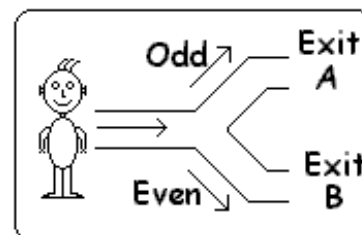


Mickey's Mazes



Mickey has an unusual hobby. He enjoys finding his way through mazes. He travels through the mazes using a die to guide him. The first maze Mickey goes into is only a small one. A picture of it is shown on the right.

If Mickey rolls his die and gets an odd number, he goes through exit A.
If he gets an even number he goes through exit B.



Task A The Mini Maze

- 1) What is the probability that Mickey will go out of exit A?
- 2) What is the probability that Mickey will leave through exit B?
- 3) If Mickey went through the maze 30 times, how many times do you think he would leave through exit A?
- 4) If Mickey went through the maze 30 times, how many times do you think he would leave through exit B?

Use your own die to guide Mickey through the maze 30 times. Put your results in the tally chart below.

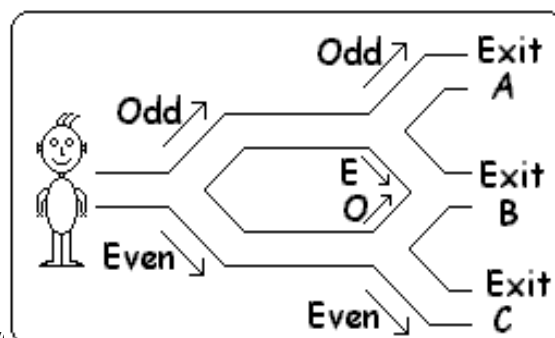
Exit	Tally	Frequency	Relative Frequency
A			
B			

- 5) Were your predictions in questions 3 and 4 correct?
- 6) If Mickey went through the maze 60 times:
 - a) How many times does **your** relative frequency suggest that Mickey would leave through exit A?
 - b) How many times does **your** relative frequency suggest that Mickey would leave through exit B?

Task B The Medium Maze

The next maze Mickey attempts is a little bit bigger. Here is a picture of it.

- 1) Mickey likes to use direct routes (he always follows the arrows). How many of these will take Mickey to exit A?
- 2) How many routes will take Mickey to exit B?
- 3) How many routes will take him to exit C?
- 4) What is the probability of Mickey leaving through exit A?
- 5) What is the probability of him leaving through exit B?
- 6) What is the probability of him leaving through exit C?
- 7) If Mickey travelled the maze 40 times, how many times would you
 - a) A
 - b) B
 - c) C



Mickey's Mazes 2



Use your die to guide Mickey through the maze 40 times. Record your results in the tally chart below.

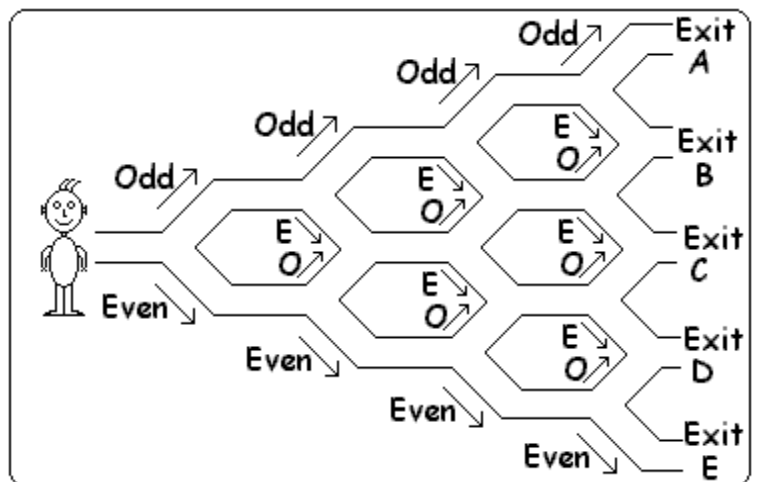
Exit	Tally	Frequency	Cumulative Frequency
A			
B			
C			

- 8) Were your predictions in question 7 correct?
- 9) If Mickey went through the maze 400 times, how many times would:
 - a) probability theory predict he would come out of exit A?
 - b) your cumulative frequency suggest he would exit through A?
- 10) Repeat the calculations in Q9 for exits B and C.

Task C The Big Maze

The next maze Mickey tries is even bigger still.

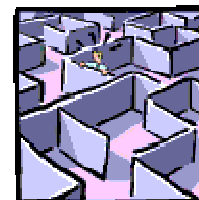
- 1) How many routes will take Mickey to...
 - a) Exit A?
 - b) Exit B?
 - c) Exit C?
 - d) Exit D?
 - e) Exit E?
- 2) Write down the probability of Mickey leaving through each of the five exits.
- 3) If Mickey travelled the maze 160 times, how many times would you expect him to leave through each of the five exits?



Task D Design Your own Maze

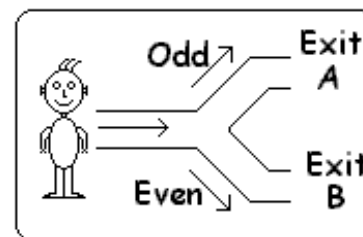
- 1) Design a maze of your own. It can be like the ones on these sheets or it can be totally different.
- 2) Decide how Mickey's dice would determine how he travels through your maze.
- 3) Work out the probability that Mickey would leave through each exit.
- 4) Try guiding Mickey through your maze 20 times. Compare the results with the probabilities. Do they match up?

Mickey's Mazes Answers



Mickey has an unusual hobby. He enjoys finding his way through mazes. He travels through the mazes using a die to guide him. The first maze Mickey goes into is only a small one. A picture of it is shown on the right.

