5.2 Odds

Odds: a ratio used to represent a level of confidence that an event will occur.

Odds in Favour: The ratio of the probability that an event will occur.

$$\text{Odds in favour} = \frac{P(A)}{P(A')}$$

Odds Against: The ratio of the probability that an event will not occur.

$$\text{Odds against} = \frac{P(A')}{P(A)}$$

Example 1: Determine the **odds** as indicated for each of the following events:

a) A hockey analyst gives the Canadian women's hockey team a 75% probability of winning the gold medal in the next Winter Olympics. Based on this prediction, what are the odds in favour of Canada winning the gold medal?

A = winning gold

$P(A) = 0.75$

$P(A') = 1 - 0.75$

$= 0.25$

$\text{Odds}(A) = \frac{0.75}{0.25}$

$= \frac{3}{1}$

∴ The odds in favour are 3 : 1

b) A local sports journalist estimates that the MSS girls' volleyball team has a 40% probability of going to the OFSAA championship tournament. What are the **odds against** the girls making OFSAA?

A = go to OFSAA

$P(A) = 0.40$

$P(A') = 1 - 0.40$

$= 0.60$

$\text{Odds against}(A) = \frac{0.6}{0.4}$

$= \frac{3}{2}$

∴ The odds against are 3 : 2.

If you know the number of outcomes for an event, you can use the following to calculate odds:

Odds in Favour $= \frac{n(A)}{n(A')}$ **Odds Against** $= \frac{n(A')}{n(A)}$

Example 2: Your pencil case has 3 red pens, 5 blue pens and 4 pencils. What are the odds of randomly drawing a pencil?

A = pencil odds $(A) = \frac{n(A)}{n(A')} = \frac{4}{8} = \frac{1}{2}$ ∴ The odds of drawing a pencil are 1:2.

In general, if the **odds in favour** are $A = \frac{h}{k}$, then $P(A) = \frac{h}{h+k}$; $P(A') = \frac{k}{h+k}$.

Example 3: Ms. Ye feels that the odds of passing this course are 8 to 1 when a student misses fewer than 3 classes. What is the probability that a student with good attendance will pass the course?

A = pass

Odds $(A) = \frac{8}{1}$ $P(A) = \frac{8}{8+1} = \frac{8}{9}$ or 88.9% chance you pass.

Example 4: The odds of Arti hitting a three-point shot are 3:5. What is the probability that you will see him hit a three-point shot when you go see a game?

B = make 3 point shot

Odds $(B) = \frac{3}{5} \longrightarrow P(B) = \frac{3}{3+5} = \frac{3}{8}$ or 37.5% chance to hit 3-point shot.