

Q.1

A) $a^2 + b^2 = c^2$

$$c = \sqrt{a^2 + b^2}$$

$$a + b + c = 1000$$

$$a + b + \sqrt{a^2 + b^2} = 1000$$

$$a + b - 1000 = -\sqrt{a^2 + b^2}. \text{ Now square both sides:}$$

$$(a + b - 1000)^2 = (-\sqrt{a^2 + b^2})^2$$

$$((a + b) - 1000)^2 = a^2 + b^2$$

$$(x + y)^2 = x^2 + 2xy + y^2$$

$$(x - y)^2 = x^2 - 2xy + y^2$$

$$(a + b)^2 - 2.1000(a + b) + 1000^2 = a^2 + b^2$$

$$a^2 + 2ab + b^2 - 2.1000(a + b) + 1000^2 = a^2 + b^2$$

$$a^2 + b^2 + 2ab - 2.1000(a + b) + 1000^2 = a^2 + b^2$$

$$2ab - 2000(a + b) + 1000^2 = 0$$

$$2ab + 1000^2 = 2000(a + b)$$

$$1 + 2 + \cdots + 1000000 = 500000(1000001)$$

$$1 + 2 + \cdots + n = \frac{n(n+1)}{2}$$

$$1.2.3.\dots n = n!$$