Math 4. Class Work 3

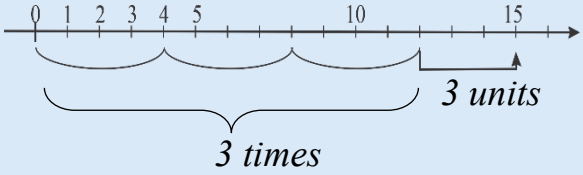
Division with remainder and divisibility rules.

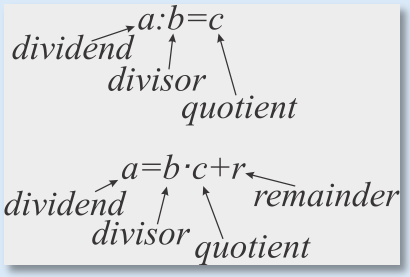
If there is a number c *(factor of a),* that $c \times b = a$ (*product*), then we can say that $a \div b = c$. This means that a **is divisible by** b, and b can "fit" into a a whole number of times: $a \div c = b$.

If there is no number such that the divisor enters the dividend several times, then we can say that this number **is not divisible by the divisor**. In such cases, we can use division with a remainder.

For example: $15 \div 4 = 3$ *with a remainder of* 3

$15 : 4 = 3R(3)$, or $15 = 4 \times 3 + 3$





We can use the **divisibility rules** to check quickly if a number is divisible by another without a remainder.

In general, if you can present a number as a product of factors, $a = c \times b \times d$ then a is divisible by each factor, by the product of factors, by itself, and by 1, or a is divisible by c, b, d, also by the products of the factors $c \times b$, $c \times d$, $b \times d$, by itself, and by 1.

Example: $210 = 21 \times 10 = 3 \times 7 \times 10 = 21 \times 2 \times 5 = \ldots$.
Then 210 is divisible by 7, 10, 70 and … (list other factors)

1. Evaluate the products and name the factors:
   Example: $3 \cdot 25 = 75$, *the factors are* 3 *and* 25.
   $a.\ 4 \cdot 12;$ $b.\ 7 \cdot 11;$ $c.\ 15 \cdot 20;$

2. The remainder of $1932 \div 17$ is 11, and the remainder of $261 \div 17$ is 6. Is
   $$2193 = 1932 + 261$$
   divisible by 17? Is it possible to say without division?

3. Find all natural numbers such that when divided by 5, the quotient and remainder are equal.

4. Factor out the common factor and find the value of the expressions:
   Example:
   $21 + 49 = 3 \times 7 + 7 \times 7 = 7 \times (3 + 7) = 7 \times 10 = 70$
   $a.\ 35 - 25;$ $b.\ 44 + 77;$ $c.\ 81 - 45;$

5. Even or odd numbers will be the sum and the product of
   a. 2 odd numbers
   b. 2 even numbers
   c. 1 even and 1 odd number
      Can you explain why?

6. Divisibility check
   a. Will the following numbers be divisible by 2:
      123457, 1029384756, 43567219874563157830
   b. by 3
      1347, 45632
   c. by 5:
      5635, 78530, 657932, 45879515
   d. by 7:
      1645, 234, 5478, 889

7. Write all divisors of numbers: 8, 12, 15, 36
   Example: $D(8)\ are\ 1, 2, 4, 8$

8. Is the product of 1247 and 999 divisible by 3 (no calculations)?

9. Number a is divisible by 5. Is the product $a \cdot b$ divisible by 5? Repeat.

10. Without calculating, establish whether the product is divisible by a number. Repeat.

    $a.\ 508 \cdot 12\ by\ 3$ $b. 85 \cdot 3719\ by\ 5$
    $c.\ 2510 \cdot 74\ by\ 37$ $d. 45 \cdot 26 \cdot 36\ by\ 15$

11. Without calculating, establish whether the sum is divisible by a number:
    $a.\ 25 + 35 + 15 + 45 \quad by\ 5;$ $\qquad b.\ 14 + 21 + 63 + 24\ by\ 7$
    $c.\ 18 + 36 + 55 + 90 \quad by\ 9;$

12. How many vans are needed to take 55 students on a field trip if a van can take 12 students?

13. The summer vacation is 73 days long. Which day of the week will be the last day of vacation if the first day is Tuesday?

14. Show that among any three consecutive natural numbers there will be one divisible by 3.

15. Among four consecutive natural numbers, will there be a number
    a. Divisible by 2?
    b. Divisible by 3?
    c. Divisible by 4?
    d. Divisible by 5?