

Houghton Mifflin *MATHEMATICS*

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Number and Operations Standard	
Understand numbers, ways of representing numbers, relationships among numbers, and number systems	
<ul style="list-style-type: none"> understand the place-value structure of the base-ten number system and be able to represent and compare whole numbers and decimals; 	TE: 4–5, 8–11, 14–17, 24–27, 30–31 PE: 4–5, 8–11, 14–17, 24–27, 30–31
<ul style="list-style-type: none"> recognize equivalent representations for the same number and generate them by decomposing and composing numbers; 	TE: 4–7, 24–25, 300–301, 311, 318–321 PE: 4–7, 24–25, 300–301, 311, 318–321
<ul style="list-style-type: none"> develop understanding of fractions as parts of unit wholes, as parts of a collection, as locations on number lines, and as divisions of whole numbers; 	TE: 316–319, 322–324, 378–379, 390–391, 550–551 PE: 316–319, 322–324, 378–379, 390–391, 550–551
<ul style="list-style-type: none"> use models, benchmarks, and equivalent forms to judge the size of fractions; 	TE: 316–319, 322–325 PE: 316–319, 322–325
<ul style="list-style-type: none"> recognize and generate equivalent forms of commonly used fractions, decimals, and percents; 	TE: 318–323, 520–521, 530–534, 536–539 PE: 318–323, 520–521, 530–534, 536–539
<ul style="list-style-type: none"> explore numbers less than 0 by extending the number line and through familiar applications; 	TE: 32–33, 214–215 PE: 32–33, 214–215
<ul style="list-style-type: none"> describe classes of numbers (e.g., odds, primes, squares, and multiples) according to characteristics such as the nature of their factors. 	TE: 6–7, 214–215, 298–309, 313 PE: 6–7, 214–215, 298–309, 313
Understand meanings of operations and how they relate to one another	
<ul style="list-style-type: none"> understand various meanings of multiplication and division; 	TE: 94–95, 132–133 PE: 94–95, 132–133
<ul style="list-style-type: none"> understand the effects of multiplying and dividing whole numbers; 	TE: 98–100, 134–135 PE: 98–100, 134–135
<ul style="list-style-type: none"> identify and use relationships between operations, such as division as the inverse of multiplication, to solve problems; 	TE: 54–55, 61, 69, 74, 134, 136, 148, 154, 341, 422–423, 433 PE: 54–55, 61, 69, 74, 134, 136, 148, 154, 341, 422–423, 433
<ul style="list-style-type: none"> understand and use properties of operations, such as the distributivity of multiplication over addition. 	TE: 96–97, 100, 120, 127, 129, 162, 165, 182 PE: 96–97, 100, 120, 127, 129, 162, 165, 182
Compute fluently and make reasonable estimates	
<ul style="list-style-type: none"> develop fluency with basic number combinations for multiplication and division and use these combinations to mentally compute related problems, such as 3050; 	TE: 96–97, 106–111, 146–147, 187 PE: 96–97, 106–111, 146–147, 187
<ul style="list-style-type: none"> develop fluency in adding, subtracting, multiplying, and dividing whole numbers; 	TE: 52–55, 96–100, 106–111, 114–115, 134–137, 146–149, 154–156 PE: 52–55, 96–100, 106–111, 114–115, 134–137, 146–149, 154–156
<ul style="list-style-type: none"> develop and use strategies to estimate the results of whole-number computations and 	TE: 52–53, 67, 90, 98–99, 114–115, 138–139, 150–153, 157, 327

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to judge the reasonableness of such results;	PE: 52–53, 90, 98–99, 114–115, 138–139, 150–153, 157, 327
<ul style="list-style-type: none"> develop and use strategies to estimate computations involving fractions and decimals in situations relevant to students' experience; 	TE: 58–59, 403, 410–411 PE: 58–59, 403, 410–411
