

SMALL GROUP ACTIVITY

WHAT IS CHANCE?

- a. You are about to throw a die. Which is harder to get – a 1 or a 6?
- b. You are about to throw 2 dice, hoping to get a double. What is the hardest double to get?
- c. I throw a thumbtack onto the desk. It can land either ‘point up’ or ‘point down’. What is the chance that it will land ‘point up’? Explain your answer.
- d. Lisa is about to throw a die. If she throws a 3, she will win \$100 000. If she throws any other number she wins nothing. Which is the hardest number for Lisa to get?
- e. Aimee chose these Powerball numbers: 1, 2, 3, 4, 5 and a Powerball of 6.
Krissie chose these Powerball numbers: 37, 21, 15, 24, 16 and a Powerball of 4.

Who has a better chance of winning? Explain your answer.

- f. Colin is flipping a coin. Heads has just come up 10 times in a row! Is the chance of getting Heads on the next throw
 - A. less than the chance of getting tails?
 - B. equal to the chance of getting tails?
 - C. greater than the chance of getting tails?

Explain your choice.

- g. You throw 2 coins. Which is more likely?
 - A. Getting 2 Heads.
 - B. Getting a Head and a Tail.
 - C. They are equally likely.

Explain your choice.

- h. You throw 2 dice. Which is more likely?
 - A. Getting double 3.
 - B. Getting a 3 and a 4.
 - C. They are equally likely.

Explain your choice.

- i. I throw a coin 20 times. How likely is it that I get exactly 10 Heads?
- j. Your class has been asked to throw a coin 10 times and record the results (Heads or Tails). To save time, Nathan gets 10 coins and throws them together. Will that make any difference? Explain.
- k. If Tahnee throws a coin 10 times, which outcome below is more likely, A or B? Explain your choice.

Throw Number	1	2	3	4	5	6	7	8	9	10
A	H	T	T	H	T	H	H	T	T	T
B	H	H	H	H	H	T	T	T	T	T

- l. You are planning a picnic for tomorrow. The weatherman says the chance of rain tomorrow is 80%. Explain what the weatherman means by this.
- m. You are planning a picnic for tomorrow. The weatherman says the chance of rain tomorrow is 100%. Explain what the weatherman means by this.
- n. You throw 2 dice. The total can be any number from 2 to 12. Which total is most likely? Explain.
- o. Which is the more likely cause of death – being killed in a plane crash or dying of a heart attack? Explain.

PROBABILITY MISCONCEPTIONS - ANSWERS

SMALL GROUP ACTIVITY

WHAT IS CHANCE?

- a. You are about to throw a die. Which is easier to get – a 1 or a 6?

Misconception A 6 is hardest to get because it is more desirable.

- b. You are about to throw 2 dice, hoping to get a double. What is the hardest double to get?

Misconception A double 6 is hardest to get because it is more desirable.

- c. I throw a thumbtack onto the desk. It can land either 'point up' or 'point down'. What is the chance that it will land 'point up'? Explain your answer.

Misconception If you have 2 outcomes, they must be equally likely. Since 'point up' and 'point down' are not symmetric, this can only be determined by throwing a thumbtack an infinity of times. Since this might take some time, we might be happy approximating the answer by throwing the thumbtack, say 100 times.

- d. Lisa is about to throw a die. If she throws a 6, she will win \$10 000. If she throws any other number she wins nothing. What is the chance that she will throw a 6?

Misconception If an outcome is more desirable, the chance of it occurring decreases.

- e. Aimee chose these Powerball numbers: 1, 2, 3, 4, 5 and a Powerball of 6.
Krissie chose these Powerball numbers: 37, 21, 15, 24, 38, 16 and a Powerball of 4.

Who has a better chance of winning? Explain your answer.

Misconception A random sequence of numbers is more likely in Powerball than a set of numbers with a pattern.

- f. Colin is flipping a coin. Heads has just come up 5 times in a row! Is the chance of getting Heads on the next throw

- A. less than the chance of getting tails?
- B. equal to the chance of getting tails?
- C. greater than the chance of getting tails?

Explain your choice.

Misconception Many students think that a coin has a memory, so for example if Heads comes in 5 times in a row, then: $P(H \text{ on next throw})$ is very small OR $P(H \text{ on next throw})$ is very large.

- g. You throw 2 coins. Which is more likely?

- A. Getting 2 Heads.
- B. Getting a Head and a Tail.
- C. They are equally likely.

Explain your choice.

Misconception Getting 2 Heads is just as likely as getting a Head and a Tail. Solution – draw a grid, showing all outcomes.

- h. You throw 2 dice. Which is more likely?

- A. Getting double 3.
- B. Getting a 3 and a 4.
- C. They are equally likely.

Explain your choice.

Misconception Getting doubles is just as likely as getting non-doubles. Solution – draw a grid, showing all outcomes.

- i. I throw a coin 20 times. How likely is it that I get 10 Heads?

Misconception Because 10 is the most likely outcome, that the chance of it occurring is very high. Best tackled by experiment, if time permits.

- j. Your class has been asked to throw a coin 10 times and record the results (Heads or Tails). To save time, Nathan gets 10 coins and throws them together. Will that make any difference? Explain.

Misconception That the probabilities are different if coins are tossed together rather than one after the other. Ask the student - does any coin know if other coins have been tossed previously?

- k. If Tahnee throws a coin 10 times, which outcome below is more likely, A or B? Explain your choice.

Throw Number	1	2	3	4	5	6	7	8	9	10
A	H	T	T	H	T	H	H	T	T	T
B	H	H	H	H	H	T	T	T	T	T

Misconception If a sequence looks random, it has a greater chance of occurring. Solution – Calculate the probability of each sequence.

- l. You are planning a picnic for tomorrow. The weatherman says the chance of rain tomorrow is 80%. Explain what the weatherman means by this.

Misconception Because 80% is so high, this means it *will* rain tomorrow.

- m. You are planning a picnic for tomorrow. The weatherman says the chance of rain tomorrow is 100%. Explain what the weatherman means by this.

Misconception Even though the chance of rain is 100%, there is still a chance that it won't rain tomorrow.

- n. You throw 2 dice. The total can be any number from 2 to 12. Which total is most likely? Explain.

Misconception When you throw 2 dice, all total are equally-likely. Solution – draw a grid.

- o. In Australia, which is the more likely cause of death - being electrocuted or being attacked by a shark? Explain.

Misconception Events that get much media coverage are more likely to occur.
Solution – get the facts.