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The wide world of sports betting

GambleAware

NSW
GOVERNMENT

Activity introduction

Quick summary

Sports betting is everywhere. Ads for gambling platforms dominate at sporting events. Big celebrities are promoting it. Even school children talk about sports in terms of odds and percentages.

Most Australians are involved with sports at some level, and this can create the illusion that our ability to predict results is greater than it really is.

The concern with young people is that exposure to gambling and gambling advertising puts them at risk of experiencing gambling harm as adults.

This lesson will teach students the difference between perfectly predictable events (like the roll of a die) and less certain events (such as sports). It will also reveal how bookmakers create odds to guarantee a profit and pay gamblers less for a win than they deserve.

Learning intentions

Students will:

- understand the many factors that determine who will win a sporting match

- understand that sports predictions are extremely complicated

- understand how odds are calculated to be in the bookmaker's favour.

Syllabus outcomes

- **MAO-WM-01** develops understanding and fluency in mathematics through exploring and connecting mathematical concepts, choosing and applying mathematical techniques to solve problems, and communicating their thinking and reasoning coherently and clearly

- **MA4-PRO-C-01** solves problems involving the probabilities of simple chance experiments

- **MA4-FRC-C-01** represents and operates with fractions, decimals and percentages to solve problems

- **MA4-RAT-C-01** solves problems involving ratios and rates, and analyses distance-time graphs

- **MA4-EQU-C-01** solves linear equations of up to 2 steps and quadratic equations of the form $ax^2 = c$

The identified Life Skills outcomes that relates to this activity are **MALS-LAN-01** recognises language that represents number, and **MALS-LAN-02** responds to and uses language that represents number.

Capabilities and priorities

Numeracy
Critical and creative thinking
Ethical understanding

Topic
Gambling probability

Unit of work
Mathematics Stage 4

Time required
55 minutes

Level of teacher scaffolding
High - students will require strong scaffolding through the explicit instruction on calculating probabilities, but will be able to perform the tasks independently.

Resources required

- Calculators – one per student

- Whiteboard

Keywords
Gambling, betting, sports, casino, money, wellbeing, gaming.

Teacher worksheet

Teacher preparation

Gambling can be a high-risk activity and is a priority concern for young people. Therefore, before conducting the lesson on gambling, it is recommended that teachers read the Facilitator Pack. The pack provides teachers and parents with essential information about gambling harm amongst young people and clarifies the nature of gambling-related behaviours and how to approach sensitive topics.

Learning intentions

Students will:

- understand the many factors that determine who will win a sporting match

- understand that sports predictions are extremely complicated

- understand how odds are calculated to be in the bookmaker's favour.

Success criteria

Students can:

- discuss the influencing factors involved in sports

- calculate the bookmaker's favour based on their given odds.

> **Teaching sequence**
>
> 10 minutes - Part A: Who would win?
>
> 30 minutes - Part B: What are the odds?
>
> 10 minutes - Part C: Form guide
>
> 5 minutes - Reflection

Part A:
Who would win?

Work through this resource material in the following sequence:

Step 1

Ask your class which event they think is easier to **predict:**

• drawing a heart from a deck of cards

• the Penrith Panthers winning the next NRL Grand Final?

Your students may have impassioned thoughts on the NRL final, but not particularly care about a deck of cards.

Step 2

We can easily calculate the probability of drawing a heart from a deck of cards.

A standard deck has 52 cards, 13 of which are hearts. Therefore, the probability is:

P (drawing a heart) = 13/52 = 0.25

Step 3

What about the chance of the Panthers winning? Unfortunately, it's not quite that simple. Despite their position on the ladder, there are still many factors that determine the outcome of a rugby game, both internal and external to the team.

As class, make a list of what some of these may be.

Possible answers might include:

• the venue where the game is being played

• history between the two teams

• players currently in the team, especially who is injured

• importance of the match to the players/team

• weather conditions.

Step 4

Given all of this information, how can you accurately predict the winner? The simple answer is: you can't, not accurately. The factors involved are too numerous, and too chaotic. However, that doesn't stop people from trying.

Even when computers are involved, there's no real way of telling how accurate a prediction is. If we say that a particular team has a 10% chance of winning a game, how do we know if that's true or not? If we had a time machine we could watch the same game play out hundreds of times. If the team wins 10% of the games, then we can be fairly confident that our prediction was accurate. Of course this is impossible, and unfortunately we don't really have any better options.

Part B:
What are the odds?

Step 1

Ask your class who they think benefits from sports betting. It's a billion-dollar industry, but who exactly is making the money, and how?

Explain to students that, generally speaking, it's not the people making the bets. Bookmakers, or bookies, use the techniques that casinos use to turn a profit. They calculate the odds, then offer bettors a bad deal (but disguised as a good deal).

