SCHOOL EDUCATION PROGRAM

VCAL – Numeracy unit:
WHAT ARE THE ODDS?

Lesson 4: Sports betting

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Lesson 4: Sports betting

Lesson goal:

To determine the chance of winning if the payout is high.

Through activities, simulations and discussions, you will learn that:

- there is a difference in potential winnings if a betting agency is involved or if it is not
- higher payouts are matched with lower probabilities of winning.

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Through this lesson we are going to do the following:

Tune in – background information

Class simulations:

- Even chances: use a coin or sports betting agency spreadsheet – Sports betting (other) tab
- One chance in four: use a pack of cards or sports betting agency spreadsheet – Sports betting (other) tab
- Soccer matches: use sports betting agency spreadsheet – Sports betting (soccer) tab

We will require the following worksheets:

- Student record sheet: Sports betting simulation
- Student worksheet 13 Sports betting

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Even chances – class simulation

Two equally good teams, Matildas and USA

Two students

One student bets $1 on the Matildas

The other bets $1 on USA

1. What is the probability of each team winning?
2. What is the payout for each team?
3. What might the payouts be if a betting agency that kept 5% was involved?

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Even chances – screen shot of sports betting agency spreadsheet

Sports Betting Agency

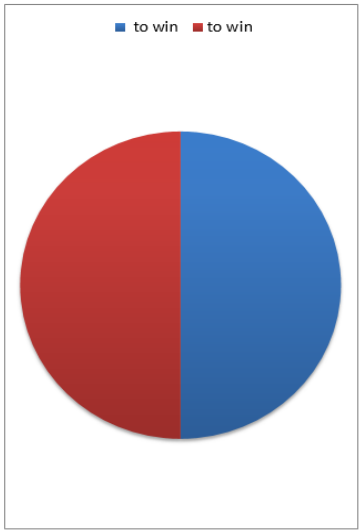
Type the team names and the total amounts bet on each. Delete percentage profit to start again.

Set the betting agency's percentage profit. Delete to restart. **5%**

Recalculate to play the game again (F9 or FN-F9)

Name the teams	**Matildas**	**USA**			
	to win	to win	Total		
Type the total bets for each result	**$20**	**$20**	$40		
Probabilities	0.500	0.500			
payouts (if no betting agency)	$2.00	$2.00			
payouts (less betting agency profit)	$1.90	$1.90			
Bet to payout ratio 1/payout	**0.53**	**0.53**	**1.05**	**Total**	

Result		**USA**
Total payout calculation		**20x$1.900**
Total payouts		**$38**
Betting agency keeps		**$2**
	Matildas	USA
long-term results	0	1
long term percentages	0%	100%



Read | Sports betting (other) | Sports betting (soccer)

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One chance in four – class simulation

Diamond or not diamond?
One card chosen from a pack
Four students
One student bets a $1 on a diamond
Three students bet a $1 each on not a diamond

1. What is the probability of a diamond ‘winning’?
2. What is the probability of a diamond ‘losing’ (not being selected)?
3. How much should the payout be for a diamond win?
4. How much should each of the other three students be paid if a diamond loses?
5. What payouts (in dollars) should be given for diamond vs not diamond?
6. What might the payouts be if a betting agency that keeps 15% was involved?

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One chance in four – screenshot of sports betting agency spreadsheet

Sports Betting Agency

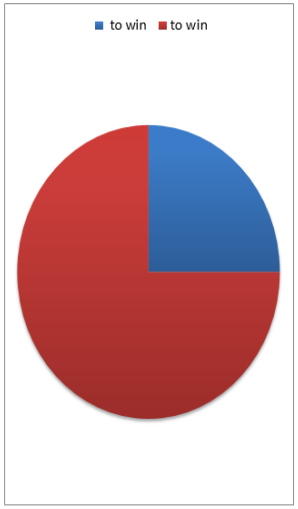
Type the team names and the total amounts bet on each. Delete percentage profit to start again.

