



b. 7, 11, 15, 23, 35, 55, \_\_\_\_\_, \_\_\_\_\_

6. Write the contrapositive of the following statement: *If today is my birthday, then I will have cake.*

7. If p is true and q is false, determine the truth value of the following statement. Please show work demonstrating how you arrive at your answer.

$$(\sim p \leftrightarrow q) \wedge (p \vee q)$$

8. Determine the truth value of each statement. Please show work demonstrating how you arrive at your answer.

a.  $0 * 12 = 0$  and  $2 + 3 = 6$

b. If 13 is an even number, then  $12 - 2 = 0$ .

9. Determine if the following arguments are valid or not. Support your decisions using either an Euler diagram or symbolic logic (or the rule used).

a. Hypothesis: If I go to the gym then I can't go to the movies.  
Conclusion: If I go to the movies, then I didn't go to the gym.

b. Hypothesis: Some dogs have fur. No lizards are dogs.  
Conclusion: Therefore, no lizards have fur.

10. Determine the number that immediately follows each of the following numbers.

a.  $112_{three}$

b.  $2031_{four}$

c.  $10011_{two}$

11. Write each of the following in the indicated base.

a.  $2031_{four}$  to base 10.

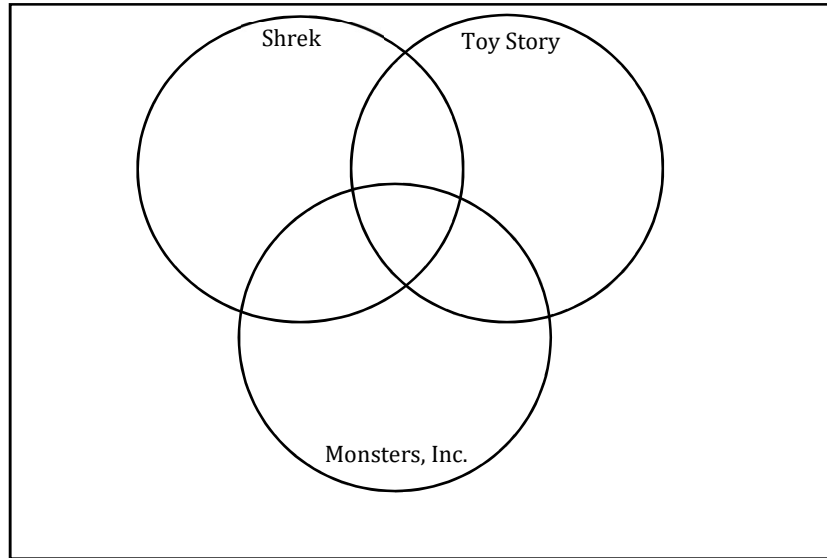
b. Convert 371 to base 6.

12. List all the subsets of the set  $\{4, 5\}$ .

13. Let  $A = \{a, b\}$  and  $B = \{1, 2, 3\}$ . Find  $A \times B$ .

14. A survey of 185 students produced the following results: 90 liked *Shrek*, 96 like *Toy Story*, 70 liked *Monster Inc.*, 33 liked *Shrek* and *Toy Story*, 30 liked *Shrek* and *Monsters Inc.*, 43 liked *Toy Story* and *Monsters Inc.*, and 15 liked all three.

a. Complete the following Venn diagram to illustrate this information.



Find the number of students who:

- b. Like none of the movies listed \_\_\_\_\_
- c. Like *Monsters, Inc.*, but not like *Shrek* or *Toy Story* \_\_\_\_\_
- d. Like exactly one of the movies listed \_\_\_\_\_
- e. Do not like *Toy Story* \_\_\_\_\_

15. Let  $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15\}$

$A = \{2, 4, 6, 8, 10, 12, 14\}$

$B = \{1, 4, 7, 12, 14\}$

$C = \{1, 2, 3, 4, 5, 6, 7, 8\}$ . Determine the following:

- a.  $A \cap B$  \_\_\_\_\_
- b.  $A - C$  \_\_\_\_\_
- c.  $\bar{A}$  \_\_\_\_\_
- d.  $(\bar{A} \cap C) \cup B$  \_\_\_\_\_
- e.  $n(B)$  \_\_\_\_\_



