Practice Packet for MyMathTest Test 3: Algebra STEM

Placement scores on MyMathTest Test 3: Algebra STEM are used to place students into Precalculus I (Math& 141, Score 35% to 69%), Precalculus II (Math& 142, Score 70% to 100%) and Business Calculus (Math& 148, Score 25% to 100%)

This practice packet contains:

- 43 problems that cover topics included in Math 98, Math 111, and Math 141 and MyMathTest Test 3: Algebra STEM.
- Answers to all problems (p. 14)
- Instructions for using online Study Plan to brush up (p. 16)

Instructions:

- Take this as a test, without any help or any notes. This should NOT be taken more than once. Instead, use your incorrect answers to target specific areas in the online Study Plan. It should take about an hour. You can use a calculator for these problems.
- Check your solutions after completing all problems (p. 14)
- If you scored 80% or higher, you should be prepared for MyMathTest Test 3: Algebra STEM.
- If you did not score well, you can:
  Use the online Study Plan (p. 16)
  Attend a live brush-up workshop

Go to https://placeandtest.highline.edu/ or call 206-592-3251 for more information about taking the placement test or to find the schedule for brush-up workshops.
Sample Content for MyMathTest Test 3: Algebra STEM

1. Factor completely.

\[ 120w^3 - 138w^2 + 36w = 6w(\quad)(\quad) \]
\[ 120w^3 - 138w^2 + 36w = 6w \]

2. Factor.

\[ 72e^2 - 98 \]

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

☐A. \[ 72e^2 - 98 = \square \]
   (Type your answer in factored form. Simplify your answer.)

☐B. The binomial is not factorable.

3. Factor.

\[ w^3 - 64 \]

Select the correct choice below and, if necessary, fill in the answer box within your choice.

☐A. The answer is \[ \square \]. (Factor completely.)

☐B. The binomial is not factorable.

4. Find the number that should be added to the expression to make it a perfect square trinomial.

\[ x^2 - \frac{1}{2}x \]

The perfect square trinomial is \[ x^2 - \frac{1}{2}x + \square \].

(Simplify your answer. Type an integer or a fraction.)

5. Find the indicated value of the given function.

\[ f(x) = 0.8x^2 + 0.6x - 8.3; f(-2) \]

\[ f(-2) = \square \]

(Type an integer or a decimal.)
6. Find the domain and the range of the relation. Use the vertical line test to determine whether the graph is the graph of a function.

- **A.** domain: $(-\infty, \infty)$
  - range: $[-1, \infty)$
  - not a function

- **B.** domain: $(-\infty, \infty)$
  - range: $[-1, \infty)$
  - function

- **C.** domain: $[-1, \infty)$
  - range: $(-\infty, \infty)$
  - not a function

- **D.** domain: $[-1, \infty)$
  - range: $(-\infty, \infty)$
  - function

7. Use the graph of the given function to find any relative maxima and relative minima.

$f(x) = x^3 - 3x^2 + 1$

- **A.** maximum: $(0,1)$; minimum: $(2, -3)$
- **B.** no maximum or minimum
- **C.** maximum: $(0,1)$; minimum: none
- **D.** maximum: none; minimum: $(2, -3)$
8. Use the graph to determine

(a) intervals on which the function is increasing, if any.

(b) intervals on which the function is decreasing, if any.

(c) intervals on which the function is constant, if any.

(a) Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

☐A. The function is increasing on the interval(s).

(Type your answer in interval notation. Use a comma to separate answers as needed.)

☐B. The function is never increasing.

(b) Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

☐A. The function is decreasing on the interval(s).

(Type your answer in interval notation. Use a comma to separate answers as needed.)

☐B. The function is never decreasing.

(c) Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

☐A. The function is constant on the interval(s).

(Type your answer in interval notation. Use a comma to separate answers as needed.)

☐B. The function is never constant.

9. Evaluate the piecewise function at the given values of the independent variable.

\[ f(x) = \begin{cases} 
3x + 5 & \text{if } x < 0 \\
2x + 7 & \text{if } x \geq 0 
\end{cases} \]

(a) \( f(-1) \) \hspace{1cm} (b) \( f(0) \) \hspace{1cm} (c) \( f(2) \)

(a) \( f(-1) = \) __

(b) \( f(0) = \) __

(c) \( f(2) = \) ___
10. For the functions \( f \) and \( g \) find a. \((f + g)(x)\), b. \((f - g)(x)\), c. \((f \cdot g)(x)\), and d. \( \left( \frac{f}{g} \right)(x) \).
   \( f(x) = x - 6, \ g(x) = 4x + 8 \)
   
a. \((f + g)(x) = \)  

b. \((f - g)(x) = \)  

c. \((f \cdot g)(x) = \)  

d. \( \left( \frac{f}{g} \right)(x) = \)

