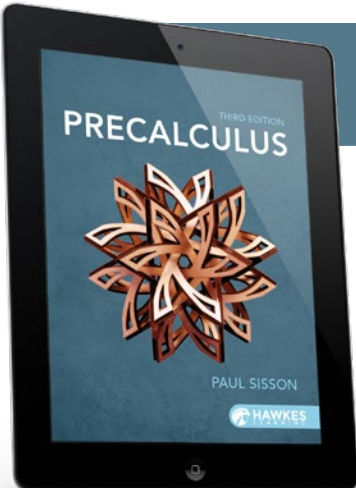
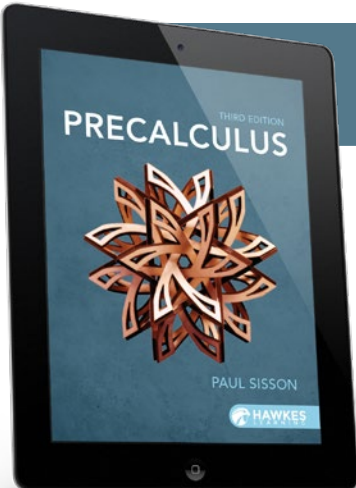




Precalculus, 3rd Edition

Question Bank Enhancements

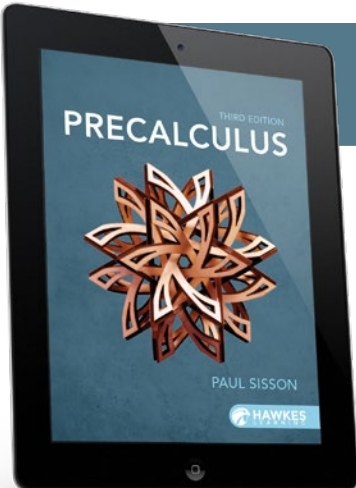
Lesson	# of New Questions	What Changed
1.2	2	Added 1 new question to simplify an expression where the numerator is a binomial raised to a positive rational exponent and the denominator is the same binomial raised to the second power. Added 1 new conceptual question about properties of radicals and rational exponents.
1.3	5	Added 3 new multiple-choice questions to factor expressions containing noninteger rational exponents, corresponding to Examples 7a and 7b and Exercise 57 in the book. Added 1 new question to factor a perfect square trinomial. Added 1 new conceptual question about perfect square trinomials and sums/differences of cubes.
1.4	3	Added 3 new questions to simplify complex algebraic expressions involving rational exponents.
1.7	6	Added 1 new question to solve a linear absolute value inequality, corresponding to Exercise 36 in the book. Added 1 new question to solve a linear absolute value inequality, corresponding to Exercise 50 in the book, using $<$ and $<=$. Added 1 new question to solve a linear absolute value inequality, corresponding to Exercise 50 in the book, but using $>$ and $>=$. Added 1 new conceptual question about the meaning of a given linear absolute value inequality. Added 2 new conceptual questions that ask to select the statement that best describes the correct approach to solving a given linear absolute value inequality.
1.8	3	Added 3 new questions to solve polynomial equations that are of a lower difficulty level than many of the existing questions in this lesson.
1.9	4	Added 1 new lower difficulty question similar to Serial #4 but the quadratic in the denominator is given in factored form. Added 2 new questions dealing with solving a formula for a certain variable. Added 1 new conceptual question that covers the concepts and vocabulary taught in the lesson.
2.1	5	Added 1 new question asking for the distance between two points. Added 1 new question asking for the midpoint. Added 1 new question asking to identify which points lie on the given graphed line. Added 1 new conceptual question that covers the terminology in the Cartesian plane. Added 1 new conceptual question that is asking to use the distance formula and the Pythagorean Theorem to show if the three given points form a right triangle.
2.3	6	Added 1 new question to find the x -intercept of a linear equation given in standard form. Added 1 new question to find the y -intercept of a linear equation given in standard form. Added 1 new multiple-choice question to select the correct graph of a linear equation given in standard form. Added 1 new question with 2 parts: one to find the x -intercept and the other to find the y -intercept of a linear equation corresponding to Exercise 30 in the book. Added 1 new question with 2 parts: one to find the x -intercept and the other to find the y -intercept of a linear equation corresponding to Exercise 38 in the book. Added 1 new conceptual question about linear equations.