Step 2

For example, let's say a bookie offers the following odds on an NRL match:

Team	Odds
Unicorns	2.45
Ferrets	1.55

Explain to your class that these values are known as 'decimal odds'. They are the amount you could potentially win per $1 bet. So here, a $10 bet on the Unicorns would get you $24.50 if they won ($10 × 2.45 = $24.50).

Be careful though, that is not your profit!

The odds take into account how much you have wagered. In this example you would hand over $10 before the match, and get $24.50 back after. Your profit was actually just $14.50. So when the odds are 2.45, your potential profit is $1.45 per $1 gambled.

Step 3

To convert this figure into a percentage, we use this formula:

$$\text{Implied probability} = \frac{\text{Stake}}{\text{Total Payout}} \times 100\%$$

'Stake' is the amount you bet.

'Total Payout' is the amount you will get back on a win.

Because the odds are given based on a $1 bet, our 'Stake' will be 1.

So in this example the bookmaker believes that the Unicorns have a 1/2.45 × 100% = 40.8% chance of winning against the Ferrets.

Or at least, that's what they are claiming...

What do you students think about this? Will the Unicorns win 40.8% of the time, or 41 out of every 100 games, they play against the Ferrets?

Step 4

Put the following table on the board and perform the calculations with your class:

	Unicorns
Odds	2.45
Games won	1,000 x 40.8% = 408
Money bet	$10,000 ($10 per match)
Money won	408 x $24.50 = $10,000

Note: 408 x 24.5 = 9,996, but this is due to rounding down the 40.8 figure.

Step 5

In this scenario, the gambler handed over $10,000 of their own money.

The Unicorns won 408 games (exactly) as predicted, and the gambler 'won' $10,000 back.
Their net profit is $0.

However, that's also the profit for the bookmaker. The gambler hasn't lost any money, so the bookmaker has given back exactly as much as was wagered.

Step 6

Ask students, does this sound likely? Would the bookmaker offer a bet that stands to profit them $0?

Have a short discussion about why this would not be the case.

Now ask students to propose where we have gone wrong in the example above. (**Hint:** It's got nothing to do with the maths, at least not how the figures were originally proposed). Do we think that these are the 'true' odds of the match?

Step 7

Explain to students that the odds offered by the bookmaker never match the true odds of the outcomes.

In reality, the bookmaker has (through varied means) come up with their own prediction for the match, and are being less than fair to the gambler.

Part B: What are the odds?

Let's say they thought the Unicorns' chance of winning was really only 35%, or 0.35. How can we convert this into odds?

$$Odds = \frac{1}{Probability\ of\ winning}$$

In that case the correct odds should be:

$$\frac{1}{0.35} = 2.86$$

The bookmaker is actually paying less for a win than they should.

Step 8

Let's do our 1,000 game example, but this time assuming that the Unicorns' chance of winning is 35%.

	Unicorns
Odds	2.45
Games won	1,000 x 35% = 350
Money bet	$10,000
Money won	350 x $24.50 = $8575

Our net position is now: $8575 - $10,000 = -$1425. We lost $1425 over the course of 1,000 games. The bookmaker, however, has made a profit this time.

To work out the net loss per game we simply divide the amount lost by the number of games: 1,425 ÷ 1,000 = 1.425

This means that, on average, whenever odds of 2.45 are given on a team with a 35% chance of winning, you will lose $1.425 per $10 gambled. It doesn't sound like much, but a loss is a loss, and it could add up over time.

Part C: Form guide

Step 1

The table below shows the odds given by our bookmaker for a game this time between the Seahorses and the Ferrets. We can see from the table that they expect the Ferrets to win easily, because they are only prepared to offer a payout of $1.18 per $1 bet. In other words, this bet would only make a profit of 18 cents per dollar wagered.

Team	Odds
Seahorses	5.00
Ferrets	1.18

Step 2

Independently, students convert these odds into percentages with the following formula. The answers have been provided below for your convenience.

$$Percentage\ chance\ =\ \frac{1}{Odds} \times 100\%$$

$$Seahorses:\ \frac{1}{5} \times 100\% = 20\%$$

$$Ferrets:\ \frac{1}{1.18} \times 100\% = 84.75\%$$

Reflection

Ask your class whether or not this lesson has influenced them.

- Would you still bet on sports knowing that the odds are always stacked against you?

- Would you still bet on sports knowing there are a range of independent variables (weather, injuries) that might impact a team's ability to win outside of the odds?

- Might they be tempted to make a silly bet because they couldn't bring themselves to bet against their team?

- Do they think that rugby tipping competitions are considered gambling?

Teacher reflection

Take this opportunity to reflect on your own teaching:

What did you learn about your teaching today?

What worked well?

What didn't work so well?

What would you share?

Where to next?

How are you going to get there?