1. (a) We can write this as "For every natural number n, if n is odd then n is the sum of two prime numbers", or even as "For every natural number n, if n is odd then there exist prime numbers m and k such that $n = m + k$."

(b) We can translate it into symbols as $(\forall n \in N)(O(n) \implies (\exists m)(\exists k)(P(m) \wedge P(k) \wedge S(m, k, n)$.

2. (a) "If $2n$ is even then n is even."

(b) "If $2n$ is odd then n is odd."

(c) "n is even and $2n$ is odd." [Or, "n is even but $2n$ is odd."]

3. Let x be an integer.

[We need to give two proofs: that if x is even then x^3 is even, and conversely that if x^3 is even then x is even. We use a direct proof for the first and proof by contraposition for the second.]

Suppose first that x is even. Then $x = 2y$ for some $y \in \mathbb{Z}$. So $x^3 = (2y)^3 = 8y^3 = 2(4y^3)$, and $4y^3 \in \mathbb{Z}$, so x^3 is even.

Conversely, suppose that x is not even. Then x is odd, so $x = 2u + 1$ for some $u \in \mathbb{Z}$. So

$$\begin{aligned} x^3 &= (2u+1)^3 \\ &= (2u)^3 + 3(2u)^2 + 3(2u) + 1 \\ &= 8u^3 + 12u^2 + 6u + 1 \\ &= 2(4u^3 + 6u^2 + 3u) + 1, \end{aligned}$$

so x^3 is odd. Hence, by contraposition, if x^3 is even then x is even.