11. If \( f(x) = -x^2 + 4x + 9 \) and \( g(x) = -2x \), find the following composition.
   
   \((f \circ g)(-1)\)  
   
   \((f \circ g)(-1) = \)

12. Write the expression in lowest terms.
   
   \( \frac{8z - 40}{7z - 35} \)
   
   \( \frac{8z - 40}{7z - 35} = \) (Type an integer or a simplified fraction.)

13. Add.
   
   \( \frac{8}{v + 8} + \frac{7}{3v} \)
   
   \( \frac{8}{v + 8} + \frac{7}{3v} = \) (Simplify your answer.)

   
   \( \frac{2}{x + 2} + \frac{9}{7x} + \frac{4}{x^2 + 2x} \)
   
   The sum is \( \) . (Simplify your answer.)
15. Simplify the complex fraction.
\[ \frac{1}{p - 9} \cdot \frac{2}{p^2 - 81} \]
Choose the simplified expression.

- A. \( \frac{p^2 - 81}{2(p - 9)} \)
- B. \( \frac{p + 9}{2} \)
- C. \( \frac{2}{p + 9} \)
- D. \( \frac{p - 9}{2} \)

16. Use the properties of exponents to simplify the expression. Write with positive exponents.
\[ x^{-\frac{5}{3}} \cdot x^{\frac{8}{3}} \]
\[ x^{-\frac{5}{3}} \cdot x^{\frac{8}{3}} = \]

17. Use the properties of exponents to simplify the expression. Write with positive exponents.
\[ \frac{(x^4)^{\frac{1}{3}}}{x^{\frac{10}{3}}} \]
\[ \frac{(x^4)^{\frac{1}{3}}}{x^{\frac{10}{3}}} = \]
(Simplify your answer. Type exponential notation with positive exponents.)

18. Simplify by factoring. Assume that all expressions under radicals represent nonnegative numbers.
\[ \sqrt{1125x^4} \]
What is the simplified form of the expression?

19. Add or subtract. Simplify by collecting like radical terms if possible.
\[ -5\sqrt{3} + 7\sqrt{27} \]
\[ -5\sqrt{3} + 7\sqrt{27} = \]
(Type an exact answer, using radicals as needed.)
20. Rationalize the denominator. Assume that all variables represent positive real numbers.

\[ \frac{9}{\sqrt{20x}} \]

\[ \frac{9}{\sqrt{20x}} = \square \] (Type an exact answer, using radicals as needed.)

21. Simplify and write in terms of \( i \), if possible.

\[ \sqrt{-63} \]

The answer is \( \square \).
(Simplify your answer. Type an exact answer, using radicals as needed. Express complex numbers in terms of \( i \).)

22. Subtract.

\( (8 + 7i) - (-2 - i) \)

\( (8 + 7i) - (-2 - i) = \square \)
(Simplify your answer. Type your answer in the form \( a + bi \).)

23. Multiply.

\( -4i \cdot 2i \)

\( -4i \cdot 2i = \square \)
(Simplify your answer. Type your answer in the form \( a + bi \).)

24. Divide.

\[ \frac{\sqrt{-35}}{\sqrt{5}} \]

\[ \frac{\sqrt{-35}}{\sqrt{5}} = \square \]
(Simplify your answer. Type an exact answer, using radicals and \( i \) as needed. Use integers or fractions for any numbers in the expression.)

25. Solve.

\[ s^2 = -30 - 11s \]

The solution is \( s = \square \).
(Type an integer or a simplified fraction. Use a comma to separate answers.)
26. Solve.

\[ \frac{3}{y - 1} - \frac{1}{4} = \frac{5}{y + 1} \]

Select the correct choice below and, if necessary, fill in the answer box within your choice.

☐A. The solution is \( y = \) .
(Simplify your answer. Use a comma to separate answers as needed.)

☐B. There is no solution.

27. Solve the equation.

\[ \sqrt{x + 3} = x + 1 \]

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

☐A. The solution is \( x = \) . (Simplify your answer. Type an integer or a fraction.)

☐B. There is no solution.

28. Solve for \( x \).

\[ \frac{7}{x} + \frac{3}{x + 1} = -5 \]

\[ x = \] 
(Use a comma to separate answers as needed. Type exact answers, using radicals as needed.)

