

**LO: To find **squares** and **square roots** of  
**integers****



**Squares**

$$9^2 =$$

**Square Roots**

$$\sqrt{9} =$$

4	64	100	3
36	11	8	16
144	81	25	6
10	10 000	121	12



## Happy and Unhappy Numbers

We are going to make a chain of numbers starting with **58** using the following rule

### Rule

To find the next number in the sequence, **square the digits** in your number and **add the answers together**

$$58 \xrightarrow{5^2 + 8^2}$$



**Continue the sequence: What happens?**

## Happy and Unhappy Numbers

We are going to make a chain of numbers starting with **58** using the following rule

### Rule

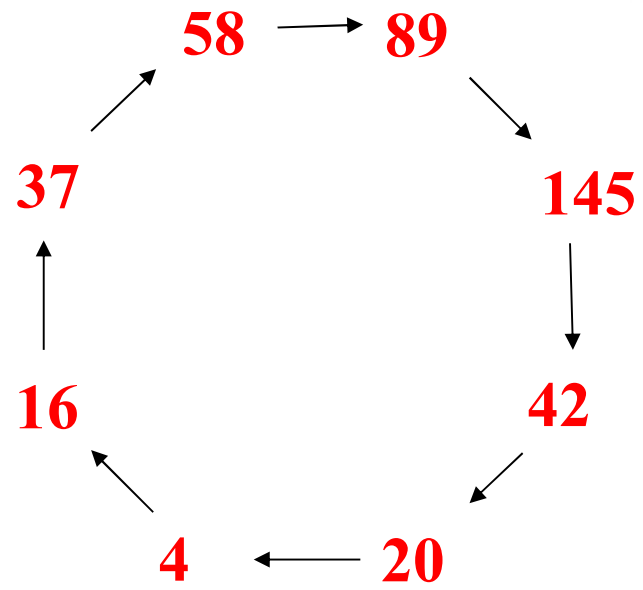
To find the next number in the sequence, **square the digits** in your number and **add the answers together**

