

## WCC Math Guided Self Placement-International Students

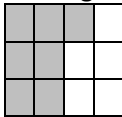
Math is an important foundation for many courses at Whatcom Community College. Getting started in math early in your education, and in a course that is right for you, is a critical step for academic success!

### Steps for Self Placement:

- Use the information in the charts below to review the prerequisite skills for each course.
- Make sure to review the accompanying examples.
- To begin study in the course listed, you should have a mastery of the math concept examples provided for that course.
- Remember that math isn't only a set of numerical problems; it also includes specific English language terms. These terms may be new to you. It is best to start at a comfortable math level so you can learn and adjust to the new language skills.
- After you have determined the best class to begin your studies, you will work with an international advisor to enroll in the corresponding course.
- Once you have begun your math studies, it is not possible to skip to a different math class level.

## Math 94

Students placing into Math 94 should already have mastery of the following skills:

| <b>Outcome/Skill</b>  | <b>Example(s)</b>  |   |   |
|---|--|---|---|
| <i>Add, subtract, and multiply whole numbers without a calculator</i>   | $406 \times 78$  | $394 + 275$   | $6,003 - 1,257$   |
| <i>Divide whole numbers without a calculator (including use of long division and remainders)</i>                | $3053 \div 6$  |   |   |
| <i>Add and subtract decimals without a calculator</i>   | $2.40 + 0.73$  | $5 - 2.68$  |   |
| <i>Round whole numbers to a given place value</i>   | Round 273 to the nearest ten   | Round 4,252 to the nearest hundred  |   |
| <i>Solve application problems involving addition, subtraction, multiplication, or division of whole numbers</i> | Emma was looking at the store inventory and sales records. One morning, the store had 457 cans of soup. The store sold 139 cans of soup during the day. How many cans of soup were left? | The kennel had 102 pounds of dog food. If they use 6 pounds a day, how many days will the 102 pounds of food last?  |   |
| <i>Answer questions involving fraction basics</i>   | What fraction of the given rectangle is shaded?<br>   | Last weekend, the flower shop had 42 customers pay with a credit card and 25 customers pay with cash. What fraction of all the payments last weekend were done with cash? | Liam had a pizza that was cut into 12 pieces. Liam ate $\frac{2}{12}$ of the pizza for lunch. He ate another $\frac{5}{12}$ of the pizza for dinner. What total fraction of the pizza did Liam eat? |

Note: ABE math classes are available for students who want to refresh these math skills or to prepare for this class.

## Math 97

Students placing into Math 97 should already have mastery of the following skills:

| <b>Outcome/Skill</b>  | <b>Example(s)</b>  |   |  |
|---|--|---|--|
| <i>Reduce fractions</i>                                     | Reduce the following fraction to lowest terms.<br>$\frac{84}{210}$   |   |  |
| <i>Add, subtract, multiply, and divide fractions</i>        | Perform the indicated operation and reduce answers to lowest terms.<br>$\frac{5}{12} + \frac{1}{9} \qquad \frac{9}{10} - \frac{3}{20}$ | Perform the indicated operation and reduce answers to lowest terms.<br>$\frac{4}{15} \cdot \frac{25}{36}$ | Perform the indicated operation and reduce answers to lowest terms.<br>$\frac{6}{11} \div \frac{2}{3}$ |
| <i>Decimal place values and rounding</i>                    | Round to the nearest tenth:<br>$0.3498$  | Round to the nearest hundredth:<br>$854.2352$   | Round to the nearest thousandth:<br>$2.1297$   |
| <i>Convert between fractions, decimals, and percentages</i> | Convert the following fraction to the equivalent decimal and percent:<br>$\frac{5}{8}$   | Convert the following decimal to the equivalent fraction and percent:<br>$0.7$                            | Convert the following percent to the equivalent decimal and fraction:<br>$9\%$                         |
| <i>Order of operations</i>                                  | Evaluate using order of operations.<br>$8 + 2(2 + 3)^2 - 7 + 3$  |   |  |
| <i>Add, subtract, multiply, and divide signed numbers</i>   | $-14 + (-9)$<br>$-11 + 18$   | $-6 - 5$<br>$-2 - (-3)$   | $5(-4)$<br>$\frac{-54}{-9}$  |

Note: ABE math classes are available for students who want to refresh these math skills or to prepare for this class.