<ul style="list-style-type: none"> use visual models, benchmarks, and equivalent forms to add and subtract commonly used fractions and decimals; 	TE: 58–61, 330–338, 340–347, 357–360, 457 PE: 58–61, 330–338, 340–347, 357–360
<ul style="list-style-type: none"> select appropriate methods and tools for computing with whole numbers from among mental computation, estimation, calculators, and paper and pencil according to the context and nature of the computation and use the selected method or tools. 	TE: 33, 68, 111, 164, 219, 275, 306, 388, 430, 534, 585 PE: 33, 68, 111, 164, 219, 275, 306, 388, 430, 534, 585
Algebra Standard	
Understand patterns, relations, and functions	
<ul style="list-style-type: none"> describe, extend, and make generalizations about geometric and numeric patterns; 	TE: 15, 76–77, 106–111, 170–172, 203, 251, 348–349, 416–417, 466–467, 533, 584–591 PE: 76–77, 106–111, 170–172, 203, 348–349, 416–417, 466–467, 584–591
<ul style="list-style-type: none"> represent and analyze patterns and functions, using words, tables, and graphs. 	TE: 15, 76–77, 107, 170–172, 210–211, 251, 348–349, 416–417, 584–585 PE: 76–77, 170–172, 210–211, 348–349, 416–417, 584–585
Represent and analyze mathematical situations and structures using algebraic symbols	
<ul style="list-style-type: none"> identify such properties as commutativity, associativity, and distributivity and use them to compute with whole numbers; 	TE: 69, 96–97, 100, 120, 127, 129, 162, 165, 182 PE: 69, 96–97, 100, 120, 127, 129, 162, 165, 182
<ul style="list-style-type: none"> represent the idea of a variable as an unknown quantity using a letter or a symbol; 	TE: 70–73, 162–164, 166–169 PE: 70–73, 162–164, 166–169
<ul style="list-style-type: none"> express mathematical relationships using equations. Use mathematical models to represent and understand quantitative relationships 	TE: 66–68, 74–75, 78–79, 166–169, 586–587 PE: 66–68, 74–75, 78–79, 166–169, 586–587
<ul style="list-style-type: none"> model problem situations with objects and use representations such as graphs, tables, and equations to draw conclusions. 	TE: 15, 34–35, 78–79, 107, 158–159, 210–211, 247, 249, 250–252, 260–261, 264–267, 270–271, 580–581, 585–589, 590–591 PE: 34–35, 78–79, 158–159, 210–211, 247, 249, 250–252, 260–261, 264–267, 270–271, 580–581, 585–589, 590–591
Analyze change in various contexts	
<ul style="list-style-type: none"> investigate how a change in one variable relates to a change in a second variable; 	TE: 15, 76–77, 170–172, 584–585, 588–589 PE: 76–77, 170–172, 584–585, 588–589
<ul style="list-style-type: none"> identify and describe situations with constant or varying rates of change and compare them. 	TE: 107, 251, 522–523, 585, 590–591 PE: 522–523, 585, 590–591
Geometry Standard	

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Analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships	
<ul style="list-style-type: none"> identify, compare, and analyze attributes of two- and three-dimensional shapes and develop vocabulary to describe the attributes; 	TE: 456–461, 464–465, 470–471, 479, 488–497 PE: 456–461, 464–465, 470–471, 488–497
<ul style="list-style-type: none"> classify two- and three-dimensional shapes according to their properties and develop definitions of classes of shapes such as triangles and pyramids; 	TE: 456–461, 464–465, 470–471, 479, 488–497 PE: 456–461, 464–465, 470–471, 488–497