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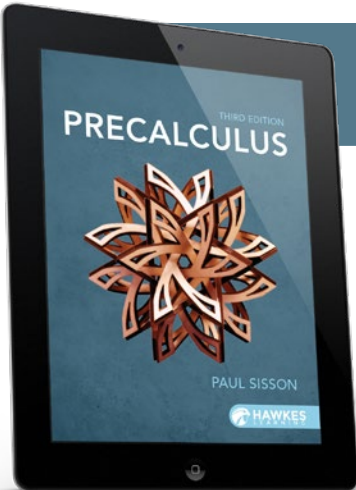
Lesson	# of New Questions	What Changed
2.4	12	Added 3 new questions similar to Serial #17, 18, 22, but they ask for the equation of the line in point-slope form rather than slope-intercept or standard form. Added 1 new question asking to convert a standard form equation to slope-intercept form. Added 1 new question asking to find the corresponding y-value given the x-value for an equation in standard form. Added 1 new question asking to find the slope and y-intercept. Added 1 new question that asks for the y-intercept of a linear equation given in standard form. Added 1 new question asking to write the equation of a line with undefined slope given a point on the line. Added 2 new questions asking to graph a linear equation by plotting two points on the line. A Cartesian plane is given, and the students click on the graph to plot the points. Added 1 new application to use and interpret the concepts of linear equations. Added 1 new conceptual question that covers the concepts and vocabulary taught in the lesson.
3.1	35	Added 31 new questions similar to existing questions, but they ask for one thing per step instead of having domain and range together in one step or domain, codomain, and range together in one step. Added 1 new question corresponding to Exercise 52 in the book, to write y explicitly as a function of x. Added 1 new question corresponding to Exercise 69 in the book, to find $\frac{f(x+h) - f(x)}{h}$. Added 2 new questions asking to find the implied domain of a given function along the lines of Exercise 92 in the book.
3.2	22	Added 7 new questions to find the slope of a linear function; these are one-step questions based on the first answer box in step 1 of the existing Serial #s 6, 7, 8, 10, 11, 12, 13. Added 7 new questions to find the y-intercept of a linear function; these are one-step questions based on the second answer box in step 1 of the existing Serial #s 6, 7, 8, 10, 11, 12, 13. Added 7 new multiple-choice questions to select the pair of points that both lie on the graph of the given linear function. Added 1 new conceptual question to select all the true statements about the graph of a given linear function.
3.3	9	Added 1 new question to find the vertex of a quadratic function given in vertex form. Added 1 new question to find the x-intercepts of a quadratic function given in vertex form. Added 1 new multiple-choice question to select the pair of points that both lie on the graph of a quadratic function given in vertex form. Added 1 new question to find the x-intercepts of quadratic functions of the forms $f(x)=ax^2+bf(x)=ax^2+b$ and $f(x)=-ax^2-bf(x)=-ax^2-b$ corresponding to Exercises 4 and 8 in the book; they have no x-intercepts. Added 1 new question to find the x-intercepts of a quadratic function of the form $f(x)=ax^2+bx+cf(x)=ax^2+bx+c$ corresponding to Exercise 10 in the book; the function has no x-intercepts. Added 1 new question to find the x-intercepts of a quadratic function of the form $f(x)=ax^2-bf(x)=ax^2-b$ corresponding to Exercise 13 in the book; the function always has two x-intercepts. Added 1 new conceptual question to state the number of x-intercepts and the location of the vertex in relation to the x-axis without graphing the given function, corresponding to the Writing & Thinking Exercise 52 in the book. Added 2 new applications with 3 parts walking the student through setting up the functions initially, and then solving to find the dimensions needed.