## Math 98

Students placing into Math 98 should already have mastery of the following skills:

| <b>Outcome/Skill</b>  | <b>Example(s)</b>   |  |   |
|---|---|--|---|
| <i>Laws of exponents</i>  | Simplify the expression<br>$x^2 \cdot x^5$                                | Simplify the expression<br>$\frac{x^6}{x^4}$                               | Simplify the expression<br>$(x^3)^2$                                      |
| <i>Add, subtract, multiply, and divide fractions with uncommon denominators</i> | Multiply; simplify if possible<br>$\frac{2}{5} \cdot \frac{20}{9}$        | Divide; simplify if possible<br>$\frac{3}{7} \div \frac{9}{10}$            | Subtract; simplify if possible<br>$\frac{3}{8} - \frac{2}{3}$             |
| <i>Add, subtract, and multiply polynomials</i>                                  | Subtract; simplify if possible<br>$(2x^2 + 5x - 1) - (x^2 - 3x - 1)$      | Multiply; simplify if possible<br>$(x - 1)(2x^2 - 5)$                      | Divide; simplify if possible<br>$\frac{2x^3 + 6x^2 + 18}{2x}$             |
| <i>Evaluate perfect square roots</i>  | Evaluate, if possible. If it is not possible, explain why.<br>$\sqrt{25}$ | Evaluate, if possible. If it is not possible, explain why.<br>$-\sqrt{16}$ | Evaluate, if possible. If it is not possible, explain why.<br>$\sqrt{-9}$ |
| <i>Evaluate formulas</i>  | Evaluate the formula below for $x = -2$<br>$y = \frac{5}{2}x - 1$         | Evaluate the formula below for $x = -2$<br>$y = 2x^2 + 8$                  | Evaluate the formula below for $x = -2$ and $y = 3$<br>$z = x^2 + y^2$    |
| <i>Plot points in coordinate plane</i>  | Plot the point $(3,7)$ .  | Plot the point $(-2,5)$ .  | Plot the point $(4, -1)$ .  |

## Math 99

Students placing into Math 99 should already have mastery of the following skills:

| <b>Outcome/Skill</b>   | <b>Example(s)</b>   |  |   |
|--|---|--|---|
| <i>Operations with fractions</i>   | Add and simplify<br>$\frac{1}{4} + \frac{2}{14}$                                      | Subtract and simplify<br>$\frac{2}{3} - \frac{1}{6}$         |   |
| <i>Add, subtract, and multiply polynomials</i>   | Add and simplify<br>$(2x^2 + 5x - 5) + (3x^2 - 9)$                                    | Subtract and simplify<br>$(2x^2 + 5x - 5) - (3x^2 - 9)$      | Multiply and simplify<br>$(5x - 5)(3x^2 - 9)$         |
| <i>Divide by monomial</i>  | Divide and simplify<br>$\frac{12x - 6}{3}$  |  |   |
| <i>Factor polynomials</i>  | Fully factor<br>$5x - 10x^2$  | Fully factor<br>$2p^3 + 5p^2 + 6p + 15$                      | Fully factor<br>$x^2 - 6x + 9$                        |
| <i>Solve quadratic equations by square root method, completing the square, quadratic formula</i> | Solve by factoring<br>$2x^2 - 5x - 3 = 0$<br>Solve by taking square root<br>$x^2 = 5$ | Solve by completing the square method<br>$x^2 + 8x + 12 = 0$ | Solve by the quadratic formula<br>$2x^2 + 4x + 1 = 0$ |
| <i>Solve linear equations</i>  | Solve for x<br>$2 = \frac{3}{4}x - 3$   | Solve for y<br>$6x + 3y = 9$                                 |   |
| <i>Graph a linear equation</i>   | Graph the equation<br>$y = \frac{1}{2}x + 3$  |  |   |
| <i>Solve proportions</i>   | Solve<br>$\frac{6}{x} = \frac{3}{4}$  |  |   |

## Math& 146

Students placing into Math& 146 should already have mastery of the following skills:

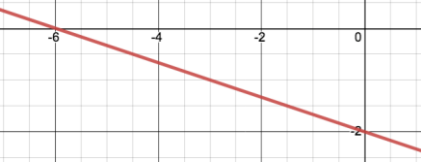
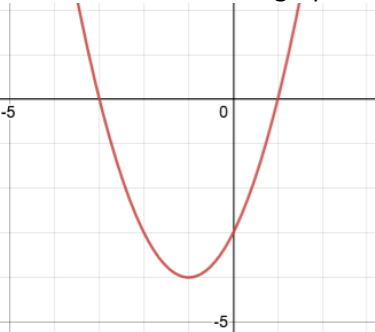
| <b>Outcome/Skill</b>   | <b>Example(s)</b>  |  |  |     |      |        |    |         |    |           |    |          |    |        |    |
|--|--|--|--|-----|------|--------|----|---------|----|-----------|----|----------|----|--------|----|
| <i>Extract information from tables and graphs</i>                      | The following table lists the number of repetitions (reps) a weightlifter was able to perform each day of the week.  |  | <table border="1"> <thead> <tr> <th>Day</th> <th>Reps</th> </tr> </thead> <tbody> <tr> <td>Monday</td> <td>13</td> </tr> <tr> <td>Tuesday</td> <td>11</td> </tr> <tr> <td>Wednesday</td> <td>17</td> </tr> <tr> <td>Thursday</td> <td>13</td> </tr> <tr> <td>Friday</td> <td>18</td> </tr> </tbody> </table> | Day | Reps | Monday | 13 | Tuesday | 11 | Wednesday | 17 | Thursday | 13 | Friday | 18 |
| Day  | Reps   |  |  |     |      |        |    |         |    |           |    |          |    |        |    |
| Monday   | 13   |  |  |     |      |        |    |         |    |           |    |          |    |        |    |
| Tuesday  | 11   |  |  |     |      |        |    |         |    |           |    |          |    |        |    |
| Wednesday  | 17   |  |  |     |      |        |    |         |    |           |    |          |    |        |    |
| Thursday   | 13   |  |  |     |      |        |    |         |    |           |    |          |    |        |    |
| Friday   | 18   |  |  |     |      |        |    |         |    |           |    |          |    |        |    |
|  |  |  | On what day of the week did the weightlifter perform the most reps? The least? Overall, is their performance improving?  |     |      |        |    |         |    |           |    |          |    |        |    |
| <i>Add, subtract, multiply, and divide fractions</i>                   | Add:<br>$\frac{4}{3} + \frac{5}{7}$  | Subtract:<br>$\frac{3}{8} - \frac{1}{2}$   | Multiply:<br>$\left(\frac{2}{5}\right)\left(\frac{8}{5}\right)$  |     |      |        |    |         |    |           |    |          |    |        |    |
|  |  |  | Divide<br>$\frac{5}{9} \div \frac{3}{4}$   |     |      |        |    |         |    |           |    |          |    |        |    |
| <i>Convert between fraction, decimal, and percent</i>                  | What is the value of $\frac{3}{5}$ when expressed as a decimal? As a percent?  |  | What is the value of 16% expressed as a fraction?  |     |      |        |    |         |    |           |    |          |    |        |    |
| <i>Round and order decimal values</i>                                  | Round 0.38712 to the nearest hundredth.  | Put the following values in order from least to greatest: 0.45, 0.501, 0.051, 0.1032 |  |     |      |        |    |         |    |           |    |          |    |        |    |
| <i>Identify, interpret, and convert scientific notation</i>            | Is $3.085 \times 10^{-2}$ greater than 1 or less than 1? What would this value be when expressed as a decimal?   |  |  |     |      |        |    |         |    |           |    |          |    |        |    |
| <i>Represent an inequality as an interval on the number line</i>       | Shade the interval $x < 5$ on a number line.   |  |  |     |      |        |    |         |    |           |    |          |    |        |    |
| <i>Calculate squares, and square roots of perfect squares</i>          | Calculate $4^2$ .  | Calculate $\sqrt{81}$ .  |  |     |      |        |    |         |    |           |    |          |    |        |    |
| <i>Solve for a specific variable in an algebraic equation</i>          | Solve the equation $E = \frac{s}{\sqrt{n}}$ for $n$ .  |  |  |     |      |        |    |         |    |           |    |          |    |        |    |
| <i>Evaluate and solve algebraic equations</i>                          | Given the equation $y = x^2 - 16$ , solve for $x$ if $y = 0$ .   |  |  |     |      |        |    |         |    |           |    |          |    |        |    |
| <i>Plot points on coordinate plane</i>                                 | Plot the point (3, -7) on a graph.   |  |  |     |      |        |    |         |    |           |    |          |    |        |    |
| <i>Graph the line of a linear equation</i>                             | Graph the line represented by the equation $y = -\frac{3}{2}x + 5$   |  |  |     |      |        |    |         |    |           |    |          |    |        |    |
| <i>Interpret slope and y-intercept of a linear equation in context</i> | A salesperson's annual wages, $w$ , are given by the equation $w = 5s + 45000$ , where $s$ is the number of items sold. What do the slope and y-intercept of this equation tell us about the salesperson's annual wages? |  |  |     |      |        |    |         |    |           |    |          |    |        |    |