<ul style="list-style-type: none"> investigate, describe, and reason about the results of subdividing, combining, and transforming shapes; 	TE: 481–483, 572–573, 578–579 PE: 481–483, 572–573, 578–579
<ul style="list-style-type: none"> explore congruence and similarity; 	TE: 462–463, 524–525 PE: 462–463, 524–525
<ul style="list-style-type: none"> make and test conjectures about geometric properties and relationships and develop logical arguments to justify conclusions. 	TE: 455, 460, 462, 464, 466–467, 474, 482–483, 486, 492, 498, 500–501, 572–573 PE: 455, 460, 462, 464, 466–467, 474, 482–483, 486, 492, 498, 500–501, 572–573
Specify locations and describe spatial relationships using coordinate geometry and other representational systems	
<ul style="list-style-type: none"> describe location and movement using common language and geometric vocabulary; 	TE: 572–579 PE: 572–579
<ul style="list-style-type: none"> make and use coordinate systems to specify locations and to describe paths; 	TE: 171, 547–579 PE: 574–579
<ul style="list-style-type: none"> find the distance between points along horizontal and vertical lines of a coordinate system. 	TE: 574–579 PE: 574–579
Apply transformations and use symmetry to analyze mathematical situations	
<ul style="list-style-type: none"> predict and describe the results of sliding, flipping, and turning two-dimensional shapes; 	TE: 572–573, 578–579 PE: 572–573, 578–579
<ul style="list-style-type: none"> describe a motion or a series of motions that will show that two shapes are congruent; 	TE: 572–73, 578–579 PE: 572–73, 578–579
<ul style="list-style-type: none"> identify and describe line and rotational symmetry in two- and three-dimensional shapes and designs. 	TE: 478–480 PE: 478–480
Use visualization, spatial reasoning, and geometric modeling to solve problems	
<ul style="list-style-type: none"> build and draw geometric objects; 	TE: 456–459, 472–477, 479, 481–483, 494–496, 572–573 PE: 456–459, 472–477, 481–483, 494–496, 572–573
<ul style="list-style-type: none"> create and describe mental images of objects, patterns, and paths; 	TE: 481–483, 578–279 PE: 481–483, 578–279
<ul style="list-style-type: none"> identify and build a three-dimensional object from two-dimensional representations of that object; 	TE: 494–496 PE: 494–496
<ul style="list-style-type: none"> identify and build a two-dimensional 	TE: 494–496

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representation of a three-dimensional object;	PE: 494–496
• use geometric models to solve problems in other areas of mathematics, such as number and measurement;	TE: 486–493, 498–501 PE: 486–493, 498–501
• recognize geometric ideas and relationships and apply them to other disciplines and to problems that arise in the classroom or in everyday life.	TE: 482–483, 500–501, 575–576, 580–581 PE: 482–483, 500–501, 575–576, 580–581
Measurement Standard	
Understand measurable attributes of objects and the units, systems, and processes of measurement	
• understand such attributes as length, area, weight, volume, and size of angle and select the appropriate type of unit for measuring each attribute;	TE: 192–199, 202–207, 456–459, 486–493, 495, 498–499 PE: 192–199, 202–207, 456–459, 486–493, 498–499
• understand the need for measuring with standard units and become familiar with standard units in the customary and metric systems;	TE: 192–199, 202–207 PE: 192–199, 202–207
• carry out simple unit conversions, such as from centimeters to meters, within a system of measurement;	TE: 194–199, 203–204, 206–209 PE: 194–199, 203–204, 206–209
• understand that measurements are approximations and how differences in units affect precision;	TE: 192–193, 202–203 PE: 192–193, 202–203
