Number Sets & GCD

3.AB PreIB Maths – Resit Exam

Unless specified otherwise, you are to **always** (at least briefly) explain your reasoning. Even in closed questions.

Natural Numbers

a) Using only the **axioms** that define **addition** and **multiplication** on natural numbers evaluate: [15 %]

- $2 \cdot 3$
- $1 + (2 \cdot 2)$

b) Assuming $x + y = y + x$, show that $x + \text{succ}(y) = \text{succ}(y) + x$. In your prove use only those **axioms** that **define addition**. [10 %]

Integers & Rationals

a) Connect the pairs that correspond to the **same equivalence classes** and write down the value of **represented rational**. [20 %]

$(2, 20)$	$(5, 50)$	$(35, 28)$
$(10, 8)$	$(25, 2)$	$(-50, -2)$
$(-2, 2)$	$(4, 4)$	$(7, 8)$

b) Integers and rationals share some similarities on their definition. They are defined as **equivalence classes** on $\mathbb{N} \times \mathbb{N}$ and $\mathbb{Z} \times \mathbb{Z}$ respectively. Create **at least one equivalence** on $\mathbb{N} \times \mathbb{N}$ and one on $\mathbb{Z} \times \mathbb{Z}$. Comment on the equivalence classes, **how many are there**? do they have a specific shape? [10 %]

Divisibility & GCD

a) Some **natural number** n can be decomposed into primes as $n = p_1 \cdot p_2 ... p_k$. Describe a method for finding **all the devisers** of n. [20 %]

b) Compute $\gcd(1029, 1617)$. Write down performed calculations **in full detail**. [20 %]