29. Solve the quadratic inequality.

\( (x + 3)(x + 1) > 0 \)

The solution set is .
(Type your answer in interval notation.)

30. Solve the inequality.

\[ \frac{x^2 + 6}{5x} \geq 1 \]

The solution set is .
(Type your answer in interval notation.)
Sample Content for MyMathTest Test 3: Algebra STEM

31. Give the coordinates of the vertex. Sketch the graph of the equation.

\[ y = x^2 + 4x + 5 \]

Use the graphing tool on the right to graph the parabola.

What is the vertex of the parabola?

☐

(Type your answer as an ordered pair.)

32. Graph the square root function, \( f(x) = \sqrt{x} \). Then use transformations of this graph to determine the graph of the given function.

\[ h(x) = -\sqrt{x} + 2 \]

Choose the correct graph of \( h(x) \).
Sample Content for MyMathTest Test 3: Algebra STEM

33. Find the domain of the function.

\[ f(x) = \sqrt{x - 10} \]

What is the domain of \( f \)?

A. \( \{x | x \text{ is a real number}\} \)

B. \( \{x | x \text{ is a real number and } x \neq 10\} \)

C. \( \{x | x \text{ is a real number and } x \geq 10\} \)

D. \( \{x | x \text{ is a real number and } x \geq 0\} \)

34. The equation for \( f \) is given by the simplified expression that results after performing the indicated operation. Write the equation for \( f \) and then graph the function.

\[ \frac{3x^6}{x^2 - 9} \cdot \frac{x^2 + 6x + 9}{15x^7} \]

\[ f(x) = \underline{\phantom{}} \]

Choose the correct graph below.

A. [Graph A]

B. [Graph B]

C. [Graph C]

D. [Graph D]
35. Graph the inverse of the function on the same set of axes.

Choose the graph that contains the function in blue and the inverse in purple.

36. Graph the exponential function.

\[ f(x) = 2^{x+1} \]

37. Graph the function.

\[ y = \log_5 x \]
Use transformations of the graph of $f(x) = 5^x$ to identify the graph of the function given below. Use the graph to determine its domain, range, and asymptote.

$g(x) = 5^{x+3}$

Identify the graph of $g(x) = 5^{x+3}$.

What is the domain of $g(x) = 5^{x+3}$?

☐ (Type your answer in interval notation.)

What is the range of $g(x) = 5^{x+3}$?

☐ (Type your answer in interval notation.)

What line is the horizontal asymptote of $g(x) = 5^{x+3}$?

$y = ☐$
39. The figure on the right shows the graph of \( f(x) = \log_4 x \). Use transformations of this graph to graph the given function. Find the graph's vertical asymptote, domain, and range.

\[ g(x) = \log_4(x + 4) \]

a.) What is the graph of the two functions?

- [ ] A.
- [ ] B.
- [ ] C.
- [ ] D.

b.) What is the vertical asymptote of the shifted function, \( g(x) \)?

\[ x = \square \]

c.) What is the domain of \( g(x) \)?

The domain is \( \square \).
(Type your answer in interval notation.)

d.) What is the range of \( g(x) \)?

The range is \( \square \).
(Type your answer in interval notation.)

40. Write the expression as a sum or difference of multiples of logarithms. Assume that variables represent positive numbers.

\[ \log_3 \left( \frac{x^5}{y} \right) \]

\[ \log_5 \left( \frac{x^5}{y} \right) = \square \]
(Type all variables without any exponents.)
41. Solve the equation for $x$. Give an exact answer and a four-decimal-place approximation.

$$\ln x = 1.3$$

The exact answer is $x = \boxed{}$.

*(Simplify your answer.)*

A four-decimal place approximation is $x = \boxed{}$.

*(Round to four decimal places as needed.)*

42. Solve the equation. Give an exact solution, and also an approximate solution to four decimal places.

$$e^{9x} = 9$$

**a.** The exact solution is $x = \boxed{}$.

**b.** The approximate solution is $x \approx \boxed{}$.

*(Do not round until the final answer. Then round to four decimal places as needed.)*

43. Solve the equation.

$$\log_3(x + 4) - \log_3x = 2$$

Select the correct choice below and fill in any answer boxes present in your choice.