• explore what happens to measurements of a two-dimensional shape such as its perimeter and area when the shape is changed in some way.	TE: 196 PE: 196
Apply appropriate techniques, tools, and formulas to determine measurements	
• develop strategies for estimating the perimeters, areas, and volumes of irregular shapes;	TE: 486–487, 500–501 PE: 486–487, 500–501
• select and apply appropriate standard units and tools to measure length, area, volume, weight, time, temperature, and the size of angles;	TE: 32–33, 192–199, 202–207, 208–211, 456–459, 486–493, 498–499 PE: 32–33, 192–199, 202–207, 208–211, 456–459, 486–493, 498–499
• select and use benchmarks to estimate measurements;	TE: 205 PE: 205
• develop, understand, and use formulas to find the area of rectangles and related triangles and parallelograms;	TE: 195–196, 429, 436–437, 486–491 PE: 195–196, 436–437, 486–491
• develop strategies to determine the surface areas and volumes of rectangular solids.	TE: 494–501 PE: 494–501
Data Analysis and Probability Standard	
Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them	
• design investigations to address a question and consider how data-collection methods affect the nature of the data set;	TE: 34–35, 265 PE: 34–35
• collect data using observations, surveys,	TE: 34–35, 247, 249, 265

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and experiments;	PE: 34–35, 247, 249
<ul style="list-style-type: none"> represent data using tables and graphs such as line plots, bar graphs, and line graphs; 	TE: 34–35, 155, 210–211, 247, 249, 250–252, 260–261, 264–267, 270–271 PE: 34–35, 210–211, 247, 249, 250–252, 260–261, 264–267, 270–271
<ul style="list-style-type: none"> recognize the differences in representing categorical and numerical data. 	TE: 244–248, 250–252, 264–271 PE: 244–248, 250–252, 264–271
Select and use appropriate statistical methods to analyze data	
<ul style="list-style-type: none"> describe the shape and important features of a set of data and compare related data sets, with an emphasis on how the data are distributed; 	TE: 244–248, 250–252, 260–263, 550–552 PE: 244–248, 250–252, 260–263, 550–552
<ul style="list-style-type: none"> use measures of center, focusing on the median, and understand what each does and does not indicate about the data set; 	TE: 155, 253, 258–261 PE: 253, 258–261
<ul style="list-style-type: none"> compare different representations of the same data and evaluate how well each representation shows important aspects of the data. 	TE: 244, 246–247, 250–252, 260–261, 264–269, 550–552 PE: 244, 246–247, 250–252, 260–261, 264–269, 550–552
Develop and evaluate inferences and predictions that are based on data	
<ul style="list-style-type: none"> propose and justify conclusions and predictions that are based on data and design studies to further investigate the conclusions or predictions. 	TE: 245, 247, 254–255, 260–263, 265, 280–281, 390–391 PE: 245, 247, 254–255, 260–263, 280–281, 390–391
Understand and apply basic concepts of probability	
<ul style="list-style-type: none"> describe events as likely or unlikely and discuss the degree of likelihood using such words as certain, equally likely, and impossible; 	TE: 276–277 PE: 276–277
<ul style="list-style-type: none"> predict the probability of outcomes of simple experiments and test the predictions; 	TE: 265, 278–281 PE: 278–281
<ul style="list-style-type: none"> understand that the measure of the likelihood of an event can be represented by a number from 0 to 1. 	TE: 278–281 PE: 278–281
Problem Solving Standard	
