

# MATH D UNIT 3 REVIEW

## INSTRUCTIONS:

Show all of your work on separate paper for credit; do not write answers on this review sheet. Number each problem in order on your paper and box your answers. Follow directions for each problem.

### I. For each function given, find the domain. (See section 6.1)

$$1) f(x) = \frac{x^2 + x + 1}{2x^2 - 5x + 2} \quad 2) g(x) = \frac{x^2 - 16}{x^2 + 9x + 20}$$

### II. Using the functions given above, also find $f(-1)$ , $f(2)$ , $g(0)$ , and $g(4)$ .

### III. Simplify the expressions below. (See section 6.1)

$$3) \frac{10x + 15}{6x^2 + 9x} \quad 4) \frac{3x - 1}{6x^2 + x - 1} \quad 5) \frac{x^2 - 9x - 36}{3x + 9} \cdot \frac{-6x + 6}{x^2 - 11x + 10}$$

$$6) \frac{3x - 9}{x^2 - 4x - 12} \div \frac{9x - 27}{x^2 - 3x - 18}$$

### IV. Perform the operations and simplify your answer. (See sections 6.1, 6.2)

$$7) \frac{-5x^2 - 3}{x^3 - 8} + \frac{7x^2 - 4x + 3}{x^3 - 8} \quad 8) \frac{3x^3 - 5}{x^2 - 2x - 3} + \frac{6 - 2x^3}{x^2 - 2x - 3} \quad 9) \frac{3x^3 + 5}{2x^2 + 5x - 3} + \frac{5x^3 - 6}{2x^2 + 5x - 3}$$

$$10) \frac{2}{x + 2} - \frac{3x}{x^2 - 4} \quad 11) \frac{x}{x^2 - 16} - \frac{8}{x^2 + 5x + 4} \quad 12) \frac{4x}{x^2 + 2x - 3} + \frac{2 - x}{x^2 + x - 6}$$

### V. Simplify the complex rational expression. (See section 6.3)

$$13) \frac{\frac{x}{y^2} + \frac{1}{y}}{\frac{y}{x^2} + \frac{1}{x}} \quad 14) \frac{\frac{4}{4a} - \frac{2}{b}}{\frac{b}{b} - \frac{a}{a}} \quad 15) \frac{\frac{3}{x^2y} - \frac{5}{xy^3}}{\frac{2}{xy^2} + \frac{3x}{x^2y^2}}$$

### VI. Divide. (See section 6.4)

$$16) \frac{15x^3 - 30x^2 + 10x - 2}{5x^2} \quad 17) (8x^2y - 6xy + 3) \div 2xy$$

$$18) (10x^3 - 26x^2 + 17x - 13) \div (5x - 3) \quad 19) \frac{6y^3 + 7y^2 + 12y - 5}{3y - 1}$$

$$20) \frac{2x^3 - 3x + 4}{x + 2}$$

NAME:

ILP#

**VII. Solve the equations for the given variable. (See sections 6.6, 6.7)**

21)  $\frac{3}{x} + \frac{x}{x+2} = \frac{4}{x^2+2x}$

22)  $\frac{x^2}{x-3} = \frac{9}{x-3}$

23)  $\frac{x+2}{x} + \frac{4}{x+3} = -\frac{12}{x^2+3x}$

24)  $I = \frac{E}{R+r}$  for  $r$

25)  $P = \frac{R-C}{n}$  for  $C$

26)  $S = \frac{a}{1-r}$  for  $r$

**VIII. Solve the following problems. (See section 6.7)**

- 27) Working together, Jay and Ethan can split a cord of firewood in **5** hours. Working alone, Jay can complete the job in **7** hours. How long would it take Ethan to split the firewood working alone?
- 28) It takes Sarah **3** hours to clean her bedroom. If her friend Diana helps her, they can both get the job done in **2** hours. How long would it take Diana to do the job by herself?