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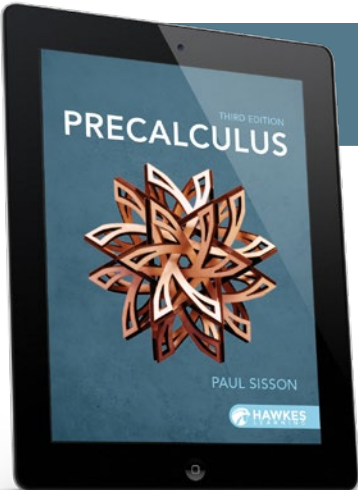
Lesson	# of New Questions	What Changed
3.4	24	Added 7 new multiple-choice questions to identify the general shape of the graph of a given function. Added 2 new multiple-choice questions to identify the general shape of the graph of one piece of a piecewise-defined function. Added 1 new multiple-choice question to identify the actual graph of a power function with odd exponents. Added 5 new multiple-choice questions to select the pair of points that both lie on the graph of a given function. Added 9 new one-step questions to evaluate a piecewise-defined function at a given x-value.
4.1	25	Added 18 new questions that each match one step of the multistep Serial #1, 4, 5, and 32 (determine the basic function, identify the shape of the basic function, identify all transformations needed to graph, determine the domain, determine the range). Added 2 new questions asking to write a formula for the function described. Added 1 new question asking to graph the given function. Added 1 new question corresponding to Exercise 56 in the book, to write a formula for a function described. Added 2 new questions corresponding to Exercises 63 and 65 in the book, to write a formula for a function whose graph is given. Added 1 new conceptual question that covers the concepts and vocabulary taught in the lesson.
4.2	13	Added 4 new questions similar to Serial #24, 40, but they ask only for one thing per step, instead of having multiple answer boxes per step. Added 2 new questions corresponding to Exercises 44-46 in the book, covering the average rate of change. Added 3 new questions to increase the variety of the questions that ask to determine if a function is odd, even, or neither. Added 2 new questions to increase the variety of the questions that ask for the type of symmetry. Added 2 new conceptual questions, one dealing with the difference quotient and the other one with odd and even functions given their graph.
4.3	25	Added 4 new questions that focus on one operation per question. Added 2 new questions: one asking for $(f + g)(x)$ and one asking for $\left(\frac{f}{g}\right)(x)$. Added 8 new questions similar to Serial #21, 25, but they ask only for one concept per question instead of having the formula for a composition and domain together in one step. Added 2 new questions that give two easier functions and ask to find their composition evaluated at a certain value. Added 9 new questions corresponding to Exercises 6, 17, 20, 43, 49 in the book.
4.4	11	Added 1 new question to find the inverse of a relation given as a set of ordered pairs. Added 1 new question to find the domain of the inverse of a relation given as a set of ordered pairs. Added 1 new question to find the range of the inverse of a relation given as a set of ordered pairs. Added 6 new questions to find the inverse of a given function. Added 2 new conceptual questions to enhance the understanding of the inverse of a function.



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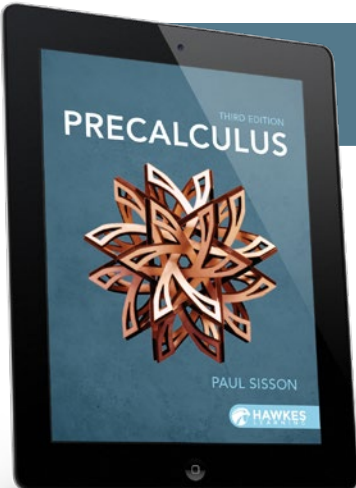
Lesson	# of New Questions	What Changed
5.1	21	Added 2 new questions like Serial #10 Step 1, but they ask specifically for one concept each: one is asking for the degree of a polynomial function, and the other is asking for the leading coefficient. Added 6 new questions each dealing with one concept: two ask to identify the correct graph, two ask to find the x-intercepts, and two ask to find the y-intercept. Added 2 new questions with 4 parts each, asking for x-intercepts, y-intercept, if a point is on the graph from 4 given options, and then to choose the correct graph from 4 graph options. Added 3 new questions like Serial #34, each dealing with one concept: one asks to write the inequality with 0 on the right-hand side, one asks to find the real zeros, and the last one asks for the solution for the given inequality. Added 1 new question corresponding to Exercise 50 in the book, to find the polynomial of lowest possible degree from a given graph. Added 1 new question corresponding to Exercises 60-65 in the book, to match the four given descriptions with their functions. Added 3 new questions that give a function and ask to identify if it is a polynomial or not. Added 1 new conceptual question asking to describe the end behavior of a polynomial function from five possible options. Added 2 new applications that use inequalities to be solved.
5.2	2	Added 2 new conceptual questions that cover the concepts and vocabulary taught in the lesson.
5.3	12	Added 6 new questions to find the potential zeros of a polynomial function using the Rational Zero Theorem; these are one-step questions based on step 1 of the existing Serial #s 1-6. Added 6 new questions to find the actual zeros of a polynomial function; these are one-step questions based on step 2 of the existing Serial #s 1-6.
5.4	9	Added 4 new one-step questions corresponding to each part of the existing Serial #1. Added 2 new one-step questions corresponding to step 2 of the existing Serial #4. Added 3 new three-step questions to find the degree of a polynomial function, the maximum number of turning points, the real zeros and their multiplicities, the x-values where the graph crosses through the x-axis, and the x-values where the graph touches the x-axis without crossing to the other side.
5.5	14	Added 3 new questions to find the equations for the vertical asymptotes of a rational function, corresponding to Examples 1b and 1c in the book. Added 2 new questions to find the equation for the horizontal or oblique of a rational function. Added 3 new one-step questions to find all the asymptotes for a rational function. Added 1 new one-step question to find the x- and y-intercepts of a rational function. Added 1 new one-step question to find the y-coordinates of four points on the graph of a rational function, by evaluating the function at four given x-values. Added 3 new five-step questions to find the vertical and horizontal or oblique asymptotes of a rational function; the x- and y-intercepts; and to determine if the graph crosses the horizontal asymptote. Added 1 new multiple-choice question to identify the correct graph of the given rational function.