## Math& 141

Students placing into Math& 141 should already have mastery of the following skills:

| <b>Outcome/Skill</b>  | <b>Example(s)</b>   |   |  |
|---|---|---|--|
| <i>Simplify algebraic expressions including combining like terms, factoring, simple radical and rational expressions, and expressions involving complex numbers</i> | Factor each of the following completely.<br>a) $x^2 - 17x + 30$<br>b) $6x^3 + 3x^2 - 9x$<br>c) $32 - 2y^4$<br>d) $4x^2 - 4ax - 3x + 3a$   | True or False:<br>$(a + b)^2 = a^2 + b^2$   | True or False:<br>$\sqrt{x^2 + y^2} = x + y$   |
| <i>Add, subtract, multiply, and divide algebraic expression, including expressions with complex numbers</i>   | Simplify each of the following completely.<br>a) $6 - 2(5a + 1) + 3(-2a + 4)$<br>b) $-\frac{2}{3}(6x - 3) + \frac{4}{3}(15 - 9x)$<br>c) $\frac{3-12x}{3}$<br>d) $(3a^2 - 5a + 10) - (5a^2 - 7a + 9)$  | e) $(5x - 2)(x + 7)$<br>f) $(2x - y)^2$<br>g) $\sqrt{64} - \sqrt[3]{-27}$<br>h) $x\sqrt{27x} + \sqrt{48x^3}$  | i) $(-2\sqrt{3a})(3\sqrt{12a^3})$<br>j) $(8 + 2i) - (-3 - 11i)$<br>k) $2i(3i + a)$<br>l) $(5 + 2i)(-2 - 3i)$ |
| <i>Exponent rules, including negative and rational exponents</i>  | Simplify each of the following. Write your answer without any negative exponents.<br>a) $a^3a^{12}$<br>b) $(-2x^3y)^2$<br>c) $\frac{a^2b^{-1}}{a^{-2}b^3}$<br>d) $\left(\frac{x^4}{y^6}\right)^{\frac{1}{2}}$<br>e) $\frac{(4a^2b)(9a^3b^4)}{18a^5b^6}$<br>f) $\frac{x^{-1}}{y^{-2}}$ | Write $\sqrt[3]{a^2}$ using a rational exponent.  |  |
| <i>Solve equations, including linear, quadratic, higher degree polynomials that can be factored, radical equations, and rational equations.</i>                     | Solve each of the following equations.<br>a) $4 - 5(2x - 1) = 7 - 3x$<br>b) $\frac{1}{3} + \frac{1}{7}x = -\frac{8}{21}$<br>c) $9t^2 - 25 = 0$<br>d) $a^2 - a + 1 = 7$<br>e) $(x + 3)(x - 1) = 12$<br>f) $2x^2 - 4x = -3$<br>g) $3(x - 2)^2 - 1 = 26$                                 | h) $-\sqrt{2x + 1} = -3$<br>i) $\frac{4}{x} = \frac{2}{7}$<br>j) $\frac{x}{2} = \frac{-3}{3-5x}$<br>k) $\frac{1}{x} - \frac{2}{x-1} = \frac{3}{x(x-1)}$<br>l) $a^{\frac{3}{2}} = 8$<br>m) $4x^3 + 10x^2 - 6x = 0$ |  |

