CHAPTER 4 STUDY GUIDE (NUMBER THEORY)

4.1 Prime and Composite Numbers examples on pages 136-139 *(see Chapter 4.1 notes)*

- **Tips:** Prime Number = is a natural number greater than 1 that has no positive divisors other than 1 and itself (examples: 2, 3, 5, 7)
- **Tips:** Composite Number = is any natural number greater than 1 that has positive factors other than 1 and itself (examples: 4, 6, 8, 9, 10)
- **Tips:** Product = is the result of multiplying. For example, 6 is the product of 2 and 3
- **Tips:** Multiple = is the product of itself and any natural number. For example, the multiples of 9 are 9, 18, 27, 36, 45, etc.
- **Tips:** Factor = is any integer that divides the given integer with no remainder. For example, 3 and 7 are factors of 21
- **Tips:** Divisibility Test (table on page 137)
  - 2 = the integer ends in an even digit 0, 2, 4, 6, or 8
  - 3 = the sum of the integer's digits is divisible by 3
  - 4 = the number formed by the last 2 digits is divisible by 4
  - 5 = the integer ends in 0 or 5
  - 6 = the integer is divisible by both 2 and 3
  - 8 = the number formed by the last 3 digits is divisible by 8
  - 9 = the sum of the integer's digits is divisible by 9
  - 10 = the integer ends in 0

Which of the following numbers are factors of the given number (2, 3, 4, 5, 6, 8, 9, 10)?

1. 120 — 2, 3, 4, 5, 6, 8, 10
2. 824 — 2, 4, 8
3. 1060 — 2, 4, 5, 10
4. 2064 — 2, 3, 4, 6, 8
5. 11,133 — 3, 9
6. 18,270 — 2, 3, 5, 6, 9, 10

4.2 Prime Factorization examples on pages 141-142 *(see Chapter 4.2 notes)*

Tips: Factor Tree Rules
1) always start with the smallest prime factors
2) only circle prime numbers
3) keep factoring numbers until all remaining numbers are prime numbers

Write the prime factorization of each number.

7. 63 — $3^2 \cdot 7$
8. 28 — $2^2 \cdot 7$
9. 90 — $2 \cdot 3^2 \cdot 5$
10. 210 — $2 \cdot 3 \cdot 5 \cdot 7$
11. 180 — $2^2 \cdot 3^2 \cdot 5$
12. 308 — $2^2 \cdot 7 \cdot 11$

4.3 Greatest Common Factor examples on pages 144-146 *(see Chapter 4.3 notes)*

- **Tips:** Greatest Common Factor (GCF) = is the greatest common number between 2 or more numbers
- **Tips:** Relatively Prime = is when the only positive integer that evenly divides both numbers is 1 (one is not a prime number)

Use prime factorization to find the GCF of each set of expressions.

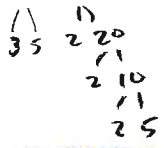
13. 66, 88 — $2 \cdot 11 = 22$
14. 48, 96 — $2^4 \cdot 3 = 48$
15. 30, 105 — $3 \cdot 5 = 15$
16. 64, 72, 96 — $2^3 = 8$
17. 57, 76, 95 — 19
18. 12, 48, 84 — $2^2 \cdot 3 = 12$

4.4 Least Common Multiple examples on pages 148-150 ***(see Chapter 4.4 notes)***

- **Tips:** To find the LCM use the highest power of each prime factor & variable

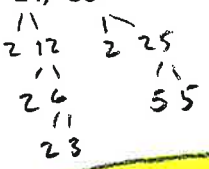
Use prime factorization to find the LCM of each set of expressions.

19. 15, 40



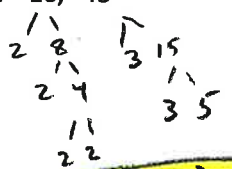
$2^3 \cdot 3 \cdot 5 = 120$

20. 24, 50



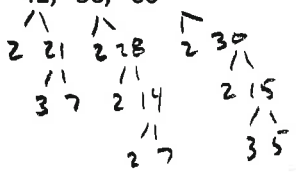
$2^3 \cdot 3 \cdot 5^2 = 600$

21. 16, 45



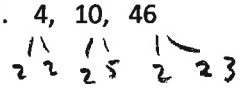
$2^4 \cdot 3^2 \cdot 5 = 720$

22. 42, 56, 60



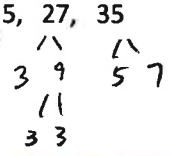
$2^3 \cdot 3 \cdot 5 \cdot 7 = 840$

23. 4, 10, 46



$2^2 \cdot 5 \cdot 23 = 460$

24. 5, 27, 35



$3^3 \cdot 5 \cdot 7 = 945$

4.9 Factoring Polynomials (Distributive Property & Grouping) examples on worksheets ***(see Chapter 4.9 notes)***

- **Tips:** Helpful Shortcuts
  1) Check if the smaller of the two numbers is the GCF
  2) Check if the difference between the two numbers is the GCF
  3) Try to factor the difference to find the GCF

Factor each polynomial.

- **Tips:** Factoring using the Distributive Property
  1) Find the Greatest Common Factor (GCF)
  2) Use the GCF to rewrite each term

25. $21a^2 - 15b$

$3(7a^2 - 5b)$

26. $12c^4d^3 + 6c^7d^5 + 4c^6d^2$

$2c^4d^2(6d + 3c^3d^3 + 2c^2)$

27. $10w^2x^2 + 9wx^2 - w^2x$

$wx(10wx + 9x - w)$

Factor each polynomial.

- **Tips:** Factoring a polynomial using grouping
  1) Must have at least 4 terms
  2) Terms must have common factors that can be grouped together

28. $2mk - 12m - 7k + 42$

$(2mk - 12m) + (-7k + 42)$

$2m(k - 6) - 7(k - 6)$

$(2m - 7)(k - 6)$

29. $4qr + 6 + 8r + 3q$

$(4qr + 8r) + (3q + 6)$

$4r(q + 2) + 3(q + 2)$

$(4r + 3)(q + 2)$

30. $5n^3p^5 - 12 + 20n^2 - 3np^5$

$(5n^3p^5 + 20n^2) + (-3np^5 - 12)$

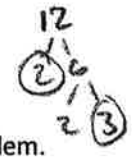
$5n^2(np^5 + 4) - 3(np^5 + 4)$

$(5n^2 - 3)(np^5 + 4)$

Constructed Response Questions:

31. Explain GCF, create a problem using GCF, and solve the problem.

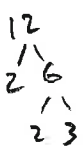
You must factor each number to find the largest number common to both numbers.

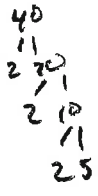


$2 \cdot 3 = 6$

32. Explain LCM, create a problem using LCM, and solve the problem.

You must factor each number. For each prime number & variable use the highest power, multiply them to get the LCM.





$2^3 \cdot 3 \cdot 5 = 120$