



# Benford's Very Strange Law

NAME: .....

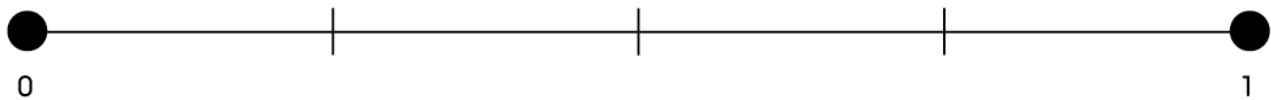
CLASS: .....

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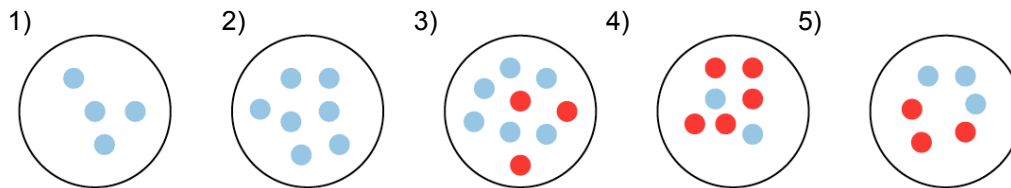


## Basic

1) Place the following words on the probability scale below: impossible, certain, likely, unlikely, even.



2) Match the circles below to the correct probability statement.



- a) It is impossible to pick a red ball.
- b) It is unlikely you will pick a red ball.
- c) It is certain that you will pick a red ball.
- d) It is 50-50 that you will pick a red ball.
- e) It is quite likely that you will pick a red ball.

3) You throw a die 300 times.

- a) If you threw a six 65 times would you think that the die is biased?
- b) How many times would you have expected to get a six?

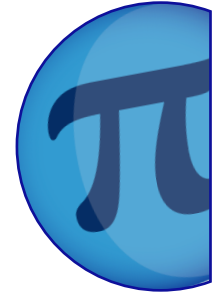


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## Core

1) If one card is drawn at random from a full pack of playing cards, what is the probability of obtaining:  
a) a heart                      b) a king                      c) a card other than a king                      d) a black card

2) You have an unbiased octagonal spinner.  
a) What is the probability of getting a score of 4 or more?

b) State the complementary event.

c) What is the probability of the complementary event?

3) Use relative frequency as a method of predicting probability. A survey of sunglasses is made at a local beach. 1000 people are questioned and the results noted below.

Category	Wearing Sunglasses	Carrying Sunglasses	No Sunglasses
Frequency	203	97	700

a) What is the probability that the next person taken at random is wearing sunglasses?

b) What is the probability that a person who has sunglasses is wearing them?

c) Out of 10 people taken at random, how many are likely to have no sunglasses?

d) In the time when 100 people with no sunglasses walk past, how many people wearing sunglasses will be likely to walk past?

4) Illustrate the data in the following table in a bar chart.

Pet	Cat	Dog	Fish	Guinea Pig	Rabbit
Number	8	18	5	3	4



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## Advanced

1) Bolts manufactured on a machine are found to be 1 per cent defective. Determine the probabilities of obtaining 0,1,2,3,4 defectives in a random sample batch of 80 such items using the Poisson probability function.

2) Write the following in logarithmic form:

a)  $2^5 = 32$

b)  $4^3 = 64$

c)  $10^6 = 1,000,000$

3) Simplify the following:

a)  $\log_{10} 100$

b)  $\log_4 16 + \log_4 8 - \log_4 32$

(c)  $\frac{1}{3} \log_9 27$

4) Justin spins a coin and rolls a die. Calculate the probability of each of the following:

a) A head and a six.

b) A tail and a score less than 5.

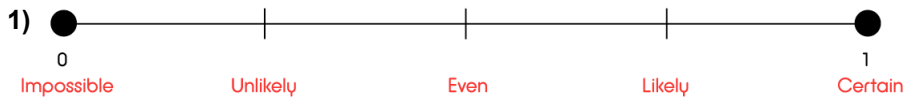
c) Either a six or a head.



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## ANSWERS

### Basic



2) a) Circle 2    b) Circle 3    c) Circle 1    d) Circle 5    e) Circle 4

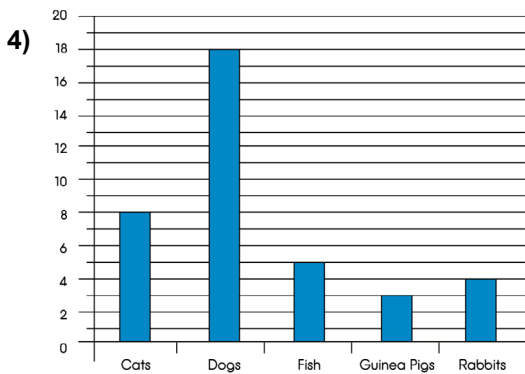
3) a)  $\frac{65}{300} \neq \frac{1}{6}$  but it could still happen with a fair die    b) 50 times

### Core

1) a)  $\frac{1}{4}$                       b)  $\frac{1}{13}$                       c)  $\frac{12}{13}$                       d)  $\frac{1}{2}$

2) a)  $\frac{5}{8}$                       b) Getting a score of 3 or less                      c)  $\frac{3}{8}$

3) a) 0.203                      b) 0.7                      c) 7                      d) 29



### Advanced

1)  $P(x=r) = \frac{e^{-\mu} \mu^r}{r!}$                        $\mu = np$                        $n = 80$                        $p = 0.01$                        $\mu = 80 \times 0.01 = 0.8$

$x = 0$      $P = 0.4493$                        $x = 1$      $P = 0.3595$                        $x = 2$      $P = 0.1438$   
 $x = 3$      $P = 0.0383$                        $x = 4$      $P = 0.0077$

2) a)  $\log_2 32 = 5$                       b)  $\log_4 64 = 3$                       c)  $\log_{10} 1,000,000 = 6$

3) a) 2                      b) 1                      c)  $\frac{1}{2}$

4) a)  $P(H, 6) = \frac{1}{12}$                       b)  $P(T, <5) = \frac{1}{3}$                       c)  $P(6 \text{ or head}) = \frac{7}{12}$