continued on next page

|   |   |   |  |
|---|---|---|--|
| <p>Work with functions, understanding notation and terminology related to functions</p>   | <p>Let <math>f(x) = -(x + 4)^2 + 3</math></p> <ol style="list-style-type: none"> <li>Evaluate <math>f(-2)</math></li> <li>Solve <math>f(x) = 6</math></li> <li>State the vertex of this quadratic function.</li> <li>State the x- intercept(s) and y- intercept for this function.</li> <li>State the domain and range of this function.</li> </ol> | <p>Let <math>f(x) = \frac{x^2-1}{x+5}</math></p> <ol style="list-style-type: none"> <li>Evaluate <math>f(-2)</math></li> <li>Solve <math>f(x) = 1</math></li> <li>State the domain of this function.</li> </ol> | <p>Let <math>f(x) = \sqrt{x + 3}</math></p> <ol style="list-style-type: none"> <li>Evaluate <math>f(13)</math></li> <li>Solve <math>f(x) = 5</math></li> <li>State the domain and range of this function.</li> </ol> |
| <p>Graphs of functions. Be able to graph linear and quadratic efficiently and/or interpret their graphs. Be able to find x- and y- intercepts of given functions algebraically.</p> | <p>Give an equation of the line whose graph is given below.</p>    | <p>Graph <math>3x - 4y = -12</math> by finding the x- and y-intercepts.</p>   | <p>Give an equation of the horizontal line through <math>(3, -5)</math></p>  |
|   | <p>For each of the following, state the slope of the line. If the slope is undefined, state "undefined".</p> <ol style="list-style-type: none"> <li>Line whose equation is <math>y = -\frac{3}{5}x + 1</math></li> <li>A horizontal line.</li> <li>A vertical line.</li> <li>Line whose equation is <math>x - 7y = 0</math></li> </ol>              | <p>Give an equation of the line through <math>(-1, 2)</math> and <math>(3, -8)</math></p>   | <p>Give an equation of the vertical line through <math>(-7, 1)</math></p>  |
|   | <p>State the vertex of the graph below.</p>    | <p>Consider the quadratic function <math>f(x) = x^2 - 2x - 8</math>. Find the x-intercept(s), if any, the y-intercept, and the vertex of this function.</p>   |  |
| <p>Solve linear systems by substitution and elimination.</p>  | <p>Solve the following system using the substitution method.</p> $\begin{aligned} x - 2y &= -3 \\ 3x + 4y &= 11 \end{aligned}$  | <p>Solve the following system using the elimination method.</p> $\begin{aligned} 2x + 3y &= -5 \\ 3x - 4y &= 1 \end{aligned}$   |  |

## Math& 142

Students placing into Math& 142 should already have mastery of the following skills:

### Outcome/Skill Example(s)

**All outcomes and skills from the placement guide for Math& 141, in *addition* to the following.**

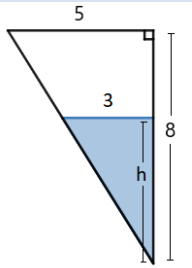
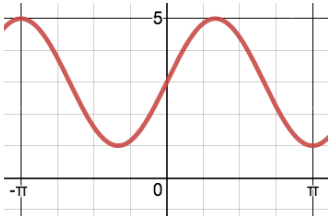
|   |  |   |  |
|---|--|---|--|
| <i>Analyze the graphs of polynomial, rational, exponential, logarithmic, and piecewise functions</i>          | Sketch the graph of the function $y = x^2(x - 3)(x + 1)^3$ , clearly indicating end behavior, intercepts, and asymptotes   | Find the vertical and horizontal asymptotes, if any, for $y = \frac{x+2}{x^2+3x-4}$                                     | Find the domain and range of $f(x) = \log_2(x + 4) - 1$                |
| <i>Analyze relationships between real and complex zeros, linear factors, and x-intercepts of a polynomial</i> | Find the quotient and remainder for $\frac{3x^2+x-5}{x+2}$   | Find a polynomial with real coefficients, which is degree 5, has zeros $x = 4$ (multiplicity 2), $x = 1$ , and $x = 3i$ | Find all complex zeros of the polynomial $P(x) = 2x^3 + 5x^2 - 6x - 9$ |
| <i>Solve exponential and logarithmic equations</i>  | Solve $\log_3(x - 8) + \log_3 x = 2$ .   | Solve $10^{6-3x} = 18$  |  |
| <i>Perform function composition.</i>  | Find the function $f \circ g$ and its domain, given the functions $f(x) = \frac{1}{\sqrt{x}}$ and $g(x) = x^2 - 4x$        | Restrict the domain of $y = (x + 2)^2$ so that it is one-to-one, and then graph its inverse.                            |  |
| <i>Analyze the relationships between graphs of conic sections and their standard equations.</i>               | Is the graph of the equation a parabola, a circle, and ellipse, a hyperbola, or none:<br>$9x^2 + 8y^2 - 15x + 8y + 27 = 0$ | Draw the sketch of an ellipse with the equation $(x - 1)^2 + 4(y + 7)^2 = 16$   | Write an equation for a circle with center $(-5, 2)$ and radius 9.     |

## Math& 151

Students placing into Math& 151 should already have mastery of the following skills:

### Outcome/Skill Example(s)

All outcomes and skills from the placement guides for Math& 141 and Math& 142, in *addition* to the following.

