• This exam is an overview of the entire MAT 140 Course. It contains material from all previous gateway exams.

• NO CALCULATORS ARE ALLOWED ON THIS EXAM.

• A 70% or higher AVERAGE on all gateway exams is required to pass College Algebra with a C or better. You may retake the exam at most once per day.

• The highest grade on the exam is what will be recorded.

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Arithmetic and Introductory Algebra

1. Express \( 11x + \frac{x}{4} \) as a single fraction.

2. Subtract \( \frac{4}{11} - \frac{2}{3} \).

3. Evaluate \( \frac{5z - 2}{3x + 4y} \) when \( x = 9, y = 2, z = 4 \).
Lines

4. Graph \( y = \frac{2}{3}x + 8 \).

5. Write the equation of the line in slope-intercept form \((y = mx + b)\) with slope \(-3\) which passes through the point \((4, -5)\).

\( (5) \)

6. Find the slope of the line \(-9x - 10y = 4\).

\( (6) \)

Functions and Graphs
7. Find the vertex of the parabola given by the quadratic function \( f(x) = x^2 + 2x - 4 \). Write your answer as a point.

(7)________________

8. How many solutions does the equation \( f(x) = -3 \) have in the graph below?

(8)________________

9. Find the \( y \)-coordinate for the point \((7, y)\) on the graph of \( f(x) = |10 - x| \).

(9)________________
10. Find $f(-3)$ when $f(x) = \sqrt{7 + x}$.

11. For the function $f(x)$ shown in the graph below, determine any x- and y-intercept(s). Write your answers as points.

$x$-intercept ________________  $y$-intercept ________________
12. For the function $f(x)$ shown in the graph below, determine $f(4)$.

![Graph showing a parabola]

13. Solve the equation $\ln(7x + 6) = 3$.

14. Solve the equation $e^{x+2} = \frac{1}{e^3}$.

15. Solve the equation $3^{4x+1} = 12$. 
16. Solve the following equation $-9t^2 - 31t + 20 = 0$. 

17. Solve the following equation $x^2 - 17x = -70$. 

18. Solve the following equation $\frac{3x}{2} + 28 = 5x$. 

19. Solve the equation $\frac{2^{2x-4}}{2^3} = 128$. 

20. Solve the following equation $20j - 21 = 21j - 25$. 
Arithmetic and Introductory Algebra

1. \( \frac{45}{4} x = \frac{45x}{4} \)

2. \( \frac{-10}{33} \)

3. \( \frac{18}{35} \)

10. 2

11. No x-intercepts and y-intercept: \((0, -1)\)

12. 0

Solving Equations

13. \( x = \frac{e^3 - 6}{7} \)

14. \( x = -5 \)

15. \( x = \frac{\log_3 (12) - 1}{4} \) or \( x = \frac{\ln 12 - 1}{4} \)

16. \( t = -4 \) and \( t = \frac{5}{9} \)

17. \( x = 7 \) and \( x = 10 \)

18. 8

19. \( x = 7 \)

20. 4

5. \( y = -3x + 7 \)

6. \( \frac{9}{10} \)

Functions and Graphs

7. \((-1, -5)\)

8. 0

9. 3
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**Arithmetic and Introductory Algebra**

1. Add $\frac{2}{3} + \frac{4}{11}$.

   (1) _____________

2. Which of the following expressions is equal to $\frac{11}{x} - \frac{x}{11}$?

   (A) $\frac{x - 11}{11x}$

   (B) 0

   (C) $\frac{-x^2 + 121}{11x}$

   (D) $\frac{-x^2}{121}$

   (E) −1
3. Evaluate $\frac{3z - 4}{5x + 2y}$ when $x = 5$, $y = 7$, $z = 8$.

(3)____________________

Lines

4. Find the slope of the line $6x - 8y = 2$.

(4)____________________

5. Graph $y = \frac{1}{2}x$.

![Graph of the line $y = \frac{1}{2}x$]
6. Write the equation of the line in slope-intercept form \( y = mx + b \) with slope 4 which passes through the point \((13, 7)\).

(6)__________________

Functions and Graphs

7. Find the vertex of the parabola given by the quadratic function \( f(x) = -x^2 + 4x - 3 \). Write your answer as a point.

(7)__________________

8. Find \( f(83) \) when \( f(x) = \sqrt{-2 + x} \).

(8)__________________
9. For the function $f(x)$ shown in the graph below, determine $f(-3)$.

10. Find the $x$- and $y$-intercept(s) for the quadratic function $f(x) = 10x^2 - 3x - 4$. Write your answers as points.

$x$-intercept __________________________ $y$-intercept __________________________
11. How many solutions does the equation $f(x) = 8$ have in the graph below?

