

Section 3.1

Questions:

- Which is more likely, rolling a "six" on four throws of one dice, or rolling a "double six" on 24 throws with two dice?
Which option do you think is more likely? Why?

- If you were the first person to write a book on probability, what would it contain?

Definitions

Event –

an outcome from an experiment

Experiment – the process by which we obtain an outcome

Random experiment – is one where there is uncertainty over whether the event will occur.

Three ways to find the value of the probability of an event

- Theoretical Probability
- Experimental Probability
- Subjective Probability

A probability cannot be greater than 1.

What are the three ways that you can write a probability?

- decimal
- fraction
- percentage

What is the difference between the word fair and biased?

fair (unbiased) = The probability of each is the same
 biased – probabilities are different (think of a coin or die)

1. Theoretical Probability

- A list of outcomes is known as the Sample space
 - Theoretical Probability is what you think it should be
- The theo prob of event A is $P(A) = \frac{n(A)}{n(u)}$ where $n(A)$ is the # of ways event A can occur + $n(u)$ is the total # of outcomes.
- If the probability of an event is P , how many times would you expect an event to occur in n trials?

$n \cdot P$ times (multiply $n \cdot P$)

Example: A fair 12 sided die has faces numbered 1-12. Event A is defined as "the number rolled is a multiple of 3".

How many possible outcomes are there? How many of the outcomes are multiples of 3?

Determine the $P(A)$.

$n(u) = 12$ $n(A) = 4$ $P(A) = \frac{n(A)}{n(u)} = \frac{4}{12} = \frac{1}{3}$

If the die were rolled 50 times, how many multiples of three would you expect?

$n \cdot P(A) = 50 \cdot \frac{1}{3} = 16 \frac{2}{3}$ times ≈ 17 times

see blue box on pg 65 for explanation idea

Experimental Probability (also known as empirical)

- What or why is experimental probability used?
when outcomes are not equally likely
- Given a fair coin what is the probability of tossing a head in one trial? Ten trials? 50 trials? * use graphing calc app to toss coin
- What is relative frequency? How often something happens \div all outcomes
- As the number of trials increases what happens to the relative frequency?
it gets closer and closer to the actual (theoretical) probability
- If a coin is tossed 510 times, how many heads will we estimate to get if we use our relative frequency?

$510 \cdot \text{relative frequency}$
or
 $510 \cdot \text{theoretical probability}$

given as a decimal ↓

Subjective Probability

- What is subjective probability? You can't always repeat an experiment a large # of times. We estimate probability on subjective judgement, experience, information or belief
- Give an example where you would use subjective probability?
Who will win this year's NA/FC Basketball game
Based on previous years --- NA will win.

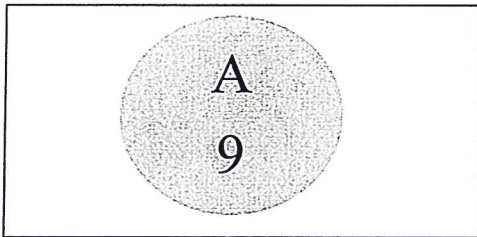
ASSIGNMENT EXERCISES 3A

Pg. 67-68 # 1-7

Section 3.2

Venn Diagrams

There are 30 students in the IB Math SL classes. 9 of them have Mr. Kaiser. Show this information in a Venn Diagram



Set A is students who have Mr. Kaiser.

$$n(A) = 9$$

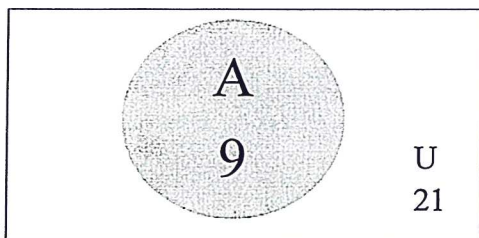
The rectangle represent the 30 students.

$$n(U) = 30$$

If an IB Math SL student is chosen at random. The probability they have Mr. Kaiser, $P(A) = \frac{9}{30} = \frac{3}{10}$

Complementary event A'

- A' (read A prime) is the complement of set A
- The complement represents the number of times the event does not occur.



From the diagram we see that $n(A') = n(U) - n(A)$

$$30 - 9 = 21$$

The probability that a student does not have Mr. Kaiser,

$$P(A') = \frac{21}{30} = \frac{7}{10}$$