|  |   |   |  |
|--|---|---|--|
| <p>Analyze relationships between right triangles, circles, and trigonometric functions, using radian and degree measures</p>                                     | <p>Describe the angle <math>210^\circ</math> in radians. In what quadrant does this angle lie?</p>                        | <p>Sketch the unit circle and place <math>210^\circ</math> in your sketch.</p> <p>Evaluate <math>\sin(210^\circ)</math>, giving your answer as an exact value.</p>  | <p>Evaluate <math>\cos\left(\frac{5\pi}{3}\right)</math>. Give your answer as an exact value.</p>  |
| <p>Solve geometric problems using triangle relationships, including right triangle identities, the Law of Sines, and the Law of Cosines</p>                      | <p>If <math>\tan\theta = \frac{2}{3}</math> and <math>\theta</math> is in quadrant III, find <math>\cos\theta</math>.</p> | <p>One angle of a non-right triangle measures <math>30^\circ</math>. The side opposite this angle has length 3 cm. One of the other sides has length 1 cm. Sketch this triangle, with all side lengths and angle sizes labeled.</p> | <p>Find the value of <math>h</math> in the diagram below:</p>    |
| <p>Relate trigonometric functions to their graphs, including vertical and horizontal shifts and stretches</p>  | <p>Graph the function <math>y = 4 - 2\sin\left(3x - \frac{\pi}{2}\right)</math> without the use of technology.</p>        | <p>Write an equation for the function in the graph below.</p>   | <p>Find the exact value of <math>\tan\left(\arccos\left(\frac{9}{15}\right)\right)</math></p> <p>Find the exact value of <math>\operatorname{arcsec}\left(\csc\left(\frac{\pi}{6}\right)\right)</math></p> |
| <p>Transform trigonometric expressions using identities, including quotient, reciprocal, sum, difference, double angle, even/odd, and Pythagorean identities</p> | <p>Simplify the expression <math>\frac{1}{1 - \sin\theta} + \frac{1}{1 + \sin\theta}</math>.</p>                          |   | <p>Simplify the expression <math>(\csc x - \cot x)(1 + \cos x)</math>.</p>   |
| <p>Solve trigonometric equations</p>   | <p>Find all solutions to the trigonometric equation <math>\sin 2\theta - \cos\theta = 0</math></p>                        | <p>Find the values of <math>x</math> between 0 and <math>\pi</math> for which the graphs of <math>y = \cos\left(\frac{x}{2}\right)</math> and <math>y = \sin x</math> intersect.</p>  |  |

**\*\*International students do not commonly enroll in MATH 107. It can be appropriate in very limited and specific situations. Please communicate with your advisor prior to enrolling in this course.**

## Math& 107

Students placing into Math& 107 should already have mastery of the following skills:

| <b>Outcome/Skill</b>   | <b>Example(s)</b>   |  |
|--|---|--|
| <i>Convert between fraction, decimal, and percent forms of numbers</i> | Express 16% as a decimal.   | Express $\frac{1}{5}$ as a percent.                                      |
| <i>Round decimal number to specified place</i>                         | Express $\frac{2}{7}$ as a decimal, rounded to three decimal places.  |  |
| <i>Convert between scientific and standard notation for numbers</i>    | Express $3.45 \times 10^3$ as a whole number (that is, express it in standard notation)   | Express 0.000982 in scientific notation                                  |
| <i>Use order of operations to solve algebraic equations</i>            | Solve $3(x+5)+1=-7(x-4)$ for $x$ .  |  |
| <i>Evaluate algebraic formulas for given values</i>                    | Suppose that a cliff diver's height (in feet) after $t$ seconds is given by the model $H = -16t^2 + 16t + 12$ . Find their height after 0.75 seconds. |  |
| <i>Use roots to solve equations with exponents</i>                     | Solve for $x$ , rounding to four decimal places: $x^3 = 29$ .   |  |
| <i>Find the slope of a line from two points</i>                        | Find the slope of the line which passes through $(-7, 7)$ and $(3, -6)$ .   |  |
| <i>Graph a line from points or an equation</i>                         | Sketch the graph of the line $y = 3x - 4$   | Sketch the graph of the line which passes through $(1, -3)$ and $(5, 8)$ |
| <i>Evaluate exponential function for given values</i>                  | If $y = 3^x$ , find the value for $y$ when $x = -1$   |  |
| <i>Graph a basic exponential function</i>                              | Sketch the graph of the equation $y = 2^x$  |  |