1. Clearly circle TRUE or FALSE for each of the following:

   (a) TRUE    FALSE    Four is a divisor of twenty-four.
   (b) TRUE    FALSE    4|12 = 4/12
   (c) TRUE    FALSE    45|9
   (d) TRUE    FALSE    Three is a multiple of thirty.
   (e) TRUE    FALSE    13 is a factor of 39
   (f) TRUE    FALSE    36 divides 6

2. A survey of 200 athletes was taken concerning which sports they play. 59 said they play Volleyball, 70 said they play Basketball, 42 said they played Volleyball and Basketball. How many students did not play Volleyball or Basketball?

3. Write 5,241 in Roman numerals.

4. Find GCD(70, 126, 56)

5. Convert 487\text{nine} to base ten.

6. Alexis read you get 756 calories from eating 9 apples. How many calories can you get from eating 2 apples?

7. Change 7\frac{2}{15} to a rational number in the form \frac{a}{b}, where a and b are integers (b \neq 0).

8. Which properties are being illustrated:
   (a) \( (3 + x) + (5 + y) = (x + 3) + (5 + y) \)
   (b) \( n \cdot 1 = 1 \cdot n = n \)
   (c) \( a \cdot (b \cdot c) = (a \cdot b) \cdot c \)
   (d) \( 5(x + y) = 5x + 5y \)
   (e) \( 4x + (-4x) = 0 \)

9. \( 43_{five} \cdot 24_{five} \)

10. \( 210_{four} \div 3_{four} \)

11. Express \( \left(\frac{x^4}{y^2}\right)^3 \cdot \left(\frac{x^2}{y^3}\right)^{-2} \) in its simplest form with no negative exponents.

12. Convert 2.3\overline{4} to \( \frac{a}{b} \) form, where a and b are integers and b \neq 0.

13. Conditional statement: “If the bell rings, you can leave the room.” Find each of the following:
   (a) inverse
   (b) converse
   (c) contrapositive

14. Convert 1563 to base five.
15. Leslie, Patrice, and ReAnna collect erasers. Altogether they have 894 erasers. ReAnna has three times as many erasers as Leslie. Patrice has 50 less erasers than Leslie and ReAnna combined. How many erasers does each person have?

16. A car dealership purchases a car from the manufacturer for $18,350. If they want to offer a 10% discount on the car and still make a profit of 20% of what they bought the car for, how much should they price the car at to put on the lot?

17. Is the set of Whole numbers closed under:
   (a) addition, (b) subtraction, (c) multiplication, (d) division

18. Add without converting to base ten: \(131_{\text{four}} + 322_{\text{four}} + 213_{\text{four}} + 233_{\text{four}}\)

19. “If you can do magic, you can go to Hogwarts”
   (a) What is the contrapositive?
   (b) What is the inverse?
   (c) What is the converse?

20. For each of the following, identify the properties of the operation(s) for whole numbers illustrated:
   (a) \(3(a + b) = 3a + 3b\)
   (b) \(2 + a = a + 2\)
   (c) \(16 \cdot 1 = 1 \cdot 16 = 16\)
   (d) \(3(2a) = (3 \cdot 2)a\)

21. Express \(\frac{x^3}{y^9} \div \frac{x^4}{y^2}\) in its simplest form with no negative exponents.

22. Is the set \(\{-1, 0, 1\}\) closed under (a) addition? (b) subtraction? (c) multiplication? (d) division?

23. Twenty-five students were interviewed on which classes they are taking this semester. Eleven are taking English, 10 are taking Math, and 15 are taking History. Two are taking all three of these. Two are taking English and Math, but not History. Three are taking Math and History. If all the students interviewed are taking at least one of these three classes, how many are taking English and History, but not Math?

24. Find the difference (in base six) for: \(5032_{\text{six}} - 2145_{\text{six}}\)

25. A box of cereal and milk together cost $5.92. The cereal costs $0.56 more than the milk. How much does the cereal cost?