*A.  $x = \boxed{}$  
*(Simplify your answer, including any radicals. Use integers or fractions for any numbers in the expression. Use a comma to separate answers as needed.)*

*B.  There is no solution.*
### Sample Content Answers

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>$(5w - 2)(4w - 3)$</td>
</tr>
<tr>
<td>2.</td>
<td>$A, 2(6c + 7)(6c - 7)$</td>
</tr>
<tr>
<td>3.</td>
<td>$A, (w - 4)(w^2 + 4w + 16)$</td>
</tr>
<tr>
<td>4.</td>
<td>$\frac{1}{16}$</td>
</tr>
<tr>
<td>5.</td>
<td>$-6.3$</td>
</tr>
<tr>
<td>6.</td>
<td>$B$</td>
</tr>
<tr>
<td>7.</td>
<td>$A$</td>
</tr>
</tbody>
</table>
| 8. | $A, (-\infty, 0), (1, 2)$  
     | $A, (0, 1), (2, \infty)$  
     | $B$ |
| 9. | $2$  
    | $7$  
    | $11$ |
| 10. | $5x + 2$  
      | $-3x - 14$  
      | $4x^2 - 16x - 48$  
      | $x - 6$  
      | $4x + 8$ |
| 11. | $13$ |
| 12. | $\frac{8}{7}$ |
| 13. | $\frac{31v + 56}{3v(v + 8)}$ |
| 14. | $\frac{23}{7x}$ |
| 15. | $B$ |
| 16. | $x$ |
| 17. | $\frac{1}{x^2}$ |
| 18. | $15x^2\sqrt{5}$ |
| 19. | $16\sqrt{3}$ |
| 20. | $\frac{9\sqrt{5x}}{10x}$ |
| 21. | $3i\sqrt{7}$ |
| 22. | $10 + 8i$ |
| 23. | $8$ |
| 24. | $i\sqrt{7}$ |
| 25. | $-5, -6$ |
| 26. | $A, 3, -11$ |
| 27. | $A, 1$ |
Sample Content Answers

28. \[ \frac{-15 + \sqrt{85}}{10}, \frac{-15 - \sqrt{85}}{10} \]

29. \((-\infty, -3) \cup (-1, \infty)\)

30. \((0, 2] \cup [3, \infty)\)

31. \((-2, 1)\)

32. 

33. C

34. \[ \frac{x + 3}{5x(x - 3)} \]

35. B

36. D

37. B

38. \[ \Lambda \]
\[ (-\infty, \infty) \]
\[ (0, \infty) \]
\[ 0 \]

39. \[ \Lambda \]
\[ -4 \]
\[ (-4, \infty) \]
\[ (-\infty, -\infty) \]

40. \[ 5 \log_3 x - \log_3 y \]

41. \[ e^{1.3} \]
\[ 3.6693 \]

42. \[ \frac{\ln 9}{9} \]
\[ 0.2441 \]

43. \[ \Lambda, \frac{1}{2} \]
How to Use the Online Study Plan

You can access a free online Study Plan to brush up the math skills you have found that need attention by going to https://mymathtest.highline.edu/. You will need an activated MyHighline account (https://helpdesk.highline.edu/myHCC.php) in order to access practice questions. It can take up to an hour to get the MyMathTest account activated, so please be patient!

The chart on the next page shows which problems to practice in the Study Plan.

Once you are in MyMathTest, choose “Practice in the STUDY PLAN” on the left sidebar to access the Study Plan Sections. Then choose the chapter you want. The screen shot shows how to access Chapter 1.2 (Chapter 1, Section 2).

Click on the Chapter you want, select the objective listed in the chart on the next page. You can access practice problems, watch videos, and take short quizzes on the concepts. The screen shot below shows the objectives for Chapter 1.2.
### Practice Packet Problems, MyMathTest Test 3: Algebra STEM