$$58 \xrightarrow{5^2 + 8^2} 89 \xrightarrow{8^2 + 9^2} 145$$



**Continue the sequence: What happens?**

# Unhappy Numbers



Now start with the number **19**

$$19 \xrightarrow{1^2 + 9^2}$$

**Continue the sequence: What happens?**



Now start with the number **19**

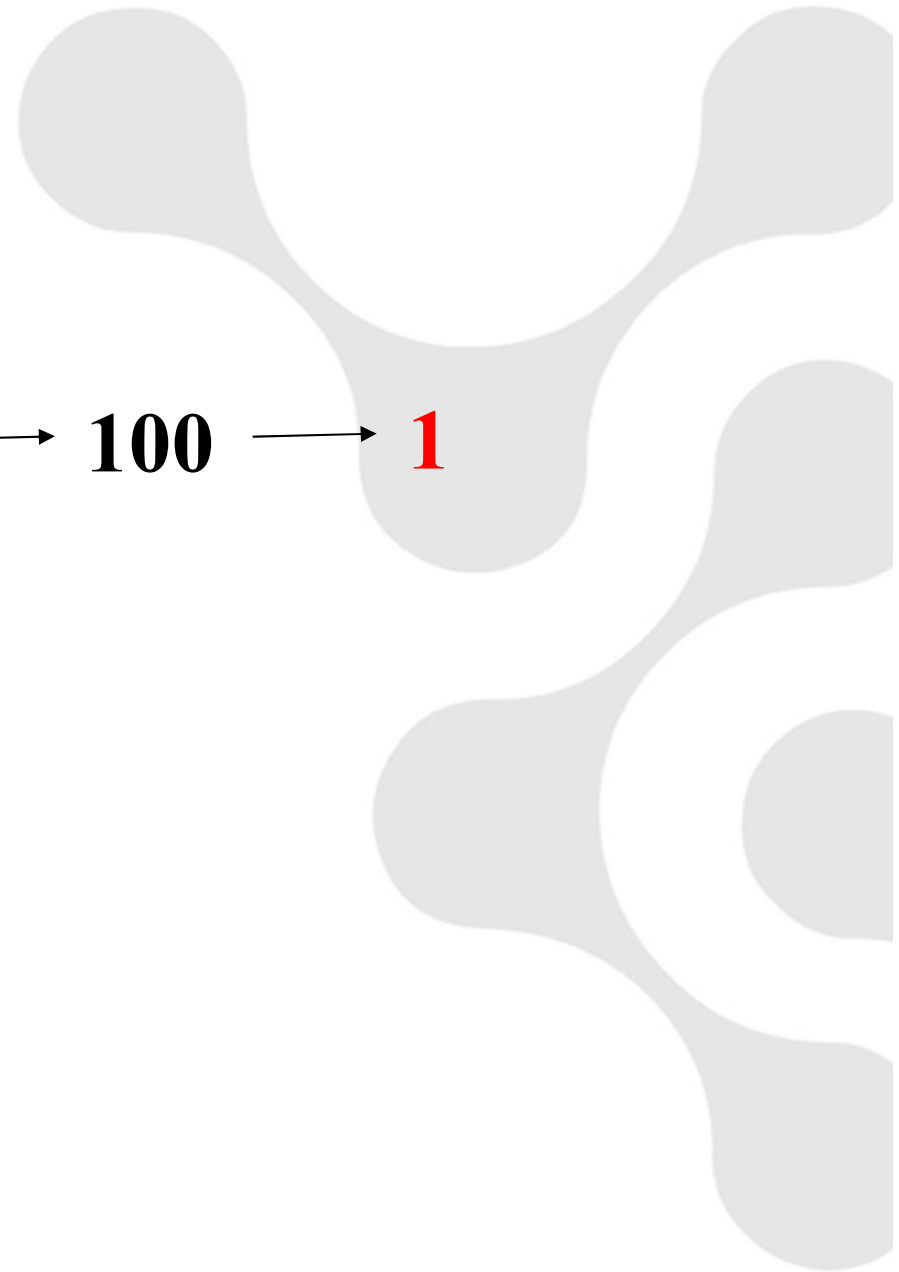
$$19 \xrightarrow{1^2 + 9^2} 82 \xrightarrow{8^2 + 2^2} 68$$