20. Determine each of the following:

a.  $3201_{four} - 312_{four} = \underline{\hspace{2cm}}$

b.  $2031_{four} \times 32_{four} = \underline{\hspace{2cm}}$

c.  $2013_{four} + 1302_{four} = \underline{\hspace{2cm}}$

21. Divide:  $101001_{two} \div 11_{two} = \underline{\hspace{2cm}}$

22. Determine whether the following relation is reflexive, symmetric, or transitive. Justify your answer for each case.

$\{(a, a), (a, b), (a, c), (b, b), (b, c), (c, a), (c, b), (c, c)\}$

a. Reflexive: Yes / No

Explanation:

b. Symmetric: Yes / No

Explanation

c. Transitive: Yes / No

Explanation

23. Determine if the following relation represents a function. Justify your answer.

$\{(l, 12), (m, 10), (k, 12), (l, 1), (d, 4)\}$

24. Is the set  $\{1, 2, 3, 5, 8, 13, 21, \dots\}$  closed under addition? Justify your response.

25. Given the following function, find a rule to describe the function, then determine the domain and range.

$\{(b, 2), (e, 5), (z, 26), (a, 1), (x, 24)\}$

- a. Rule: \_\_\_\_\_
- b. Domain = \_\_\_\_\_
- c. Range = \_\_\_\_\_

26. Xander is four years older than Ynez. Ten years ago, Xander was 3 times as old as Ynez was then. How old are Xander and Ynez now?

27. Given that  $f(x) = 5x - 12$  and  $g(x) = -8x$  determine the following:

a.  $(f \circ g)(-2)$

b.  $(g \circ g)(5)$

28. The variables  $a$ ,  $b$ ,  $c$ , and  $d$  each represent a different whole number. Given that  $a$  is not zero, use the properties of addition and multiplication of whole numbers and then relations below to determine the values of  $a$ ,  $b$ ,  $c$ , and  $d$ .

$d + d = b$  a=\_\_\_\_\_

$a \times d = a$  b=\_\_\_\_\_

$a \times c = c$  c=\_\_\_\_\_

$d + b = a$  d=\_\_\_\_\_

29. A student answers the question, "Estimate the product  $323 \times 850$  by rounding the factors to the nearest hundred" as  $323 \times 850 = 274,550 \rightarrow 274,600$ . How do you respond?

30. A student claims that  $(-2) + (-3) = 5$  because two negatives make a positive. Demonstrate how you could show this student that the sum is actually  $-5$  by using either the chips method, or a number line.

31. Indicate whether the following statements are true or false.

- a. \_\_\_\_\_  $a + (b + c) = (b + c) + a$  illustrates the associative property of addition
- b. \_\_\_\_\_  $-|x| + x = 0$  if  $x < 0$
- c. \_\_\_\_\_  $4|84,406$
- d. \_\_\_\_\_ If  $2(x - 3) = 10$ , then  $x = 8$
- e. \_\_\_\_\_  $0 \div 18 = 0$
- f. \_\_\_\_\_  $(f \circ g)(x)$  is always the same as  $(g \circ f)(x)$
- g. \_\_\_\_\_  $0 \div 0 = 0$
- h. \_\_\_\_\_ Every function is a relation
- i. \_\_\_\_\_ Whole numbers are closed under division
- j. \_\_\_\_\_ Zero is the multiplicative inverse

32. Rewrite each of the following terms with a single exponent:

a.  $5^6 \cdot 15^6$

b.  $3^4 \cdot 3^7$

c.  $(4^8)^3$

d.  $11^{22} \div 11^2$

33. Express the following using a single, positive exponent:

a.  $(6^{-2})^7$

b.

c.

d.  $\frac{2^{-9}}{2^{-15}}$



34. Determine each of the following:

a. The prime factorization of 504.

b. The prime factorization of 1890.

c.  $\text{GCD}(504, 1890)$

d.  $\text{LCM}(504, 1890)$

35. Calculate the following:

a. Find  $\text{GCD}(1584, 385)$  using the Euclidean Algorithm.

b. Find  $\text{LCM}(1584, 385)$

36. Find all digits which make the following true. Justify your answer with divisibility tests.

$3 \mid 257\_\_$  but  $9 \nmid 257\_\_$

37. Find two fractions between  $\frac{5}{11}$  and  $\frac{9}{17}$ . Simplify your answers. Justify your answer without using decimals.

