

NEW YORK CITY COLLEGE OF TECHNOLOGY
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DEPARTMENT OF MATHEMATICS
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MAT063 and MAT065 FINAL EXAM REVIEW – FORM 1R

I. Signed Number Evaluation:

Evaluate:

1. $-3(9) - 4(7)(-1)$ 2. $2(-5) - \frac{18}{-3} + 1$ 3. $-(-2)^4$ 4. $3(10) - 4^2$
5. $2^3 + 4(-5 + 1)$ 6. $\frac{4^2 - 9}{-7} - 6(3)$ 7. $2 + 3(1 - 6) + 12 \div 4 \times 3$

II. Numerical Evaluation:

Evaluate each expression when $x = 2$, $y = -3$, and $z = -1$:

8. $3x - y$ 9. $\frac{7 - y^2}{z}$ 10. $2x^2 - 3xy + y^2$ 11. $y^3 + 2xy - 5x^2$

III. Formula Substitution:

Evaluate the following expressions:

12. If $C = \frac{5}{9}(F - 32)$, find C when $F = 23^\circ$ 13. If $m = 24$ and $v = \frac{1}{2}$, find k for $k = \frac{1}{2}mv^2$
14. If $d = 10$ and $t = -2$, then find V for $V = \frac{d}{t}$

IV. Function Notation

Given the functions: $f(x) = -2x^3 - 3x^2 - 4x + 1$ and $g(x) = 5 - 3x$. Find the following values:

15. $f(0)$ 16. $f(-1)$ 17. $f(1)$ 18. $g(2)$ 19. $g(-3)$

V. Multiplication of Terms and Powers:

Multiply:

20. $-5xy^2(3x^3)$ 21. $(7df^2)(-2d^2ef)(e^2f)$ 22. $(-5x^3y)^2$ 23. $-2x(-3x)^2(-y)$

VI. Division of Terms:

Reduce:

24. $\frac{-15a^3b^2}{-5a^3b}$ 25. $\frac{-32q^3rs}{16qs}$ 26. $\frac{-12mn^3}{12mn^3}$ 27. $\frac{-24r^2s^3t^2}{-30r^4s^3}$ 28. $\frac{40x^5y^7z^2}{-12y^{11}z}$

VII. The Distributive Law:**Multiply:**

29. $7x(3x - 4)$

30. $2y^3(y^2 - 5y + 4)$

31. $-5r^2s(3r^2 - 4s - 9)$

Divide:

32. $\frac{8y^5 - 4y^3}{2y^2}$

33. $\frac{12m^3 - 15m^2 + 3m}{-3m}$

34. $\frac{21r^2s - 14r^2s^3t - 28r^3s^2}{-7r^2s}$

VIII. Combined Operations:**Rewrite and simplify:**

35. Subtract $6x + 4$ from $4x$

36. Subtract $2a^2 - 4a$ from $3a + a^2$

37. Subtract $6x^2 - 3x + 1$ from $-2x^2 + 5x - 1$

Multiply and Combine:

38. $8r(rs^2) + 3rs(rs) - r^2s^2$

39. $7q - (4q - q)$

40. $(a^2b + 4b) + (2ab^2 - 3b)$

41. $(7x^2 + 2x - 3) - (x^2 + 2x - 1)$

42. $5x - 3(2x - 7) + 9$

43. $2x^2(x - 6) - x(3x + 5) - 11$

IX. Multiplication of Polynomials:**Multiply:**

44. $(2x - 7)(-x - 3)$

45. $(y - 7)^2$

46. $(2y + 5)(3y + 4)$

47. $(2m - 7)(2m + 7)$

48. $(x + 2)(x^2 - 2x + 3)$

49. $(2x + 3)(x^2 - x - 2)$

50. $(x - 4)(3x^2 + x - 2)$

X. Factoring: (Greatest Common Factor, Trinomial, Difference of Squares, and Combined)**Factor Completely:**

51. $4z^2 - 8z$

52. $2bx - 6by + 4bz$

53. $-12ax^3y - 18ax^2y^2 + 24ax^2$

54. $y^2 + 5y - 6$

55. $x^2 - 11x + 24$

56. $4a^2 - 36$

57. $49x^2 - 144$

58. $12x^3 - 3x$

59. $5c^2 - 25c + 30$

60. $3x^2y - 6xy - 105y$

61. $2x^2 - x - 3$

62. $4x^2 + 5x - 6$

63. $6x^2 - 11x + 5$

64. $4x^2 + 8x - 5$

XI. Reducing Fractions:

Factor and Reduce:

65. $\frac{x^2 - 3x}{x^2 - 2x - 3}$

66. $\frac{a^2 - 8a + 16}{a^2 - 3a - 4}$

67. $\frac{b^2 - 81}{b^2 - 11b + 18}$

XII. Multiplication of Fractions:

Multiply:

68. $\frac{8t}{-21r^2s - 14t^2} \cdot \frac{8t}{3rs}$

70. $\left(\frac{-8x}{3t^3}\right)\left(\frac{15y}{20t}\right)\left(\frac{9y}{5x^2}\right)$

71. $\frac{4x^2y}{9w^2z} \cdot \frac{2xy}{-3wz^2} \cdot \frac{8xy^3}{5wz}$

69. $(6ab^3)\left(\frac{-21a^2b}{14b^2}\right)$

XIII. Division of Fractions:

Divide:

72. $\frac{14ab}{15x^2y} \div \frac{-21a^2b^2}{35xy}$

73. $\frac{9x^2y}{4ab} \div 12ay^2$

74. $\frac{2a}{3a} \div \frac{bx}{cx}$

75. $-\frac{2x}{3y^2} \div 6x^2y$

XIV. Addition and Subtraction of Fractions:

Combine:

76. $\frac{8}{y-3} - \frac{8}{y-2}$

77. $\frac{4y}{2x} + \frac{3y}{x}$

78. $\frac{3}{2x} - \frac{2x}{5}$

79. $\frac{3x^2}{4} + \frac{1}{6x}$

XV. Radicals:

Simplify:

80. $-\sqrt{144x^2}$

81. $-6a\sqrt{9a^4b^2}$

82. $2w\sqrt{48w^9}$

83. $-2b\sqrt{49x^{12}b^4}$

Multiply:

84. $(\sqrt{6x^2})(\sqrt{3x^3})$

85. $(5\sqrt{8y^3})(2\sqrt{2y^4})$

86. $(5a\sqrt{2b^7})(7b^2\sqrt{6a^5})$

Add or subtract the following:

87. $3\sqrt{7} - 5\sqrt{7}$

88. $\sqrt{3} + \sqrt{12}$

89. $\sqrt{20} - 3\sqrt{5}$

90. $2\sqrt{8} + 3\sqrt{18}$

Multiply or Divide and simplify completely:

91. $-5(2\sqrt{7})$

92. $(\sqrt{3})(2\sqrt{6})$

93. $(3\sqrt{6})(-2\sqrt{2})$

94. $\sqrt{8}(-3 + \sqrt{3})$

95. $\frac{\sqrt{14}}{\sqrt{2}}$

96. $\frac{5\sqrt{10}}{\sqrt{5}}$

97. $\frac{3\sqrt{8}}{\sqrt{2}}$

98. $\frac{5\sqrt{2}\sqrt{6}}{\sqrt{3}}$

99. $\frac{3\sqrt{5}\sqrt{10}}{\sqrt{2}}$

XVI. One Variable First Degree or Linear Equations:

Solve and Check:

100. $6a - a = 4a + 2$

101. $8 + 3t - t = 6 + t$

102. $5h - (h + 2) = 7 + (h + 3)$

103. $6z - 5 - 7z = 10 - 2z + 3$

104. $0 = 7 - 2k + 3 - 3k$

105. $2y - 3(4y - 8) = 2(5 + y) - 10$

XVII. Fractional Equations:

Solve:

106. $\frac{8d}{5} = -16$

107. $3 - \frac{1}{x} = \frac{7}{5x} - \frac{9}{5}$

108. $\frac{5y}{6} - \frac{5}{8} = \frac{3y}{4} - \frac{1}{3}$

109. $\frac{2-y}{5y} = \frac{4}{15y} - \frac{1}{3}$

110. $\frac{3x}{5} = \frac{x+1}{2}$

XVIII. Decimal Equations:

Solve:

111. $1.4x + .5 = -2.3$

112. $3 - .2w = 4.2$

113. $.04x - 0.11 = .25$

114. $.6y + 0.13 = 1.93$

115. $x + 0.15 = 1.4x - 0.25$

116. $0.3x - 1.2 = 0.1x + 0.4$

XIX. Linear Inequalities

Solve the following inequalities and sketch the solution on a number line:

117. $5x - 3 < 12$

118. $8 - 3x \geq 11$

119. $6x + 7 > 4x - 3$

120. $5 - 2(x - 3) \leq 7$

XX. Literal Equations and Formula Rearrangement:

Solve each equation for the indicated variable:

121. Solve for y : $3x - 2y = 5$

122. Solve for p_2 : $p_1v_1 = p_2v_2$

123. Solve for g : $V = K + gt$

124. Solve for m : $F = \frac{mv^2}{r}$

XXI. Quadratic Equations:

Solve and Check:

125. $m^2 - 3m - 4 = 0$

126. $x^2 - 10x = -24$

127. $4p^2 - 10p = 0$

128. $5y^2 = -15y$

129. $9z^2 - 25 = 0$

130. $49 = 81x^2$

XXII. Checking a solution:

Check if the number in parenthesis is a solution to the given equations:

131. ($x = 3$) $2 + 3(x+1) = 10 + 4x - 2$

132. ($x = -1$) $2x^2 - 3x + 1 = x^3 + 4x + 11$

133. ($x = 6$) $18 - \frac{2}{3}x - 5 = 7 - (3 - x) - 1$

134. ($x = -2$) $-7 + x^2 - 3x = 9 + x - 10$

XXIII. Systems of Two Variable Linear Equations:

Solve Graphically:

135. $y = 2x$
 $x + y = -3$

136. $y - 2x = -7$
 $x - y = 4$

137. $5x - 2y + 8 = 0$
 $3x + y = -7$

Solve Algebraically:

138. $x + 2y = -4$
 $2x - y = -3$

139. $2x + 5y = -4$
 $4x + 7y = -2$

140. $4x + 3y = 2$
 $3x + 5y = -4$

XXIV. Translating Expressions:

Translate into an algebraic expression using a variable:

141. 5 less than twice an unknown number.

142. the price of x pants at \$45 and y shirts at \$23

143. 3 times a number increased by 7

144. 4 times the difference of a number and 11

XXV. Word Problems: Show all work and answers:

145. If twice an unknown number is added to thirteen, the sum is twenty-five. Write an equation that expresses the relationship in this sentence and find the unknown number.

146. When three times an unknown number is subtracted from 20, the result is the unknown number. Write an equation that expresses the relationship in this sentence and find the unknown number.

147. If five times a number is subtracted from 23, the result is equal to twice the number increased by nine. Write an equation that expresses the relationship in this sentence and find the unknown number.

148. A \$1200 TV is on sale for 15% off. What is the sale price?

149. Perl buys a new car, with a down payment of 15% of the price of the car. The down payment is \$3150. What is the original price of the car?

150. John can travel 300 miles in five hours. How long will it take him to travel 540 miles?

151. A plane has a cruising range of 900 miles on its main fuel tank, which holds 50 gallons of fuel. At this rate, how many gallons of fuel would be used in a flight of 252 miles?

152. The average pass rate in a class of 35 students is 10 students. How many students will pass in a class of 98 students?

153. Jack can fly at 140 mph in his small plane. If a trip to Ohio takes him $3\frac{1}{2}$ hours, how many miles was the trip?

XXVI. Slope and Lines

Write each line in slope-intercept form, state the slope, the y-intercept and then sketch the graph.

154. $2x + y = 4$

155. $-4x - 3y = 12$

156. $-x - 2y = -5$

157. $3x - 2y = 10$

XXVII. Scientific Notation

Perform each operation:

158. $\frac{(1.2 \times 10^8)(4 \times 10^{-1})}{(2 \times 10^{-9})}$

159. $\frac{(6.3 \times 10^{-5})}{(6 \times 10^{-4})(2.1 \times 10^{-4})}$

160. $\frac{(3.2 \times 10^{-4})(4 \times 10^{-11})}{(1.6 \times 10^3)}$

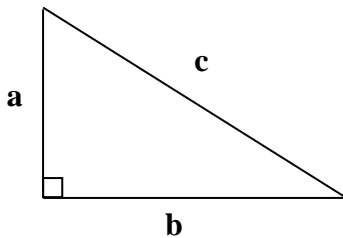
161. $\frac{(2 \times 10^{-3})(4 \times 10^{-5})}{(8 \times 10^{-6})(2 \times 10^{-7})}$

162. $\frac{(5.4 \times 10^{-7})(3 \times 10^{-2})}{(1.8 \times 10^{-3})(1.5 \times 10^{-4})}$

163. $\frac{(8 \times 10^9)(5 \times 10^{-6})}{(1.25 \times 10^5)(2 \times 10^2)}$

XXVIII. Pythagorean Theorem:

Solve for the indicated sides by using the Pythagorean Theorem:



164. In the right triangle, if $a = 6$ and $b = 8$, find c .

165. In the right triangle, if $c = 13$ and $b = 12$, find a .

166. In the right triangle, if $a = 6$ and $b = 6$, find c .

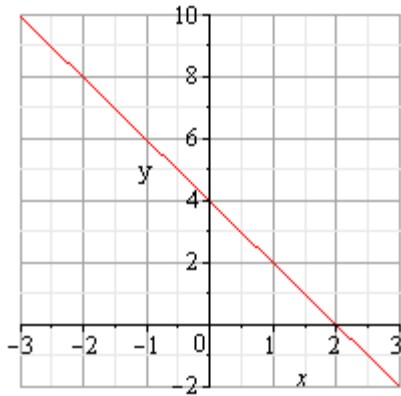
167. In the right triangle, if $c = 8$ and $a = 4$, find b .

ANSWERS TO MA063 AND MA065 FINAL EXAM REVIEW - FORM 1R

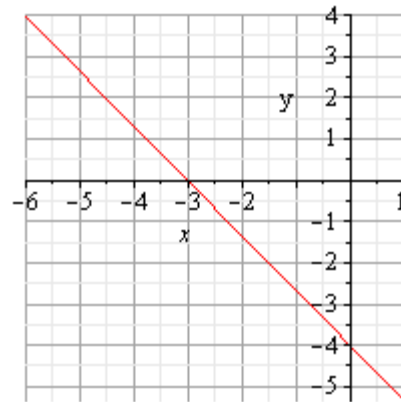
1. 1 2. -3 3. -16 4. 14 5. -8
6. -19 7. -4 8. 9 9. 2 10. 35
11. -59 12. $C = -5$ 13. $K = 3$ 14. $V = -5$ 15. 1
16. 4 17. -8 18. -1 19. 14 20. $-15x^4y^2$
21. $-14d^3e^3f^4$ 22. $25x^6y^2$ 23. $18x^3y$ 24. $3b$ 25. $-2q^2r$
26. -1 27. $\frac{4t^2}{5r^2}$ 28. $-\frac{10x^5z}{3y^4}$ 29. $21x^2 - 28x$ 30. $2y^5 - 10y^4 + 8y^3$
31. $-15r^4s + 20r^2s^2 + 45r^2s$ 32. $4y^3 - 2y$ 33. $-4m^2 + 5m - 1$ 34. $-3 + 2s^2t + 4rs$
35. $-2x - 4$ 36. $-a^2 + 7a$ 37. $-8x^2 + 8x - 2$ 38. $10r^2s^2$ 39. $4q$
40. $a^2b + b + 2ab^2$ 41. $6x^2 - 2$ 42. $-x + 30$ 43. $2x^3 - 15x^2 - 5x - 11$
44. $-2x^2 + x + 21$ 45. $y^2 - 14y + 49$ 46. $6y^2 + 23y + 20$ 47. $4m^2 - 49$
48. $x^3 - x + 6$ 49. $2x^3 + x^2 - 7x - 6$ 50. $3x^3 - 11x^2 - 6x + 8$ 51. $4z(z - 2)$
52. $2b(x - 3y + 2z)$ 53. $-6ax^2(2xy + 3y^2 - 4)$ OR $6ax^2(-2xy - 3y^2 + 4)$ 54. $(y + 6)(y - 1)$
55. $(x - 8)(x - 3)$ 56. $4(a + 3)(a - 3)$ 57. $(7x + 12)(7x - 12)$ 58. $3x(2x + 1)(2x - 1)$
59. $5(c - 3)(c - 2)$ 60. $3y(x - 7)(x + 5)$ 61. $(2x - 3)(x + 1)$ 62. $(4x - 3)(x + 2)$
63. $(6x - 5)(x - 1)$ 64. $(2x + 5)(2x - 1)$ 65. $\frac{x}{x + 1}$ 66. $\frac{a - 4}{a + 1}$
67. $\frac{b + 9}{b - 2}$ 68. $\frac{49rt}{4}$ 69. $-9a^3b^2$ 70. $-\frac{2t^2}{5x}$ 71. $-\frac{x^2}{15w^2y}$
72. $-\frac{14}{9bx}$ 73. $\frac{3x^2}{16a^2by}$ 74. $\frac{2c}{3b}$ 75. $-\frac{1}{9xy^3}$ 76. $-\frac{1}{8}$
77. $\frac{5x}{6y}$ 78. $\frac{9y - 5x}{6xy}$ 79. $\frac{8 + x}{6x^2}$ 80. $-12x$ 81. $-18a^9b$

