7th Grade Mathematics (Accelerated)

Proportional Relationships and Percentages Unit 3 Pacing Calendar - Illustrative Mathematics



ORANGE PUBLIC SCHOOLS OFFICE OF CURRICULUM AND INSTRUCTION OFFICE OF MATHEMATICS

Revised: 11/04/2019

From the New Jersey State Learning Standards:

Traditional Pathway Accelerated 7th Grade

In **Accelerated 7th Grade**, instructional time should focus on four critical areas: (1) Rational Numbers and Exponents; (2) Proportionality and Linear Relationships; (3) Introduction to Sampling Inference; (4) Creating, Comparing, and Analyzing Geometric Figures

1. Students develop a unified understanding of number, recognizing fractions, decimals (that have a finite or a repeating decimal representation), and percents as different representations of rational numbers. Students extend addition, subtraction, multiplication, and division to all rational numbers, maintaining the properties of operations and the relationships between addition and subtraction, and multiplication and division. By applying these properties, and by viewing negative numbers in terms of everyday contexts (e.g., amounts owed or temperatures below zero), students explain and interpret the rules for adding, subtracting, multiplying, and dividing with negative numbers. They use the arithmetic of rational numbers as they formulate expressions and equations in one variable and use these equations to solve problems. They extend their mastery of the properties of operations to develop an understanding of integer exponents, and to work with numbers written in scientific notation.

2. Students use linear equations and systems of linear equations to represent, analyze, and solve a variety of problems. Students recognize equations for proportions (y/x = m or y = mx) as special linear equations (y=mx + b), understanding that the constant of proportionality (m) is the slope, and the graphs are lines through the origin. They understand that the slope (m) of a line is a constant rate of change, so that if the input or x-coordinate changes by an amount A, the output or y-coordinate changes by the amount m×A. Students strategically choose and efficiently implement procedures to solve linear equations in one variable, understanding that when they use the properties of equality and the concept of logical equivalence, they maintain the solutions of the original equation.

3. Students build on their previous work with single data distributions to compare two data distributions and address questions about differences between populations. They begin informal work with random sampling to generate data sets and learn about the importance of representative samples for drawing inferences

4. Students continue their work with area from Grade 6, solving problems involving the area and circumference of a circle and surface area of three-dimensional objects. In preparation for work on congruence and similarity, they reason about relationships among two-dimensional figures using scale drawings and informal geometric constructions, and they gain familiarity with the relationships between angles formed by intersecting lines. Students work with three-dimensional figures, relating them to two-dimensional figures by examining cross sections. They solve real- world and mathematical problems involving area, surface area, and volume of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes and right prisms. Students use ideas about distance and angles, how they behave under translations, rotations, reflections, and dilations, and ideas about congruence and similarity to describe and analyze two-dimensional figures and to solve problems. Students show that the sum of the angles in a triangle is the angle formed by a straight line, and that various configurations of lines give rise to similar triangles because of the angles created when a transversal cuts parallel lines. Students complete their work on volume by solving problems involving cones, cylinders, and spheres.

Yearlong Pacing Guide Accelerated 7

Grade	SEP	00	CT NO	DV D	EC J/	AN	FEB	M	AR	A	PR M	MAY	JUN
6	Unit 1		Unit 2	Unit 3	Unit 4		Unit 5		Un	it 6	Unit 7		Unit 8
6	6.G		6.RP	6.RP	6.NS		6.NS		6.	EE	6.NS		6.SP
Acc	Unit	Unit	Unit	Unit	Unit	Unit	Unit	Unit	Unit	Unit	Unit		
	1	2	3	4	5	6	7	8	9	10	11		
7	7.RP	7.G	7.RP	7.NS	7.EE	7.G	8.G	8.G	8.EE	8.EE	7.SP		
ı													
Unit :	1		Unit 2		Unit 3		Unit 4	L I			Unit 5		
7.RP: Scal	e	7.G: N	leasuring	7.RP:			7.NS: Ration	nal		7.EE:			
Drawings	&	Circles	5	Propo	ortional		Number			Expre	ssions,		
Proportion	nal			Relat	ionships &		Arithmetic			Equat	ions, &		
Relationsh	nips			Perce	entages					Inequ	alities		
						-			-				
Unit	6		Unit 7		Unit 8		Unit 9)		L L	Jnit 10		Unit 11
7.G: Angle	25,	8.G: R	igid	8.G. [Dilations,		8.EE: Linear		1	8.EE:	Exponents	;	7.SP:
Triangles a	and	Transf	ormations	Simila	arity, and		Relationshi	os		and S	cientific		Probability
Prisms		& Con	gruence	Intro	ducing					Notat	ion		&
				Slope									Sampling