12. Find the $y$-coordinate for the point $(9, y)$ on the graph of $f(x) = 7x + 1$.

Solving Equations

13. Solve the equation $\log_2(x + 3) = 3$.

14. Solve the following equation $3x^2 - x - 5 = 0$. 
15. Solve the equation $2^5 \cdot 2^{2x-4} = 32$.

16. Solve the equation $5^{3x+3} = 28$.

17. Solve the following equation $t - 22 = 15$.

18. Solve the following equation $4w^2 = 16$.

19. Solve the equation $e^{x+3} = \frac{1}{e^2}$.

20. Solve the following equation $\frac{5}{8} + \frac{h + 7}{4} = \frac{2h + 7}{8}$.
Arithmetic and Introductory Algebra

1. \( \frac{34}{33} \)
2. C
3. \( \frac{20}{39} \)
4. \( \frac{3}{4} \)

Solving Equations

11. 2
12. 64
13. \( x = 5 \)
14. \( x = \frac{1 \pm \sqrt{61}}{6} \)
15. \( x = 2 \)
16. \( x = \frac{\log_5(28) - 3}{5} \) or \( x = \frac{\ln 28}{\ln 5} - 3 \)
17. 37
18. \( w = 2 \) and \( w = -2 \)
19. \( x = -5 \)
20. -4

6. \( y = 4x - 45 \)

Functions and Graphs

7. (2,1)
8. 9
9. -5

10. x-intercepts: \( \left( \frac{4}{5}, 0 \right), \left( -\frac{1}{2}, 0 \right) \) and y-intercept: \( (0, -4) \)
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Arithmetic and Introductory Algebra

1. Multiply $\frac{5}{6} \cdot \frac{3}{5}$.

   (1) __________________

2. Evaluate $\frac{2x + y}{y - 3}$ when $x = -6, y = 4$.

   (2) __________________
3. Which of the following expressions is equal to \( \frac{x^5 - x^5(x + 6)}{x^5} \)?

(A) \( dx^5 - x^6 \)

(B) \(-x - 5\)

(C) \(-x + 7\)

(D) \(6 - x^6\)

(E) \(7 - x^5\)

Lines

4. Find the slope of the line \(10x - 8y = -13\).

5. Write the equation of the line in slope-intercept form \((y = mx + b)\) with slope \(-11\) which passes through the point \((8, -6)\).
6. Graph \( y = -\frac{1}{2}x \).

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**Functions and Graphs**

7. For the function \( f(x) \) shown in the graph below, determine \( f(-1) \).
8. Find $f(-4)$ when $f(x) = x^2 + 2x - 3$.

(8)__________________

9. Find the $x$- and $y$-intercept(s) for the quadratic function $f(x) = 11x^2 - 3x - 10$. Write your answers as points.

$x$-intercept __________________________  $y$-intercept __________________________

10. Find all possible $x$-coordinate(s) for the point $(x, 2)$ on the graph of $g(x) = \log_2 (x + 2)$.

(10)__________________
11. How many solutions does the equation \( f(x) = 6 \) have in the graph below?

![Graph of a function](image)

12. Find the vertex of the parabola given by the quadratic function \( f(x) = -x^2 - 10x - 24 \).
Write your answer as a point.

13. Solve the following equation \( 11y - 1 + 3y + 10 = 4y - 15 \).
14. Solve the following equation $x^2 - 15x = -54$. 

15. Solve the following equation $\frac{4}{3} - \frac{h + 8}{3} = \frac{2h - 2}{9}$. 

16. Solve the equation $2^{3x+2} = 8$. 

17. Solve the equation $4^{2x+1} = 18$. 

18. Solve the equation $\log_3(x + 2) = 4$. 

19. Solve the following equation $9x^2 - 6x + 1 = 0$. 
20. Solve the equation $e^{5x+3} = e^2$. (20)
Arithmetic and Introductory Algebra

1. \( \frac{1}{2} \)
2. \(-8\)
3. B

Solving Equations

11. 1
12. (-5,1)
13. \(-\frac{12}{5}\)
14. \(x = 9\) and \(x = 6\)
15. -2
16. \(x = \frac{1}{3}\)
17. \(x = \frac{\log_4 (18) - 1}{2}\) or \(x = \frac{\ln 18}{\ln 4} - 1\)
18. \(x = 79\)
19. There are no real solutions.
20. \(x = -\frac{1}{5}\)

Functions and Graphs

7. 2
8. 5

9. x-intercepts: \(\left(\frac{3 + \sqrt{449}}{22}, 0\right), \left(\frac{3 - \sqrt{449}}{22}, 0\right)\) and y-intercept: \((0, -10)\)

10. \(x = 2\)