**IX. Evaluate the expressions below without using a calculator. (See sections 7.1, 7.2)**

29)  $\sqrt{(-3)^2}$

30)  $\sqrt{(-7)^2}$

31)  $\sqrt[3]{(-44)^3}$

32)  $-\sqrt{\frac{1}{49}}$

33)  $\sqrt{-\frac{25}{4}}$

34)  $\sqrt[3]{-\frac{27}{8}}$

35)  $(-8)^{5/3}$

36)  $(9)^{3/2}$

37)  $(-27)^{4/3}$

38)  $\frac{8^{7/6}}{8^{5/6}}$

39)  $\frac{9^{5/7}}{9^{3/14}}$

40)  $\frac{16^{7/10}}{16^{1/5}}$

**X. Solve the following problems. (See section 7.2)**

- 41) The Galapagos Islands, lying 600 miles west of Ecuador, are famed for their extraordinary wildlife. The function  $f(x) = 29x^{\frac{1}{3}}$  models the number of plant species,  $f(x)$ , on the various islands of the Galapagos chain in terms of the area,  $x$ , in square miles, of a particular island. Use the function to find how many species of plants are on a Galapagos Island that has an area of 37 square miles? Round to the nearest whole number.
- 42) The function  $f(x) = 70x^{\frac{3}{4}}$  models the number of calories per day,  $f(x)$ , a person needs to maintain life in terms of the person's weight,  $x$ , in kilograms. (1 kilogram is approx. 2.2 pounds.) Use this model and a calculator to calculate how many calories per day does a person who weighs 70 kilograms (approx. 154 pounds) need to maintain life? Round to the nearest calorie.
- 43) The function  $f(x) = 350x^{\frac{2}{3}}$  models the expenditures,  $f(x)$ , in millions of dollars, for the U.S. National Park Service  $x$  years after 1985. According to this model, what will the expenditures be in 2012, in millions of dollars?

<b>XIII. Do the following problems. (See section 7.1)</b>
---

In the problems below, complete each table and graph the given function. Identify the function's domain and range. *Include a scale.*

44)  $h(x) = \sqrt{x+3}$

$x$	$h(x) = \sqrt{x+3}$
-3	
-2	
1	
6	

45)  $f(x) = \sqrt{4-x}$

$X$	$f(x) = \sqrt{4-x}$
-5	
0	
3	
4	

<b>XII. Simplify the expressions below. Assume all variables represent positive numbers. Assume all variables represent positive numbers. (See section 7.2)</b>
---

46)  $(27y^{9/5})^{1/3}$

47)  $(4y^{8/3})^{1/2}$

48)  $(2x^{1/4})^4$

49)  $(\sqrt[3]{x^2})(\sqrt[5]{x})$

50)  $(\sqrt[4]{x})(\sqrt[5]{x^2})$

51)  $\frac{\sqrt[3]{y^2}}{\sqrt[6]{y}}$

<b>XI. Simplify the expressions below. Assume all variables represent positive numbers. (See sections 7.3, 7.4)</b>
---