	2019-2020 Accelerated Grade 7 (iM)									
	Quarter 1			Quarter 2			Quarter 3		Qua	rter 4
Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6	Unit 7	Unit 8	Unit 9	Unit 10	Unit 11
iM 7.1 iM 7.2	iM 7.3	iM 7.4	iM 7.5	iM 7.6	iM 7.7	iM 8.1	iM 8.2	iM 8.3	iM 8.7	iM 7.8
7.G.1(A) 7.RP.2a(M) 7.RP.2b(M) 7.RP.2c(M) 7.RP.2d(M)	7.G.4(A)	7.RP.1(M) 7.RP.3(M)	7.NS.1(M) 7.NS.2(M) 7.NS.3(M)	7.EE.3(M) 7.EE.4(M) 7.EE.2(M) 7.EE.1(M)	7.G.5(A) 7.G.2(A) 7.G 3(A) 7.G.6(A)	8.G.1(M) 8.G.2(M) 8.G.5(M)	8.G.4(M) <mark>8.G.3(M)</mark> 8.EE.6(M)	8.EE.5(M) 8.F.4(S) 8.EE.8(M)	8.EE.1(M) 8.EE.3(M) 8.EE.4(M)	7.SP.6(S) 7.SP.5(S) 7.SP.7(S) 7.SP.8(S) 7.SP.1(S) 7.SP.2(S) 7.SP.3(S) 7.SP.4(S)
20 Days	8 Days	11 Days	14 Days	18 Days	12 Days	13 Days	12 Days	12 Days	11 Days	15 Days
Oct. 9	Oct. 24	Nov. 15	Dec. 12	Jan. 22	Feb. 12	Mar. 11	Apr. 1	Apr. 29	May. 18	June 11

Major Work Supporting Content Additional Content

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I. Unit Overview

Students began their work with ratios, rates, and unit rates in grade 6, representing them with expressions, tape diagrams, double number line diagrams, and tables. They used these to reason about situations involving color mixtures, recipes, unit price, discounts, constant speed, and measurement conversions. They extended their understanding of rates to include percentages as rates per 100, reasoning about situations involving whole-number percentages. They did not use the terms "proportion" and "proportional relationship" in grade 6.

A proportional relationship is a collection of equivalent ratios, and such collections are objects of study in grade 7. In previous grade 7 units, students worked with scale factors and scale drawings, and with proportional relationships and constants of proportionality. Although students have learned how to compute quotients of fractions in grade 6, these first units on scaling and proportional relationships do not require such calculations, allowing the new concept (scaling or proportional relationship) to be the main focus.

In this unit, students deepen their understanding of ratios, scale factors, unit rates (also called constants of proportionality), and proportional relationships, using them to solve multi-step problems that are set in a wide variety of contexts that involve fractions and percentages.

The section begins by revisiting scale factors and proportional relationships, each of which has been the focus of a previous unit. Both of these concepts can be used to solve problems that involve equivalent ratios. However, it is often more efficient to view equivalent ratios as pairs that are in the same proportional relationship rather than seeing one pair as obtained by multiplying both entries of the other by a scale factor. From the scaling perspective, to see that one ratio is equivalent to another or to generate a ratio equivalent to a given ratio, a scale factor is needed—which may be different for each pair of ratios in the proportional relationship. From the proportional relationship perspective, all that is needed is the constant of proportionality—which is the same for every ratio in the proportional relationship.