**Continue the sequence: What happens?**



# Happy Numbers

**19** → **82** → **68** → **100** → **1**





**Now choose your own starting number between 1-100.**

**Use the rule to make a number chain.**

**If your chain reaches 1 then all the numbers in the chain are **happy numbers****

**If your chain repeats any number in the unhappy circle then all the numbers in the chain are **unhappy numbers****

**How many happy or unhappy numbers can you find?**



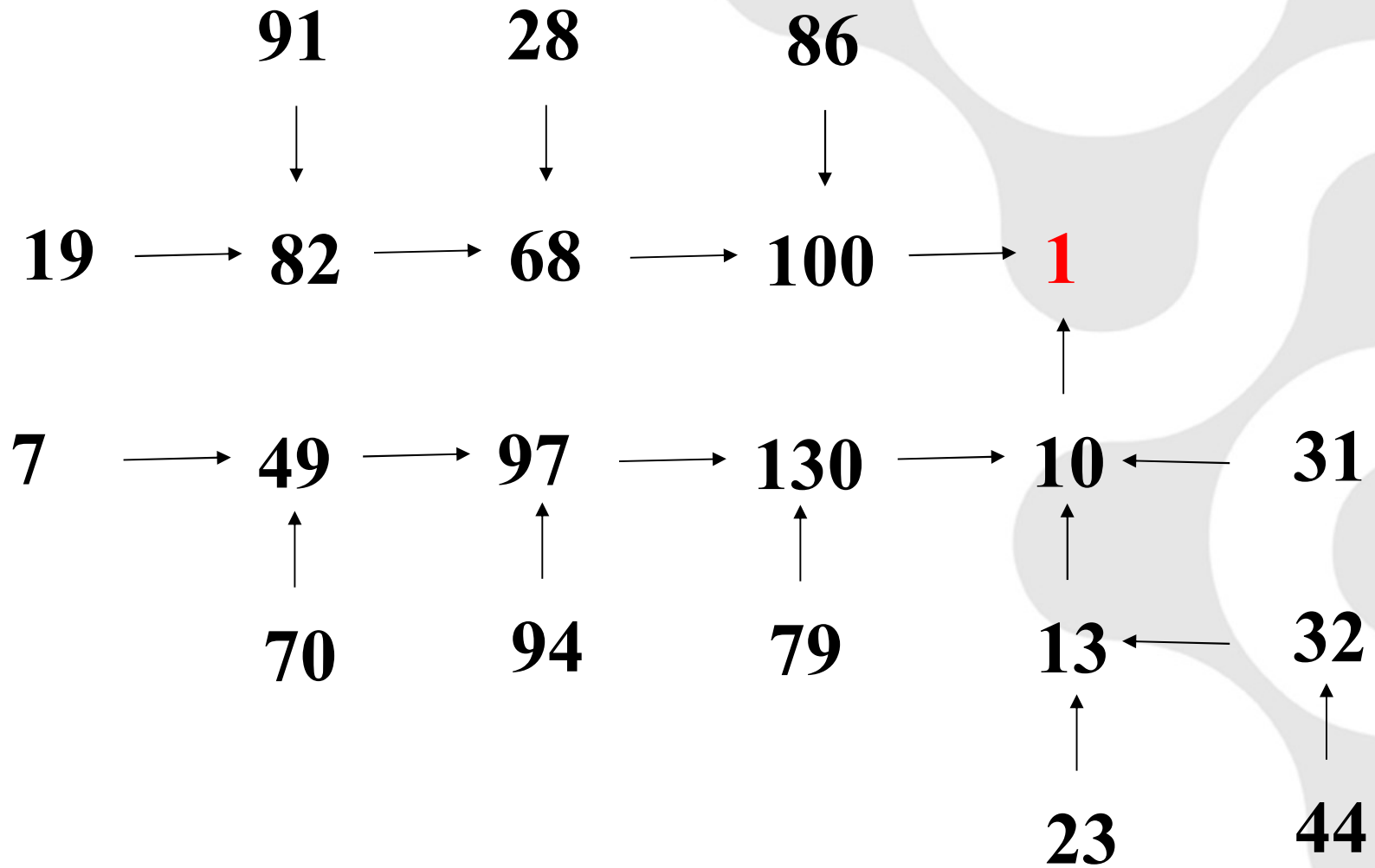
## **Answers**

**(For when you have tried a few numbers)**

**for all integers between 1 and 100**

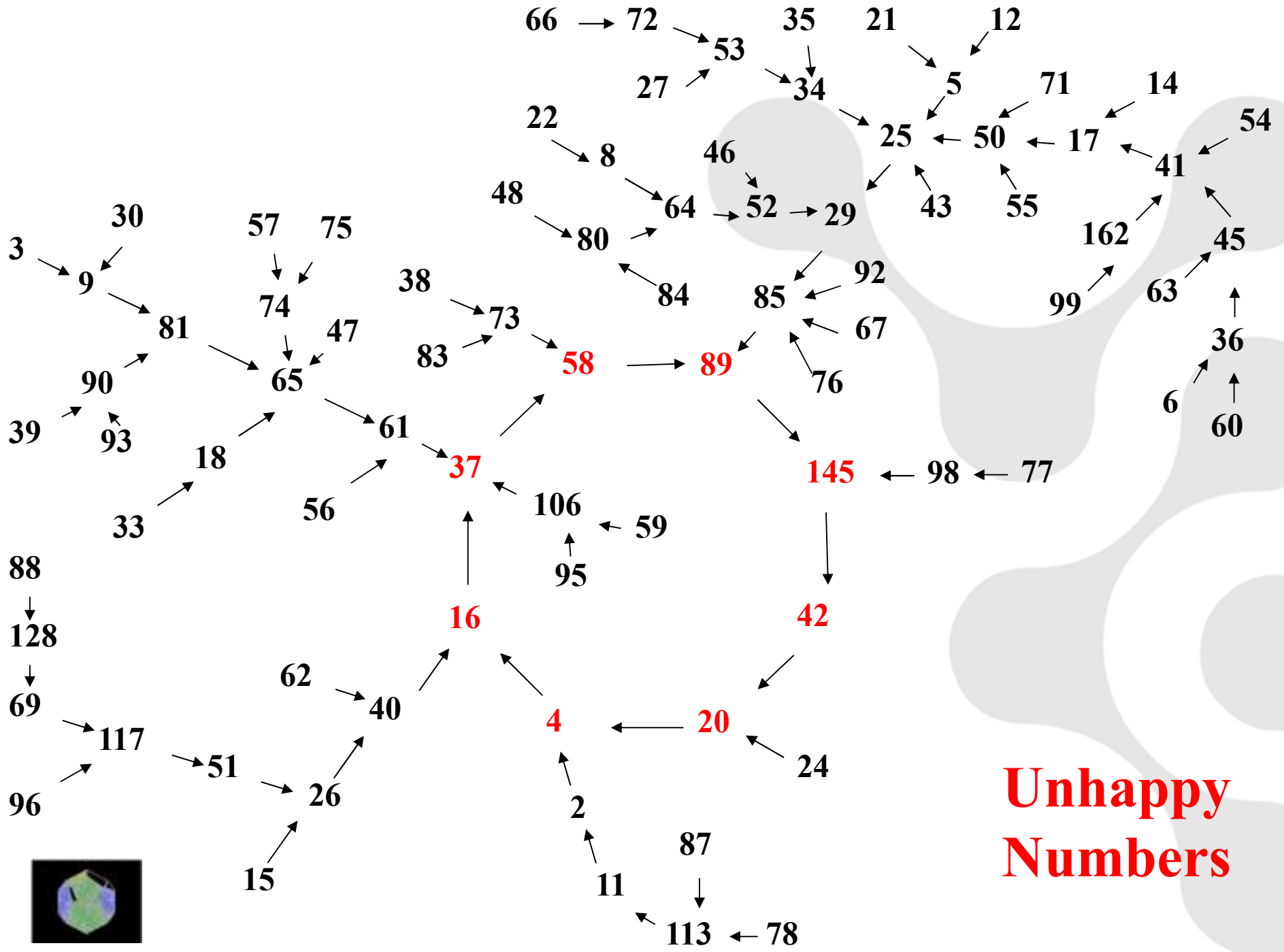


# Happy Numbers



<b>1</b>	2	3	4	5	6	<b>7</b>	8	9	<b>10</b>
11	12	<b>13</b>	14	15	16	17	18	<b>19</b>	20
21	22	<b>23</b>	24	25	26	27	<b>28</b>	29	30
<b>31</b>	<b>32</b>	33	34	35	36	37	38	39	40
41	42	43	<b>44</b>	45	46	47	48	<b>49</b>	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	<b>68</b>	69	<b>70</b>
71	72	73	74	75	76	77	78	<b>79</b>	80
81	<b>82</b>	83	84	85	<b>86</b>	87	88	89	90
<b>91</b>	92	93	<b>94</b>	95	96	<b>97</b>	98	99	<b>100</b>





**Unhappy Numbers**





**Which numbers are easy to square?**

**Which numbers are easy to find the square root of?**

**How can you estimate the square root of any integer  
less than 100?**