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Lesson	# of New Questions	What Changed
6.1	16	Added 4 new multiple-choice questions to choose the correct graph of the given exponential function, where the functions are of simpler forms than in existing questions; they correspond to Exercises 1, 7, 8, and 14 in the book. Added 1 new multiple-choice question to choose the two exponential functions that have the same graph. Added 1 new question to match four related exponential functions (all with the same base, but different signs for the coefficients and exponents) to their correct graphs. Added 1 new two-step question to find missing coordinates of three points on the graph of an exponential function and then choose the correct graph of the function. Added 1 new four-step question to find the x-intercept of an exponential function, the y-intercept, to choose which of the given points is on the graph, and then to choose the correct graph of the function. Added 1 new question to find the x- and y-intercepts of a basic exponential function. Added 1 new question to find the domain and range of a basic exponential function. Added 1 new three-step question to find the domain, range, and asymptote for an exponential function. Added 3 new questions to use transformations to write a formula for the exponential function described. Added 1 new question to solve an elementary exponential equation that is of a simpler form than equations in existing questions. Added 1 new conceptual question about exponential functions.
6.2	2	Added 2 new questions to use transformations to write a formula for the exponential function described, where the base function is e^x.
6.3	18	Added 6 new multiple-choice questions to translate equations between exponential and logarithmic form. Added 2 new free-response questions to translate equations between exponential and logarithmic form, but the given equations are with the approximately equal sign. Added 1 new question to find the x- and y-intercepts of a simple logarithmic function. Added 1 new question to find the domain and range of a simple logarithmic function. Added 2 new four-step questions to find the x-intercept of a simple logarithmic function, the y-intercept, to choose which of the given points is on the graph, and then to choose the correct graph of the function. Added 1 new question to match four related logarithmic functions (all with the same base, but different signs for the coefficients and arguments) to their correct graphs. Added 2 new multiple-choice questions to find the inverse of a logarithmic function. Added 3 new conceptual questions to test the terminology of the lesson and the relationship between exponential and logarithmic functions and their domains.
6.4	2	Added 1 new question like Serial #25 but it has two steps instead of one step, where Step 2 matches Serial #25 and Step 1 asks for the given logarithmic expression to be rewritten in a form that can be evaluated, by applying the change of base formula. Added 1 new conceptual question that covers the concepts and vocabulary taught in the lesson.
6.5	5	Added 1 new question to solve an exponential equation corresponding to Example 2 and Exercise 4 in the book. Added 2 new questions to solve logarithmic equations involving the common base-10 logarithm where one argument of log in each equation is a quadratic polynomial. Added 1 new question to solve a logarithmic equation involving the natural logarithm. Added 1 new conceptual question about properties of logarithms and exponents.



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Lesson	# of New Questions	What Changed
7.2	10	Added 6 new questions to evaluate one of the six trig functions using a given right triangle. Added 3 new questions to find a missing side length of a right triangle using trig functions and a calculator. Added 1 new question to express the length of one leg of a right triangle in terms of one acute angle of the triangle.
7.4	15	Added 2 new multiple-choice questions to identify the transformed sine function that would produce the given graph. Added 2 new multiple-choice questions to identify the transformed cosine function that would produce the given graph. Added 1 new multiple-choice question to identify the graph of $\sin x$. Added 1 new multiple-choice question to identify the graph of $\cos x$. Added 1 new multiple-choice question to identify the graph of a function of the form $a \cdot \sin x$. Added 1 new multiple-choice question to identify the graph of a function of the form $a \cdot \cos x$. Added 1 new free-response question to identify the transformed sine or cosine function that would produce the given graph. Added 6 new multiple-choice questions with functions corresponding to Exercises 21, 24, and 27 in the book, with two types of questions corresponding to each exercise: one type asks to identify the correct graph of the given trig function, and the second type asks to select the formula for the trig function whose graph matches the given graph. Note: We more than doubled the size of the question bank for this lesson. All the new questions add variety and increase the number of low-level questions in this lesson.
8.2	2	Added 2 new multiple-choice questions to verify a given trigonometric identity or prove that it is false, corresponding to Exercises 61 and 67 in the book.
8.4	5	Added 5 new questions to solve trigonometric equations on the interval $[0, 2\pi)$.