The second section of the unit is about percent increase and decrease. Students consider situations for which percentages can be used to describe a change relative to an initial amount, e.g., prices before and after a 25% increase. They begin by considering situations with unspecified amounts, e.g., matching tape diagrams with statements such as "Compared with last year's strawberry harvest, this year's strawberry harvest increased by 25%". They next consider situations with a specified amount and percent change, or with initial and final amounts, using double number line diagrams to find the unknown amount or percent change. Next, they use equations to represent such situations, using the distributive property to show that different expressions for the same amount are equivalent, e.g., x-0.25x=0.75x. So far, percent change in this section has focused on whole-number rates per 100, e.g., 75%. The last lesson asks students to compute fractional percentages of given amounts.

In the third section of the unit, students begin by using their abilities to find percentages and percent rates to solve problems that involve sales tax, tip, discount, markup, markdown, and commission (MP2). The remaining lessons of the section continue the focus on situations that can be described in terms of percentages, but the situations involve error rather than change—describing an incorrect value as a percentage of the correct value rather than describing an initial amount as a percentage of a final amount (or vice versa).

The last section of the unit consists of a lesson in which students analyze news items that involve percent increase or decrease. In small groups, students identify important quantities in a situation described in a news item, use diagrams to map the relationship of of the quantities, and reason mathematically to draw conclusions (MP4). This is an opportunity to choose an appropriate type of diagram (MP5), to state the meanings of symbols used in the diagram, to specify units of measurement, and to label the diagram accurately (MP6). Each group creates a display to communicate its reasoning and critiques the reasoning shown in displays from other groups (MP3).

These materials follow specific conventions for the use of language around ratios, rates, and proportional relationships. Please see the unit narrative for the second unit to read about those conventions.

II. Pacing Guide

Activity	New Jersey State Learning Standards (NJSLS)	Estimated Time (Blocks)
Lesson 1: Ratios and Rates with Fractions	7.RP.A.1, 7.RP.A.2	1
Lesson 2: Half as Much Again	7.RP.A.2	1
Lesson 3: Say it With Decimals	7.NS.A.2.d, 7.RP.A.2	1
Lesson 4: Percent Increase and Decrease	7.RP.A.3	1
Lesson 5: Equations to Represent Percent Increase and Decrease	7.RP.A.3	1
Lesson 6: Tax and Tip	7.RP.A.3	1
Lesson 7: More Percentage Context	7.RP.A.3	1
Lesson 8: More Percentage Problems	7.RP.A.3	1
Lesson 9: Measurement Error and Percentage Error	7.RP.A.3	1
Performance Task 1		1/2
Total Time		9 ¹ / ₂ Blocks

Major Work Supporting Content Additional Content

III. Scope & Sequence

Accelerated Unit Lesson	Accelerated Lesson Name	Original Unit Lesson	Activity Name
		7.4.2	A Train is Traveling at
3.1	Ratios and Rates with Fractions	7.4.2	Comparing Running Speeds
5.1	Ratios and Rates with Fractions	7.4.3	The Price of Rope
		7.4.3	Running, Manufacturing, Painting, Swimming
		7.4.4	Notice and Wonder: Tape Diagrams
		7.4.4	Walking Half as Much Again
3.2	Half as Much Again	7.4.4	More and Less
5.2	Half as Much Again	7.4.4	Card Sort: Representations of Proportional
			Relationships
		7.4.4	Fruit Snacks and Skating
		7.4.5	Notice & Wonder: Fractions to Decimals
2.2	3.3 Say it With Decimals		More and Less with Decimals
3.3			Card Sort: More Representations
		7.4.5	Reading More
		7.4.6	Improving Their Game
	4 Percent Increase and Decrease	7.4.6	More Cereal and a Discount Shirt
3.4		7.4.6	Using Tape Diagrams
		7.4.7	Double Number Lines
		7.4.7	Representing More Juice
		7.4.8	From 100 to 106
2 5	Equations to Represent Percent	7.4.8	Interest and Depreciation
3.5	Increase and Decrease	7.4.8	Matching Equations
		7.4.8	Tyler's Savings Bond
		7.4.10	Notice & Wonder: The Price of Sunglasses
		7.4.10	Shopping in a Third City
3.6	Tax and Tip	7.4.10	Dining at a Restaurant
	·	7.4.10	Shopping in a Third City
		7.4.10	A Restaurant in a Different City
		7.4.11	Leave a Tip
27	Mara Daraantaga Cantaut	7.4.11	A Car Dealership
3.7	More Percentage Context	7.4.11	Commission at a Gym
		7.4.11	Card Sort: Percentage Situations
		7.4.12	Tax, Tip, and Discount
3.8	More Percentage Problems	7.4.12	What is the Percentage?
	0	7.4.12	Info Gap: Sporting Goods
		7.4.13	Measuring Your Classroom
	Measurement Error and Percent	7.4.14	Number Talk: Estimating a Percentage of a
3.9			Number
_	Error	7.4.14	Plants, Bicycles, and Crowds
		7.4.14	Jumbo Eggs