Instructional programs from prekindergarten through grade 12 should enable all students to—	
<ul style="list-style-type: none"> build new mathematical knowledge through problem solving; 	TE: 20–21, 34–35, 62–63, 78–79, 112–113, 116–117, 158–159, 174–175, 210–211, 226–227, 270–271, 280–281, 312–313, 348–349, 382–383, 390–391, 416–417, 436–437, 466–467, 500–501, 540–541, 554–555, 580–581, 590–591 PE: 20–21, 34–35, 62–63, 78–79, 112–113, 116–117, 158–159, 174–175, 210–211, 226–227, 270–271, 280–281, 312–313, 348–349, 382–383, 390–391, 416–417, 436–437, 466–467, 500–501, 540–541, 554–555, 580–581, 590–591

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<ul style="list-style-type: none"> • solve problems that arise in mathematics and in other contexts; 	<p>TE: 19, 34–35, 75, 78–79, 101, 116–117, 149, 174–175, 209, 226–227, 263, 280–281, 321, 348–349, 373, 390–391, 409, 436–437, 489, 500–501, 523, 554–555, 589, 590–591</p> <p>PE: 19, 34–35, 75, 78–79, 101, 116–117, 149, 174–175, 209, 226–227, 263, 280–281, 321, 348–349, 373, 390–391, 409, 436–437, 489, 500–501, 523, 554–555, 589, 590–591</p>
<ul style="list-style-type: none"> • apply and adapt a variety of appropriate strategies to solve problems; 	<p>TE: 13, 20–21, 57, 62–63, 103, 112–113, 143, 158–159, 201, 210–211, 255, 270–271, 312–313, 327, 375, 382–383, 416–417, 425, 466–467, 483, 527, 540–541, 580–581, 587</p> <p>PE: 13, 20–21, 57, 62–63, 103, 112–113, 143, 158–159, 201, 210–211, 255, 270–271, 312–313, 327, 375, 382–383, 416–417, 425, 466–467, 483, 527, 540–541, 580–581, 587</p>
<ul style="list-style-type: none"> • monitor and reflect on the process of mathematical problem solving. 	<p>TE: 20–21, 34–35, 62–63, 78–79, 112–113, 116–117, 158–159, 174–175, 210–211, 226–227, 270–271, 280–281, 312–313, 348–349, 382–383, 390–391, 416–417, 436–437, 466–467, 500–501, 540–541, 554–555, 580–581, 590–591</p> <p>PE: 20–21, 34–35, 62–63, 78–79, 112–113, 116–117, 158–159, 174–175, 210–211, 226–227, 270–271, 280–281, 312–313, 348–349, 382–383, 390–391, 416–417, 436–437, 466–467, 500–501, 540–541, 554–555, 580–581, 590–591</p>
<p>Reasoning and Proof Standard</p>	
<p>Instructional programs from prekindergarten through grade 12 should enable all students to—</p>	
<ul style="list-style-type: none"> • recognize reasoning and proof as fundamental aspects of mathematics; 	<p>TE: 26, 28, 30, 47, 52, 60, 69, 100, 106, 114, 146, 150, 195, 206, 214, 218, 274, 299, 323, 334, 381, 408, 414, 422, 462, 488, 518, 520, 536, 544, 588</p> <p>PE: 26, 28, 30, 47, 52, 60, 69, 100, 106, 114, 146, 150, 195, 206, 214, 218, 274, 299, 323, 334, 381, 408, 414, 422, 462, 488, 518, 520, 536, 544, 588</p>
<ul style="list-style-type: none"> • make and investigate mathematical conjectures; 	<p>TE: 20–21, 34, 62, 78, 112, 116, 158, 174, 210, 226, 270, 280, 312, 348, 382, 390, 416, 436, 466, 500, 540, 554, 580, 590</p> <p>PE: 20–21, 34, 62, 78, 112, 116, 158, 174, 210, 226, 270, 280, 312, 348, 382, 390, 416, 436, 466, 500, 540, 554, 580, 590</p>
<ul style="list-style-type: none"> • develop and evaluate mathematical arguments and proofs; 	<p>TE: 46, 100, 106, 196, 246, 274, 343, 462, 488, 518, 544, 545, 588</p> <p>PE: 46, 100, 106, 196, 246, 274, 343, 462, 488, 518, 544, 545, 588</p>

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<ul style="list-style-type: none"> select and use various types of reasoning and methods of proof. 	<p>TE: 16, 68, 99, 101, 108, 111, 115, 156, 172, 196, 252, 301 342, 343, 370, 373, 379, 381, 388, 430, 434, 455, 461, 491, 534, 548, 552, 576, 585</p> <p>PE: 16, 68, 99, 101, 108, 111, 115, 156, 172, 196, 252, 301 342, 343, 370, 373, 379, 381, 388, 430, 434, 455, 461, 491, 534, 548, 552, 576, 585</p>