26. Kirby paid $480 for a flat screen TV to sell in her store. She wants to price it so that she can offer a 25% discount and still make 30% of the price she paid. At what price should the TV be marked?

27. Explain whether the following sets are closed under addition:
   (a) \(B = \{0, 1\}\)
   (b) \(T = \{0, 4, 8, 12, 16, \ldots\}\)
   (c) \(\{x | x \in W \text{ and } x > 5\}\)
28. Let \( S = \{a, b, c,\} \), \( T = \{b, u, g\} \), and \( E = \{u, g, l, y\} \). Given \( U = \{a, b, c, d, e, f, g, u, l, w, y\} \), find the following:

(a) \( \overline{T} \)
(b) \( T \cap E \)
(c) \( S \cup \emptyset \)
(d) How many subsets does \( E \) have?
(e) How many proper subsets does \( E \) have?
(f) Is \( T \subseteq (S \cup G) \)?
(g) Is \( T \in (S \cup G) \)?
(h) Is \( \{y, u\} \in E \)?
(i) Is \( \{y, u\} \subset E \)?

29. Find the difference (in base 3) for:
\[ 20010_{\text{three}} - 2022_{\text{three}} \]

30. Find the next three terms in the series 1, 2, 4, 8, 16, …

31. ReAnna paid $120 for a new radar detector to sell in his shop. He wants to price it so that he can offer a 20% discount and still make 25% of the price he paid for it. At what price should the radar detector be marked?

32. Fill each blank space with a single digit that makes the corresponding statement true. Find all possible answers.

(a) 6|58_2
(b) 8|831_0
(c) 11|8_193
(d) 9|382_46

33. Find the next three terms in the series 12, 26, 40, 54, 68, …

34. Using the words “divisible”, “divisor”, “multiple”, “factor”, “divides”, describe the relationship between the numbers 2 and 12 in as many ways as possible.

35. Decide if the number 746,988 is divisible by each of the following numbers, and briefly EXPLAIN how you reached this decision:

(a) 3   (b) 6   (c) 8   (d) 11

36. Laura has available \( 14 \frac{1}{4} \) cups of sugar. She uses \( 1 \frac{3}{4} \) cups to make brownies, \( 2 \frac{1}{2} \) cups making cookies, and \( 1 \frac{2}{3} \) cups to make a cake. How many cups of sugar is left over?

37. Two bells ring at 8:00AM. For the remainder of the day, one bell rings every half hour and the other bell rings every 45 min. What time will it be when the bells ring together again?

38. Audrey makes 4 free throws for every 1 she misses. If she shoots a total of 140 free throws one Saturday, how many would you expect her to make?
39. Use a factor tree to find the prime factorization of 19,224

40. Find the sum (in base 5) for:
   \[ 2132_{\text{five}} + 3423_{\text{five}} \]

41. Find the prime factorization of 24,500.

42. \[ 21_{\text{three}} \cdot 20_{\text{three}} \]

43. \[ 413_{\text{five}} \div 2_{\text{five}} \]

44. If there are 9 boys and 6 girls at a party and the host wanted each to be given exactly the same number of candies that could be bought in packages containing 12 candies, what is the fewest number of packages that could be bought?

45. Change 6.93\overline{2} to a rational number in the form \( \frac{a}{b} \), where \( a \) and \( b \) are integers (\( b \neq 0 \)).

46. At the Party Store, paper plates come in packages of 30, paper cups in packages of 15, and napkins in packages of 20. What is the least number of plates, cups, and napkins that can be purchased so that there is an equal number of each item?

47. (a) A nickel is what fraction of a dollar?
   (b) 25 min is what fraction of an hour?
   (c) 16 hr is what fraction of a day?

48. Sally bought a dress marked 20\% off. If the regular price was $28.00, what was the sale price?

49. Tanner makes 84 free throws at practice. If his success-to-failure ratio is 7:3, how many free throws did he attempt?

50. After going trick-or-treating, Cooper found he had twice as many Snickers as M&Ms, and twice the number of Twix as Snickers. If he had 98 pieces of candy consisting of only these three brands of candy, how many Twix did he have?