38. Show how to use unit fractions such as  $\frac{1}{2}$ ,  $\frac{1}{3}$ ,  $\frac{1}{4}$ ,  $\frac{1}{5}$ , or 1 to estimate the following. Also, indicate the estimated answer written in simplest form.

$$\frac{7}{25} + \frac{9}{37} + \frac{100}{97} + \frac{40}{75}$$

39. Perform the following operations, simplifying all your answers. Show all steps. No credit will be given without work.

a.  $12 - 5\frac{4}{9} =$  \_\_\_\_\_

b.  $7\frac{3}{5} + 4\frac{2}{3} =$  \_\_\_\_\_

c.  $4\frac{2}{3} \times 5\frac{4}{7} =$  \_\_\_\_\_

d.  $16\frac{4}{15} \div 4 =$  \_\_\_\_\_

40. A box of candy holds 40 pieces when first opened. The box is now  $\frac{2}{5}$  full. How many pieces of candy have been eaten?

41. Convert 9.08 to a fraction in simplest form.

42. Perform the following operations. Show all steps. No credit will be given without work.

a.  $-45 \div (-8 + 3) =$ \_\_\_\_\_

b.  $(-5 + 9) \times (-7 - (-4)) =$ \_\_\_\_\_

c.  $(-9)(2)(11) \div (-6) =$ \_\_\_\_\_

d.  $(8 + (-8)) \div (-7) =$ \_\_\_\_\_

43. Simplify the following. Express your answer in scientific notation.

$$\frac{6 \times 10^9}{(4 \times 10^2)(3 \times 10^5)}$$

44. Simplify if possible. If not, indicate that radical is not a real number.

a.  $\sqrt[3]{432}$

b.  $\sqrt{-25}$

45. The ratio of girls to boys in Miss Melon's kindergarten class is 4 to 6. If there are 12 girls in the class, determine how many total students are in the kindergarten class.

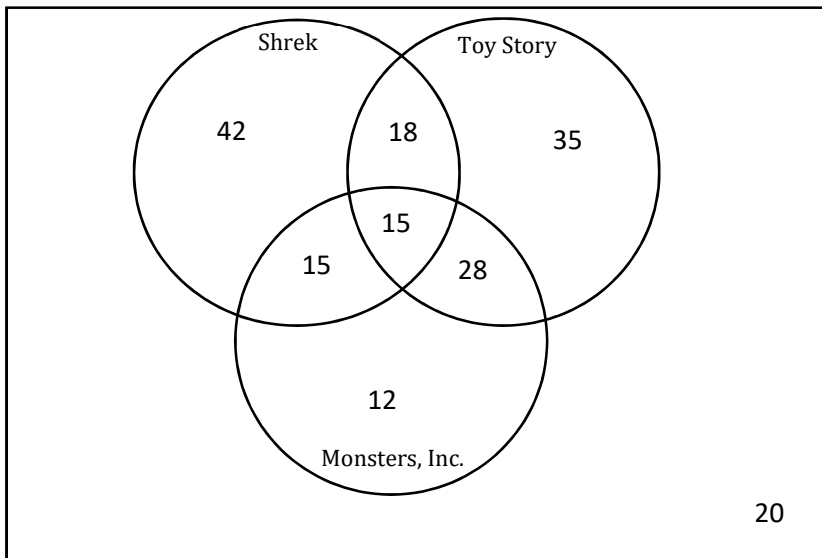
46. Indicate whether the following statements are true or false:

a. \_\_\_\_\_ 1 is a prime number.

- b. \_\_\_\_\_ Every rational number has an additive inverse.
- c. \_\_\_\_\_ The rational numbers are closed under division.
- d. \_\_\_\_\_ A number and its multiplicative inverse have opposite signs.
- e. \_\_\_\_\_ Given two integers, there is always an integer between them.
- f. \_\_\_\_\_  $\frac{2}{3} = 0.67$
- g. \_\_\_\_\_  $1 = 0.\bar{9}$
- h. \_\_\_\_\_  $(-2)^{\frac{1}{4}}$  is real number.
- i. \_\_\_\_\_  $\frac{0}{5}$  is a rational number.
- j. \_\_\_\_\_ The final is scheduled for Wednesday, May 10<sup>th</sup> at 11:30am in AB244.