III. Pacing Calendar

OCTOBER									
Sunday	Monday	Tuesday 1	Wednesday 2	Thursday 3	Friday 4	Saturday 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	31					

NOVEMBER								
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday 1	Saturday 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		

Please complete the pacing calendar based on the suggested pacing (see Pacing Guide on page 2).									
DECEMBER									
Monday	Tuesday	Wednesday	Thursday	Friday	Saturday				
2	3	4	5	6	7				
9	10	11	12	13	14				
16	17	18	19	20	21				
23	24	25	26	21	28				
30	31								
	Monday 2 9 16 23	MondayTuesday2391016172324	MondayTuesdayWednesday23491011161718232425	MondayTuesdayWednesdayThursday234591011121617181923242526	DECEMBERMondayTuesdayWednesdayThursdayFriday2345691011121316171819202324252627				

IV. PARCC Assessment Evidence Statements Type I Type III

Type II

NJSLS	Evidence Statement	Clarification	Math Practices	Calculator ?
<u>7.RP.1</u>	Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. For example, if a person walks ½ mile in each 1/4 hour, compute the unit rate as the complex fraction 1/2/1/4 miles per hour, equivalently 2 miles per hour.	 i) Tasks have a real-world context. ii) Tasks do not assess unit conversions. 	MP.2 MP.4 MP.6	Yes
<u>7.RP.2a</u>	Recognize and represent proportional relationships between quantities: a. Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.	 i) Tasks have "thin context"2 or no context. ii) Tasks are not limited to ratios of whole numbers. iii) Tasks use only coordinates in Quadrant 1 and use only a positive constant of proportionality. 	MP.2 MP.5	Yes
<u>7.RP.2b</u>	Recognize and represent proportional relationships between quantities: b. Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.	 i) Tasks may or may not have a context. ii) Tasks sample equally across the listed representations (graphs, equations, diagrams, and verbal descriptions). iii) Tasks use only coordinates in Quadrant 1 and use only a positive constant of proportionality. 	MP.2 MP.5 MP.8	No
<u>7.RP.2c</u>	Recognize and represent proportional relationships between quantities: c. Represent proportional relationships by equations. For example, if total cost <i>t</i> is proportional to the number <i>n</i> of items purchased at a constant price <i>p</i> , the relationship between the total cost and the number of items can be expressed as $t = pn$.	i) Tasks have a context. ii) Tasks use only coordinates in Quadrant 1 and use only a positive constant of proportionality	MP.2 MP.8	No