52)  $4\sqrt{3x} \cdot 2\sqrt{4x}$

53)  $8y^2\sqrt{2y} \cdot 3\sqrt{10y}$

54)  $2\sqrt{5x} \cdot 3\sqrt{15x}$

55)  $\sqrt{12x^3y^4}$

56)  $\sqrt[3]{8a^3b^4}$

57)  $\sqrt[4]{32x^{16}y^{10}z^5}$

58)  $5\sqrt{12} + 6\sqrt{20} - 2\sqrt{27} + \sqrt{75}$

59)  $3\sqrt{2x^2} - 7\sqrt{8x^2} + 2x\sqrt{75}$

60)  $\sqrt[4]{\frac{1}{16}}$

61)  $\sqrt[4]{\frac{9}{y^8}}$

62)  $-\sqrt[4]{\frac{81x}{z^{32}}}$

*Do no write answers or work out problems on this page, use separate paper.*

## MATH D UNIT 3 REVIEW ANSWERS

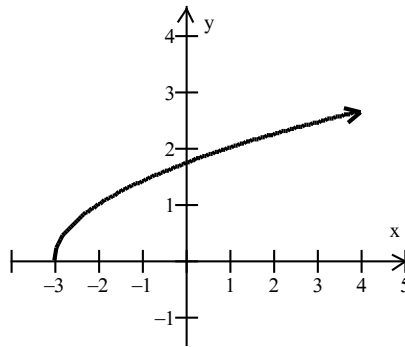
- 1) Domain =  $\left(-\infty, \frac{1}{2}\right) \cup \left(\frac{1}{2}, 2\right) \cup (2, \infty)$       2) Domain =  $(-\infty, -5) \cup (-5, -4) \cup (-4, \infty)$
- $f(-1) = \frac{1}{9}$ ,       $f(2)$  is undefined,       $g(0) = -\frac{4}{5}$ ,       $g(4) = 0$
- 3)  $\frac{5}{3x}$       4)  $\frac{1}{2x+1}$       5)  $\frac{-2(x-12)}{x-10}$
- 6)  $\frac{x+3}{3(x+2)}$       7)  $\frac{2x}{x^2+2x+4}$       8)  $\frac{x^2-x+1}{x-3}$
- 9)  $\frac{4x^2+2x+1}{x+3}$       10)  $\frac{-x-4}{(x-2)(x+2)}$       11)  $\frac{x^2-7x+32}{(x-4)(x+1)(x+4)}$
- 12)  $\frac{3x+1}{(x-1)(x+3)}$       13)  $\frac{x^2}{y^2}$       14)  $\frac{2}{2a+b}$
- 15)  $\frac{3y^2-5x}{5xy}$       16)  $3x-6+\frac{2}{x}-\frac{2}{5x^2}$       17)  $4x-3+\frac{3}{2xy}$
- 18)  $2x^2-4x+1-\frac{10}{5x-3}$       19)  $2y^2+3y+5$       20)  $2x^2-4x+5-\frac{6}{x+2}$
- 21)  $x = -1, x = -2$  (Extraneous)      22)  $x = -3, x = 3$  (Extraneous)      23)  $x = -6, x = -3$  (Extraneous)
- 24)  $r = \frac{E}{I} - R$  or  $r = \frac{E - RI}{I}$       25)  $C = R - Pn$
- 26)  $r = 1 - \frac{a}{S}$  or  $r = \frac{S - a}{S}$       27) 17.5 hours      28) 6 hours
- 29) 3      30) 7      31) -44      32)  $-\frac{1}{7}$
- 33) not a real number      34)  $-\frac{3}{2}$       35) -32      36) 27
- 37) 81      38) 2      39) 3      40) 4
- 41) 97 species of plants      42) 1694 calories per day      43) \$3,150 million

NAME:

ILP#

44)

x	h(x)
-3	0
-2	1
1	2
6	3

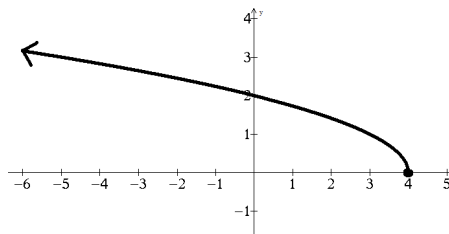


Domain:  $\{x \mid x \geq -3\}$  or  $[-3, \infty)$

Range:  $\{y \mid y \geq 0\}$  or  $[0, \infty)$

45)

x	f(x)
-5	3
0	2
3	1
4	0



Domain:  $\{x \mid x \leq 4\}$  or  $(-\infty, 4]$

Range:  $\{y \mid y \geq 0\}$  or  $[0, \infty)$

46)  $3y^{3/5}$

47)  $2y^{4/3}$

48)  $16x$

49)  $\sqrt[15]{x^{13}}$

50)  $\sqrt[20]{x^{13}}$

51)  $\sqrt{y}$

52)  $16x\sqrt{3}$

53)  $48y^3\sqrt{5}$

54)  $30x\sqrt{3}$

55)  $2xy^2\sqrt{3x}$

56)  $2ab\sqrt[3]{b}$

57)  $2x^4y^2z\sqrt[4]{2y^2z}$

58)  $9\sqrt{3} + 12\sqrt{5}$

59)  $-11x\sqrt{2} + 10x\sqrt{3}$

60)  $\frac{1}{2}$       61)  $\frac{\sqrt[4]{9}}{y^2}$

62)  $-\frac{3\sqrt[4]{x}}{z^8}$