MA171 Final Exam Review ANSWER KEY

1. 238 blocks
2.  $X = 18$
3. Josh 6, Jared 5
4.
  - a. Arithmetic. Explanations may differ.
  - b.  $a_n = -3 + 4(n - 1)$
  - c. 93
5.
  - a. 33, 45
  - b. 87, 139
6. If I did not have cake, then it is not my birthday.
7. T
8.
  - a. F
  - b. T
9.
  - a. Valid. Explanations may differ.
  - b. Invalid. Explanations may differ.
10.
  - a.  $120_{thr}$
  - b.  $2032_{four}$
  - c.  $10100_{two}$
11.
  - a. 141
  - b.  $1415_{six}$
12.  $\emptyset, \{4\}, \{5\}$
13.  $\{(a, 1), (a, 2), (a, 3), (b, 1), (b, 2), (b, 3)\}$
- 14.



- a. 20  
b. 12  
c. 89  
d. 89
- 15.
- a. {4, 12, 14}  
b. {10, 12, 13, 14}  
c. {1, 3, 5, 7, 9, 11, 15}  
d. {1, 3, 4, 5, 7, 12, 14}  
e. 5
- 16.
- a. F  
b. F  
c. F  
d. F  
e. T  
f. T  
g. T  
h. T  
i. F  
j. F
- 17.
- a.  $80 + 50 = 130, 2 + 9 = 11, 130 + 11 = 141$   
b.  $1200 + 50 + 12 = 1250 + 12 = 1262$   
c. Add 1; add 30; add 100; Final answer: 154  
d. 35,636  
e.  $312 \times 5$  (Processes may vary.)
18.  $3500 \div 50 = 70$  (Estimations may vary!)
- 19.
- a.  $132312_{four}$   
b.  $3321_{four}$   
c.  $1101_{two} \times 10_{two}$
20. Explanations may vary.
- a. Yes  
b. No (not all arrows are double-ended)  
c. No (no shortcut of  $b \rightarrow a$  for  $b \rightarrow c \rightarrow a$ )
21. No. Explanations may vary.
22. No. Explanations may vary.
- 23.
- a. Wording of rule may vary: The range is the domain's numeric place in the alphabet.  
b.  $\{b, e, z, a, x\}$   
c.  $\{2, 5, 26, 1, 24\}$
24. Zander 16, Ynez 12

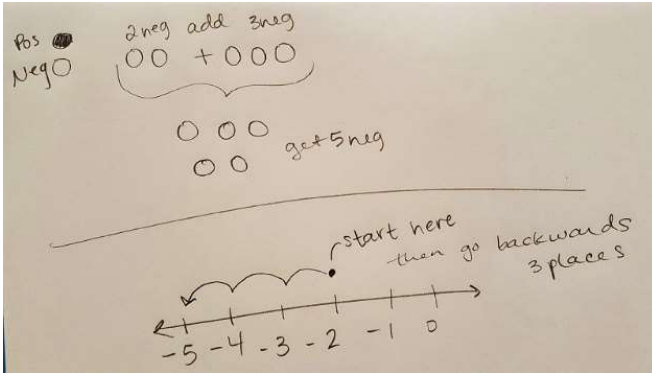
25.

- a. 68
- b. 320

26.  $a = 3, b = 2, c = 0, d = 1$

27. Explanations may vary.

28. Wording/explanations may vary.



29.

- a. F
- b. T
- c. F
- d. T
- e. T
- f. F
- g. F
- h. T
- i. F
- j. F

30.

- a.  $75^6$
- b.  $3^{11}$
- c.  $4^{24}$
- d.  $11^{20}$

31.

- a.  $2^3 \cdot 3^2 \cdot 7$
- b.  $2 \cdot 3^3 \cdot 5 \cdot 7$
- c. 126
- d. 7560

32.

- a. 11
- b. 55,440

33. 1 and 7

34.  $\frac{1}{6}, \frac{4}{9}, \frac{8}{15}, \frac{2}{3}$

35.  $\frac{6}{13}$  and  $\frac{1}{2}$

36.  $\approx 3$

37.

- a.  $6\frac{5}{9}$
- b.  $12\frac{4}{15}$
- c. 26
- d.  $4\frac{1}{15}$

38. 24 pieces

39.

- a. 9
- b. -12
- c. 33
- d. 0

40.  $5 \times 10^1$

41.

- a.  $2\sqrt[3]{36}$
- b. Not real

42. 30 kids

43.

- a. F
- b. T
- c. F
- d. T
- e. F
- f. F
- g. T
- h. T
- i. T
- j. F