Accelerated				
<u>7.RP.2d</u>	Recognize and represent proportional relationships between quantities. d. Explain what a point (x, y) on the graph of a proportional relationships means in terms of the situation, with special attention to the points (0, 0) and (1, r) where r is the unit rate.	 i) Tasks require students to interpret a point (x, y) on the graph of a proportional relationship in terms of the situation. For the explain aspect of 7.RP.2d, see 7.C.6.1. ii) Tasks use only coordinates in Quadrant 1 and use only a positive constant of proportionality 	MP.2 MP.4	No
<u>7.RP.3-1</u>	Use proportional relationships to solve multistep ratio problems.	i) Tasks will include proportional relationships that only involve positive numbers.	MP.1 MP.2 MP.6	Yes
<u>7.RP.3-2</u>	Use proportional relationships to solve multistep percent problems. Examples: simple interest, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error.	-	MP.1 MP.2 MP.5 MP.6	Yes
<u>7.C.7.2</u>	Present solutions to multi-step problems in the form of valid chains of reasoning, using symbols such as equals signs appropriately (for example, rubrics award less than full credit for the presence of nonsense statements such as $1 + 4 = 5 +$ 7 = 12, even if the final answer is correct), or identify or describe errors in solutions to multi-step problems and present corrected solutions. Content Scope: Knowledge and skills articulated in 7.NS.2d	 i) Tasks focus on demonstrating understanding that a number is rational. ii) Tasks do not directly assess the ability to divide two whole numbers. 	MP.1 MP.3 MP.6 MP.7 MP.8	Yes

V. Differentiated Instruction

Supporting English Language Learners

The purpose of this document is to nudge the field forward by offering support to the next generation of mathematics learners and by challenging persistent assumptions about how to support and develop students' disciplinary language. The goal is to provide guidance to mathematics teachers for recognizing and supporting students' language development processes in the context of mathematical sense making. UL/SCALE provides a framework for organizing strategies and special considerations to support students in learning mathematics practices, content, and language. The framework is intended to help teachers address the specialized academic language demands in math when planning and delivering lessons, including the demands of reading, writing, speaking, listening, conversing, and representing in math (Aguirre & Bunch, 2012). Therefore, while the framework can and should be used to support all students learning mathematics, it is particularly well-suited to meet the needs of linguistically and culturally diverse students who are simultaneously learning mathematics while acquiring English.

For more information, click the link below:

Supporting ELL Learners

Supporting Students with Disabilities

The philosophical stance that guided the creation of these materials is the belief that with proper structures, accommodations, and supports, all children can learn mathematics. Lessons are designed to maximize access for all students and include additional suggested supports to meet the varying needs of individual students. While the suggested supports are designed for students with disabilities, they are also appropriate for many children who struggle to access rigorous, grade-level content. Teachers should use their professional judgment about which supports to use and when, based on their knowledge of the individual needs of students in their classroom.

For more information, click the link below:

Supporting Students with Disabilities

VI. Vocabulary

<u>Repeating</u> <u>Decimal</u>	A repeating decimal is an infinite decimal expansion that eventually repeats the same sequence of digits over and over again. The repeated sequence is indicated by a line above it.
<u>Percentage</u> Increase	Given an initial amount and a final amount which is larger than the initial amount, the percentage increase is the difference (final amount minus initial amount) expressed as a percentage of the initial amount.
<u>Percentage</u> <u>Decrease</u>	Given an initial amount and a final amount which is smaller than the initial amount, the percentage decrease is the difference (initial amount minus final amount) expressed as a percentage of the initial amount.
<u>Measurement</u> <u>Error</u>	Measurement error is the positive difference between a measurement of a quantity and the actual quantity. It is often expressed as a percentage of the actual value. For example, if we get 6 cm when we measure a line that is actually 6.2 cm long, then the measurement error is 0.2 cm and the percent error is 3.2%, because $0.2\div6.2=0.032$.
Percent Error	The difference between the correct value and the incorrect value, expressed as a percentage of the correct value.

VII. Assessment Framework

Unit 3 Assessment Framework								
Assessment	NJSLS	Estimated Time	Format	Graded ?				
Pre-Unit 4 Diagnostic Assessment (Beginning of Unit – Optional) Illustrative Mathematics	6.RP.A.3a, 6.RP.A.3b, 6.RP.A.3c 6.EE.A.3, 7.RP.A.3,	1/2 Block	Individual	Yes (No Weight)				
End-of-Unit 4 Assessment (End of Unit – Optional) Illustrative Mathematics	7.RP.A.2, 7.RP.A.3, 7.G.A.1, 7.RP.A.1, 7.EE.B.3	1 Block	Individual	Yes				