82. $8w^5\sqrt{3w}$
83. $-14b^3x^6$
84. $3x^2\sqrt{2x}$
85. $40y^3\sqrt{y}$
86. $70a^3b^5\sqrt{3ab}$
87. $-2\sqrt{7}$
88. $3\sqrt{3}$
89. $-\sqrt{5}$
90. $13\sqrt{2}$
91. $-10\sqrt{7}$
92. $6\sqrt{2}$
93. $-12\sqrt{3}$
94. $-6\sqrt{2} + 2\sqrt{6}$
95. $\sqrt{7}$
96. $5\sqrt{2}$
97. 6
98. 10
99. 15
100. $a = 2$
101. $t = -2$
102. $h = 4$
103. $z = 18$
104. $k = 2$
105. $y = 2$
106. $d = -10$
107. $x = \frac{1}{1}$ or $\frac{2}{2}$
108. $y = \frac{2}{7}$ or $3\frac{1}{2}$
109. $y = -1$
110. $x = 5$
111. $x = -2$
112. $w = -6$
113. $x = 9$
114. $y = 3$
115. $x = 1$
116. $x = 8$
117. $x < 3$
118. $x \leq -1$
119. $x > -5$
120. $x \geq 2$
121. $y = \frac{3x-5}{2}$
122. $p_2 = \frac{p_1v_1}{v_2}$
123. $g = \frac{v-k}{t}$
124. $m = \frac{Fr}{v^2}$
125. $m = 4, m = -1$
126. $x = 6, x = 4$
127. $p = 0, p = \frac{5}{2}$
128. $y = 0, y = -3$
129. $z = \frac{5}{5}, z = -\frac{3}{5}$
130. $x = \frac{9}{7}, x = -\frac{9}{7}$
131. No, since $14 \neq 20$
132. Yes, since $6 = 6$
133. Yes, since $9 = 9$
134. No, since $3 \neq -3$
135. $x = -1, y = -2$
136. $x = 3, y = -1$
137. $x = -2, y = -1$
138. $x = -2, y = -1$
139. $x = 3, y = -2$
140. $x = 2, y = -2$
141. $2x - 5$
142. $45x + 23y$
143. $3x + 7$
144. $4(x - 11)$
145. $13 + 2x = 25, x = 6$
146. $20 - 3x = x, x = 5$
147. $23 - 5x = 2x + 9, x = 2$
148. \$1020
149. \$21,000
150. 9 hours
151. 14 gallons
152. 28 students
153. 490 miles

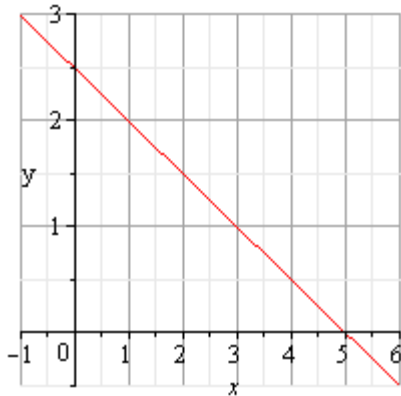
154. $y = -2x + 4$ slope: -2 y-intercept: $(0, 4)$



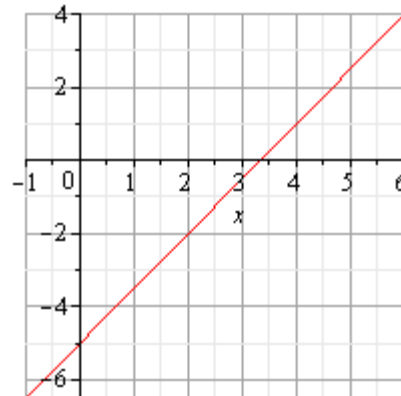
155. $y = -\frac{4}{3}x - 4$ slope: $-\frac{4}{3}$ y-intercept: $(0, -4)$



156. $y = -\frac{1}{2}x + \frac{5}{2}$ slope: $-\frac{1}{2}$ y-intercept: $(0, \frac{5}{2})$



157. $y = \frac{3}{2}x - 5$ slope: $\frac{3}{2}$ y-intercept: $(0, -5)$



158. 2.4×10^{16}

159. 5×10^2

160. 8×10^{-18}

161. 5×10^4

162. 6×10^{-2}

163. 1.6×10^{-3}

164. 10

165. 5

166. $6\sqrt{2}$

167. $4\sqrt{3}$