## Some solutions to Happy Octopus

**1, 1, 1, … so 1 is happy.**

2, 4, 20, 4, 20, … so 2 is sad. (2-cycle)

3, 11, 2, 4, 20, … so 3 is sad. (2-cycle)

4 is sad. (2-cycle)

5, 31, 12, 5, … so 5 is sad. (3-cycle)

6, 44, 40, 20, 4, 20, … so 6 is sad. (2-cycle)

7, 61, 45, 51, 32, 15, 32, … so 7 is sad. (2-cycle)

**10, 1, 1, 1, 1… so 10 is happy.**

11, 2, 4, 20, 4, … so 11 is sad. (2-cycle)

12, 5, 31, 12, … so 12 is sad. (3-cycle)

13, 12, … so 13 is sad. (3-cycle)

14, 21, 5, … so 14 is sad. (3-cycle)

5, 32, 15,… so 15 is sad. (2-cycle)

16, 45, 51, 32, … so 16 is sad. (2-cycle)

17, 62, 50, 31,… so 17 is sad. (3-cycle)

20, 4, 20, 4, … so 20 is sad. (2-cycle)

21, 5, … so 21 is sad. (3-cycle)

**22, 10, 1, 1,… so 22 is happy.**

23, 15, … so 23 is sad. (2-cycle)

**24, 24, 24, 24, so 24 is happy.**

**25, 35,, 42, 24, 24,… so 25 is happy.**

26, 50, 31,… so 26 is sad. (3-cycle)

27, 65, 75, 112, 6, 44, 40, 20,… so 27 is sad. (2-cycle)

30 , 11, 2, 4, 20, … so 30 is sad. (2-cycle)

31, 12, … so 31 is sad. (3-cycle)

32, 15, … so 32 is sad. (2-cycle)

**33, 22, 10, 1, … so 33 is happy.**

34, 31, 12, … so 34 is sad. (3-cycle)

**35, 42, 24, 24, … so 35 is happy.**

36, 55, 62, 50, 31, … so 36 is sad. (3-cycle)

37, 72, 65, 75, 112 so 37 is sad. (2-cycle)

40 > 20 > 4 > 20 so 40 is sad. . (2-cycle)

41, 21, 5, 31, 12, 5, … so 41 is sad. (3-cycle)

**42, 24, 24,… so 42 is happy.**

43, 31, … so 43 is sad. (3-cycle)

44, 40, 20, 4, 20,… so 44 is sad. (2-cycle)

45, 51, 32, … so 45 is sad. (2-cycle)

**46, 64, 64, 64, … so 46 is happy.**

47, 101, 2, 4, 20, … so 47 is sad. (2-cycle)