8 against CBSE Class 8

Topic	CBSE Class 8	US Grade 8	The child from India is
Irrationals	not yet (Class 9)	irrationals, roots, decimals	behind
Exponents	incl. negative exponents	same + scientific notation	level
Linear equations	one variable, both sides	same + two variables, slope, graphs	ahead on solving; behind on graphing
Systems	not yet (Class 10)	two linear equations	behind
Functions	not in Class 8	functions, linear and non-linear	behind; the word is new
Factorisation	factorisation, identities, polynomial division	not in Grade 8	ahead by a year
Geometry	quadrilaterals, constructions, mensuration	transformations, similarity, Pythagoras on the plane	ahead on mensuration; behind on transformations
Data	bar graphs, pie charts, probability	scatter plots, best fit, two-way tables	behind

Plan for a child arriving from Class 8: skip the algebra revision, spend the first term on functions, slope, systems and scatter plots, keep factorisation sharp for Algebra 1, and ask about a late placement into Algebra 1 if the school allows it.