If Mickey rolls his die and gets an odd number, he goes through exit A.
If he gets an even number he goes through exit B.



Task A The Mini Maze

- 1) What is the probability that Mickey will go out of exit A? $1/2$
- 2) What is the probability that Mickey will leave through exit B? $1/2$
- 3) If Mickey went through the maze 30 times, how many times do you think he would leave through exit A? **15**
- 4) If Mickey went through the maze 30 times, how many times do you think he would leave through exit B? **15**

Use your own die to guide Mickey through the maze 30 times. Put your results in the tally chart below.

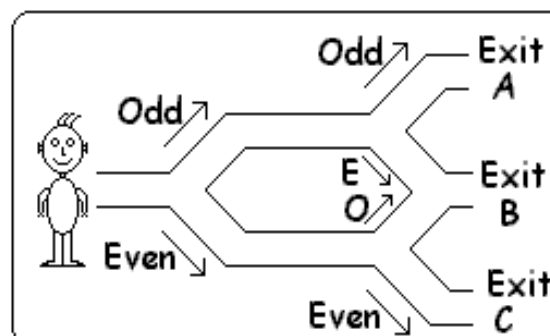
Exit	Tally	Frequency	Relative Frequency
A			
B			

- 5) Were your predictions in questions 3 and 4 correct?
- 6) If Mickey went through the maze 60 times:
 - a) How many times does **your** relative frequency suggest that Mickey would leave through exit A?
 - b) How many times does **your** relative frequency suggest that Mickey would leave through exit B?

Task B The Medium Maze

The next maze Mickey attempts is a little bit bigger. Here is a picture of it.

- 1) Mickey likes to use direct routes (he always follows the arrows). How many of these will take Mickey to exit A? **1**
- 2) How many routes will take Mickey to exit B? **2**
- 3) How many routes will take him to exit C? **1**
- 4) What is the probability of Mickey leaving through exit A? $1/4$
- 5) What is the probability of him leaving through exit B? $1/2$
- 6) What is the probability of him leaving through exit C? $1/4$
- 7) If Mickey travelled the maze 40 times, how many times would you expect him to leave through exits:
 - a) **10**
 - b) **20**
 - c) **10**



Mickey's Mazes 2 Answers



Use your die to guide Mickey through the maze 40 times. Record your results in the tally chart below.

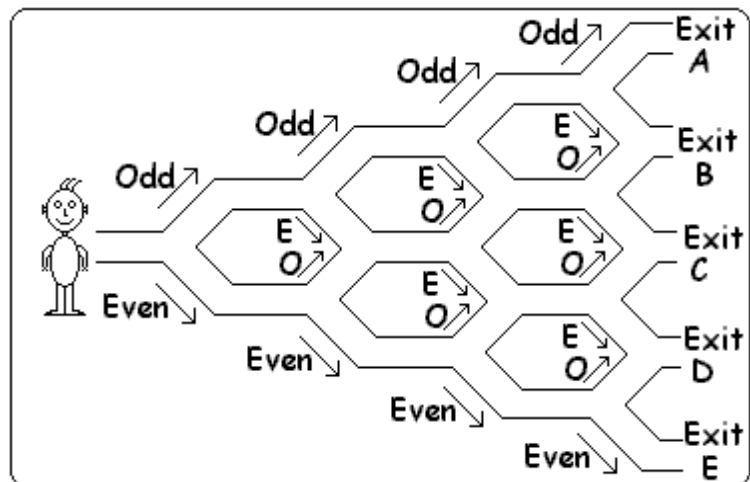
Exit	Tally	Frequency	Relative Frequency
A			
B			
C			

- 8) Were your predictions in question 7 correct?
- 9) If Mickey went through the maze 400 times, how many times would:
 - a) probability theory predict he would come out of exit A? **100**
 - b) your relative frequency suggest he would exit through A?
- 10) Repeat the calculations in Q9 for exits B and C. **Probability theory suggests 200 and 100.**

Task C The Big Maze

The next maze Mickey tries is even bigger still.

- 1) How many routes will take Mickey to...
 - a) Exit A? **1**
 - b) Exit B? **4**
 - c) Exit C? **6**
 - d) Exit D? **4**
 - e) Exit E? **1**



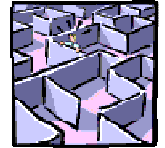
- 2) Write down the probability of Mickey leaving through each of the five exits.

$P(A) = 1/16$
 $P(B) = 4/16$
 $P(C) = 6/16$
 $P(D) = 4/16$
 $P(E) = 1/16$
- 3) If Mickey travelled the maze 160 times, how many times would you expect him to leave through each of the five exits?

$A = 1/16 \times 160 = 10$

 $B = 4/16 \times 160 = 40$
 $C = 6/16 \times 160 = 60$
 $D = 4/16 \times 160 = 40$
 $E = 1/16 \times 160 = 10$

Mickey's Mazes 3 Answers



Task E Weird Mazes

The following mazes have much more complicated probabilities.

- 1) For each maze you must do the following:
 - a) Work out how many routes there are through each maze.
 - b) Work out the probability of arriving at each exit.

	No. of Paths	P(A)	P(B)	P(C)	P(D)	P(E)
Maze 1	4	1/4	1/4	1/2		
Maze 2	7	1/8	3/8	1/2		
Maze 3	4	1/4	1/4	1/4	1/4	
Maze 4	4	1/4	1/8	1/8	1/2	
Maze 5	10	1/8	3/8	5/16	1/8	1/16

- c) Guide Mickey through the maze 20 times to see if your probabilities are correct.