Unit 3 Performance Assessment Framework						
Assessment	NJSLS	Estimated Time	Format	Graded ?		
Unit 3 Performance Task 1 (Early-Mid November) Double Discounts	7.RP.A.3	1/2 Block	Individual	Yes; Rubric		
Unit 3 Performance Task Option 1 (Optional) Finding a 10% Increase	7.RP.A.3	Teacher Discretion	Teacher Discretion	Yes, if administered		

Accelerated 7th Grade: Unit 3 Performance Task

Name _____

Block _____

Date

Double Discounts (7.RP.A.3)

Emily has a coupon for 20 percent off of her purchase at the store. She finds a backpack that she likes on the discount rack. Its original price is \$60 but everything on the rack comes with a 30 percent discount. Emily says

Thirty percent and twenty percent make fifty percent so it will cost \$30.

a. Is Emily Correct? Explain

b. What price will Emily pay for the backpack?

Accelerated 7th Grade Double Discounts – Rubric

Name:	Date:
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NJSLS: 7.RP.A.3 Type: _____ Teacher: _____ Clearly constructs and communicates a complete response based on concrete referents provided in the prompt or • constructed by the student such as diagrams that are connected to a written (symbolic) method, number line diagrams or coordinate plane diagrams. Clearly constructs and communicates a complete response by ▶ using a logical approach based on a conjecture and/or stated assumptions **Task Description** ▶ providing an efficient and logical progression of steps ▶ using grade-level vocabulary, symbols, and labels > providing a justification of a conclusion with minor computational error > evaluating, interpreting and critiquing the validity and efficiency of others' responses Level 5: Level 4: Level 3: Level 2: Level 1: Distinguished Command Strong Command Moderate Command Partial Command **Command Level** Description Perform the task items accurately or with minor with minor conceptual with serious errors on with some nonwith some errors on computation errors. conceptual errors. both math concept and both math concept and errors and some computation errors. computation. computation. 5 pts 2-3 pts Score range 6 pts 4 pts 0-1 pt **Task Score & PLD** Assigned

7th Grade Map Distance – Scoring Guide

NAME: _____

#	Answer	Scoring
Part A	It is true that 20% and 30% make 50%. However, in the context of sale prices it is essential to keep track of the wholes to which these percents apply. The 30% discount on the backpack applies to the original price of \$60:	1 point: Correctly stating that Emily's statement is incorrect.
	0.3 × 60 = 18 making the discount of the backpack \$18.00. Therefore, after the using the coupon, the backpack price becomes \$42.	2 points: Writing a thorough and correct explanation.
	Emily's additional 20% coupon applies not to the original backpack price but to the discounted price of \$42:	
	0.2 × 42= 8.40 Emiliy would need to save an additional \$12 off the price of \$42 in order to buy the backpack for #30 so her calculations are not correct.	3 TOTAL POINTS
Part B	As displayed in part (A), Emily's coupon lowers the discount rack price by \$8.40, therefore she will pay:	3 points: Student has correct answer, correct
	42 -8.40 = 33.60	work, and units. 2 points: Student has
	\$33.60	correct discount amount and correct units but has a minor mistake. 1 point: student only has the correct discount amount.
		3 TOTAL POINTS

Accelerated 7th Grade: Unit 3 Performance Task Option 1

 Name
 Block
 Date

Finding a 10% Increase (7.RP.A.3)

5,000 people visited a book fair in the first week. The number of visitors increased by 10% in the second week.

How many people visited the book fair in the second week?

IX. 21st Century Career Ready Practices

CRP1. Act as a responsible and contributing citizen and employee.

CRP2. Apply appropriate academic and technical skills.

CRP3. Attend to personal health and financial well-being.

CRP4. Communicate clearly and effectively and with reason.

CRP5. Consider the environmental, social and economic impacts of decisions.

CRP6. Demonstrate creativity and innovation.

CRP7. Employ valid and reliable research strategies.

CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.

CRP9. Model integrity, ethical leadership and effective management.

CRP10. Plan education and career paths aligned to personal goals.

CRP11. Use technology to enhance productivity.

CRP12. Work productively in teams while using cultural global competence.

For additional details see 21st Century Career Ready Practices .

References

"Illustrative Mathematics" Open Up Resources. 2018

<https://auth.openupresources.org/register/complete>