<table>
<thead>
<tr>
<th>Practice Packet Problems, MyMathTest Test 3: Algebra STEM</th>
<th>Related Study Plan Sections</th>
<th>Section Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Factoring</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>13.4</td>
<td>Factor trinomials using FOIL</td>
</tr>
<tr>
<td>2</td>
<td>13.5</td>
<td>Factor a difference of squares</td>
</tr>
<tr>
<td>3</td>
<td>13.5</td>
<td>Factor sums and differences of cubes</td>
</tr>
<tr>
<td>4</td>
<td>17.2</td>
<td>Completing the square</td>
</tr>
<tr>
<td><strong>Functions</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>11.6</td>
<td>Use function notation</td>
</tr>
<tr>
<td>6</td>
<td>11.6</td>
<td>Find domain and range of a function</td>
</tr>
<tr>
<td>7</td>
<td>11.10</td>
<td>Use graph to locate relative maxima or minima</td>
</tr>
<tr>
<td>8</td>
<td>11.10</td>
<td>Identify intervals on which function increases, decreases, or is constant</td>
</tr>
<tr>
<td>9</td>
<td>11.10</td>
<td>Understand and use piecewise functions</td>
</tr>
<tr>
<td>10</td>
<td>18.1</td>
<td>Add, subtract, multiply, and divide functions</td>
</tr>
<tr>
<td>11</td>
<td>18.1</td>
<td>Construct composite functions</td>
</tr>
<tr>
<td><strong>Rational expressions and exponents</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>14.1</td>
<td>Write rational expressions in lowest terms</td>
</tr>
<tr>
<td>13</td>
<td>14.4</td>
<td>Add or subtract rational expressions having different denominators</td>
</tr>
<tr>
<td>14</td>
<td>14.4</td>
<td>Add or subtract rational expressions having different denominators</td>
</tr>
<tr>
<td>15</td>
<td>14.5</td>
<td>Simplify complex fractions.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>16</td>
<td>16.7</td>
<td>Use rules for exponents to simplify expressions that contain rational exponents.</td>
</tr>
<tr>
<td>17</td>
<td>16.7</td>
<td>Use rules for exponents to simplify expressions that contain rational exponents.</td>
</tr>
</tbody>
</table>

**Radicals and Complex Numbers**

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>18</td>
<td>16.2</td>
<td>Simplify radicals involving variables</td>
</tr>
<tr>
<td>19</td>
<td>16.3</td>
<td>Simplify radical sums and differences</td>
</tr>
<tr>
<td>20</td>
<td>16.8</td>
<td>Rationalize denominators</td>
</tr>
<tr>
<td>21</td>
<td>16.10</td>
<td>Write square roots of negative numbers in the form bi.</td>
</tr>
<tr>
<td>22</td>
<td>16.10</td>
<td>Add or subtract complex numbers.</td>
</tr>
<tr>
<td>23</td>
<td>16.10</td>
<td>Multiply complex numbers.</td>
</tr>
<tr>
<td>24</td>
<td>16.10</td>
<td>Divide complex numbers.</td>
</tr>
</tbody>
</table>

**Solving Equations and Inequalities**

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>13.6</td>
<td>Solve quadratic equations by factoring</td>
</tr>
<tr>
<td>26</td>
<td>14.6</td>
<td>Solve equations with rational expressions</td>
</tr>
<tr>
<td>27</td>
<td>16.6</td>
<td>Solve radical equations by squaring a binomial</td>
</tr>
<tr>
<td>28</td>
<td>17.6</td>
<td>Solve various equations that are quadratic in form</td>
</tr>
<tr>
<td>29</td>
<td>17.7</td>
<td>Solve polynomial inequalities of degree 2 or greater</td>
</tr>
<tr>
<td>30</td>
<td>17.7</td>
<td>Solve inequalities that contain rational expression with variables in the denominator</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>31</td>
<td>17.4</td>
<td>Graph quadratic equations</td>
</tr>
<tr>
<td>33</td>
<td><a href="https://www.khanacademy.org/math/algebra2/algebra-functions/domain_and_range/v/domain-of-a-radical-function">https://www.khanacademy.org/math/algebra2/algebra-functions/domain_and_range/v/domain-of-a-radical-function</a></td>
<td>Find domain of a radical function</td>
</tr>
<tr>
<td>34</td>
<td><a href="https://www.khanacademy.org/math/algebra2/rational-expressions/rational-function-graphing">https://www.khanacademy.org/math/algebra2/rational-expressions/rational-function-graphing</a></td>
<td>Graph rational functions</td>
</tr>
<tr>
<td>35</td>
<td>18.2</td>
<td>Graph functions and their inverse</td>
</tr>
<tr>
<td>36</td>
<td>18.3</td>
<td>Graph exponential functions</td>
</tr>
<tr>
<td>37</td>
<td>18.4</td>
<td>Identify and graph logarithmic functions</td>
</tr>
</tbody>
</table>

**Solving exponential and logarithmic equations (This topic is included in Math 141)**

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>40</td>
<td>18.5</td>
<td>Use properties of logarithms together</td>
</tr>
<tr>
<td>41</td>
<td>18.6</td>
<td>Evaluate natural logarithms of powers of e</td>
</tr>
<tr>
<td>42</td>
<td>18.7</td>
<td>Solve exponential equations</td>
</tr>
<tr>
<td>43</td>
<td>18.7</td>
<td>Solve logarithmic equations</td>
</tr>
</tbody>
</table>