Worksheet: The Division Algorithm

The Division Algorithm states that if **a** is any integer and **d** is a positive integer, then there exist unique integers **q** (the quotient) and **r** (the remainder) such that: **a = dq + r**, where $0 \leq r < d$ **Definitions:** - **a** is the dividend (the number being divided). - **d** is the divisor (the number we are dividing by). - **q** is the quotient (the whole number result of division). - **r** is the remainder (what is left over).

In many programming languages (including Python), the division algorithm connects to two operators: - ***//*** (floor division) gives the quotient. - **%** (modulo) gives the remainder.

Examples:

Example 3: Find the quotient and remainder when 101 is divided by 11.

Example 4: Find the quotient and remainder when -11 is divided by 3.

Example 5: Find the quotient and remainder when 250 is divided by 17.

Example 6: Find the quotient and remainder when -45 is divided by 7.

Python Example:

```
# Python examples of division algorithm
a = 101
d = 11
print(a // d)  # quotient = 9
print(a % d)   # remainder = 2

a = -11
d = 3
print(a // d)  # quotient = -4
print(a % d)   # remainder = 1
```