<p>Communication Standard</p>	
<p>Instructional programs from prekindergarten through grade 12 should enable all students to—</p>	
<ul style="list-style-type: none"> organize and consolidate their mathematical thinking through communication; 	<p>TE: 3, 5, 7, 10, 99, 101, 191, 209, 215, 221, 263, 299, 321, 359, 381, 423, 455, 519, 571</p> <p>PE: 3, 5, 7, 10, 99, 101, 191, 209, 215, 221, 263, 299, 321, 359, 381, 423, 455, 519, 571</p>
<ul style="list-style-type: none"> communicate their mathematical thinking coherently and clearly to peers, teachers, and others; 	<p>TE: 97, 169, 193, 204, 217, 221, 367, 459, 471, 474, 477, 480, 494, 525, 531</p> <p>PE: 97, 169, 193, 204, 217, 221, 367, 459, 471, 474, 477, 480, 494, 525, 531</p>
<ul style="list-style-type: none"> analyze and evaluate the mathematical thinking and strategies of others; 	<p>TE: 30, 75, 153, 156, 173, 199, 238, 338, 360, 421, 461, 523, 552, 589</p> <p>PE: 30, 75, 153, 156, 173, 199, 238, 338, 360, 421, 461, 523, 552, 589</p>
<ul style="list-style-type: none"> use the language of mathematics to express mathematical ideas precisely. 	<p><i>Reading Mathematics</i> is featured at the beginning of each chapter.</p> <p>TE: 2–3, 50–51, 94–95, 132–133, 190–191, 242–243, 296–297, 364–365, 406–407, 452–453, 516–517, 570–571</p> <p>PE: 2–3, 50–51, 94–95, 132–133, 190–191, 242–243, 296–297, 364–365, 406–407, 452–453, 516–517, 570–571</p>
<p>Connections Standard</p>	
<p>Instructional programs from prekindergarten through grade 12 should enable all students to—</p>	
<ul style="list-style-type: none"> recognize and use connections among mathematical ideas; 	<p>TE: 54–55, 147–148, 153–154, 378–381, 384–388, 422–423, 486–493, 498–499</p> <p>PE: 54–55, 147–148, 153–154, 378–381, 384–388, 422–423, 486–493, 498–499</p>
<ul style="list-style-type: none"> understand how mathematical ideas interconnect and build on one another to produce a coherent whole; 	<p>TE: 66–79, 106–115, 146–149, 154–159, 214–227, 274–279, 330–347, 366–373, 378–381, 384–389, 408–415, 420–434, 518–523, 530–537</p> <p>PE: 66–79, 106–115, 146–149, 154–159, 214–227, 274–279, 330–347, 366–373, 378–381, 384–389, 408–415, 420–434, 518–523, 530–537</p>
<ul style="list-style-type: none"> recognize and apply mathematics in contexts outside of mathematics. 	<p>TE: 19, 75, 101, 149, 209, 263, 321, 373, 409, 489, 523, 589</p> <p>PE: 19, 75, 101, 149, 209, 263, 321, 373, 409, 489, 523, 589</p>

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Representation Standard	
Instructional programs from prekindergarten through grade 12 should enable all students to—	
<ul style="list-style-type: none"> • create and use representations to organize, record, and communicate mathematical ideas; 	TE: 34–35, 78–79, 158–159, 210–211, 247, 249, 250–252, 260–261, 264–267, 270–271, 580–581, 590–591 PE: 34–35, 78–79, 158–159, 210–211, 247, 249, 250–252, 260–261, 264–267, 270–271, 580–581, 590–591
<ul style="list-style-type: none"> • select, apply, and translate among mathematical representations to solve problems; 	TE: 174–175, 244–255, 260–269, 280–281, 390–391, 436–437, 550–552 PE: 174–175, 244–255, 260–269, 280–281, 390–391, 436–437, 550–552
<ul style="list-style-type: none"> • use representations to model and interpret physical, social, and mathematical phenomena. 	TE: 34–35, 78–79, 158–159, 210–211, 247, 249, 250–252, 260–261, 264–267, 270–271, 580–581, 590–591 PE: 34–35, 78–79, 158–159, 210–211, 247, 249, 250–252, 260–261, 264–267, 270–271, 580–581, 590–591