Set the betting agency's percentage profit. Delete to restart. **15%**

Recalculate to play the game again (F9 or FN-F9)

Name the teams	**Diamond**	**Not Diamond**	
	to win	to win	Total
Type the total bets for each result	**$20**	**$60**	$80
Probabilities	0.250	0.750	
payouts (if no betting agency)	$4.00	$1.33	
payouts (less betting agency profit)	$3.40	$1.13	
Bet to payout ratio 1/payout	**0.29**	**0.88**	**1.18** **Total**

Result	**Diamond**	
Total payout calculation	**20x$3.400**	
Total payouts	**$68**	
Betting agency keeps	**$12**	
	Diamond	Not Diamond
long-term results	3	2
long term percentages	60%	40%



Read | Sports betting (other) | Sports betting (soccer)

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Soccer matches – class simulation

Australia vs Japan

20 students

$10 each to bet

15 bet on Australia

5 bet on Japan

No students bet on a draw

1. Does that mean that Australia is three times more likely to win than Japan?
2. Does that mean that Australia has three chances out of four of winning, a probability of ¾?

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Record sheet

Student record sheet
Sports betting simulation

Start with $50 and bet $10 on each match. Decide if Australia will win, lose or draw.

Circle your choice before each game simulation.

	My choice (circle one)	Bet	Payout, if any result
Match 1	Win Lose Draw	$10	
Match 2	Win Lose Draw	$10	
Match 3	Win Lose Draw	$10	
Match 4	Win Lose Draw	$10	
Match 5	Win Lose Draw	$10	
	Total	$50	
	Total payout less $50		

Did you win or lose?_____ How much?_____

Application task

Use the spreadsheet with the following set-up: Betting agency percentage 20%, Australia $200 to win, Japan $400 to win and $200 for the draw.

Predict: How many home team wins will there be in 20 matches? _____

Observe: Carry out 20 simulations of $1 bets on the home team.

How many home team wins were there? _____

Calculate the total payout at $3.20 per win. _____

How much money is won or lost on the 20 x $1 bets? _____

Explain: Was your number of wins reasonably close to what you predicted? Would you prefer this or the alternative of either a big loss or a big win on just one $20 bet?

_____

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Soccer matches – screenshot of sports betting agency spreadsheet

Sports Betting Agency

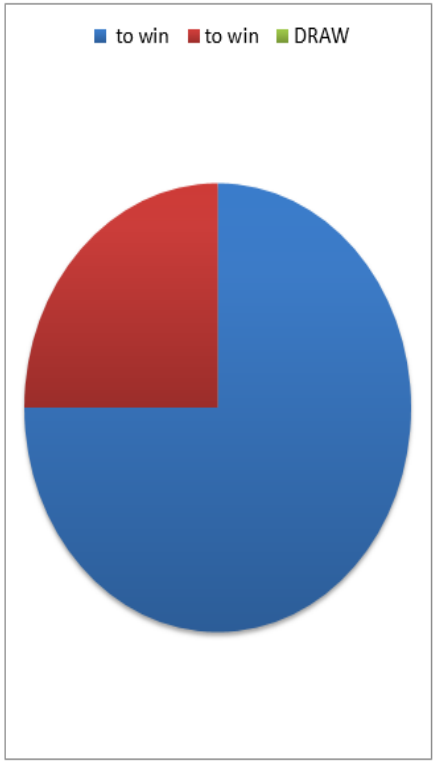
Type the team names and the total amounts bet on each. Delete percentage profit to start again.

Set the betting agency's percentage profit. Delete to restart. **20%**

Recalculate to play the game again (F9 or FN-F9)

Name the teams	**Australia**	**Japan**		
	to win	to win	DRAW	Total
Type the total bets for each result	**$150**	**$50**	**$0**	$200
Probabilities	0.750	0.250	0.000	
payouts (if no betting agency)	$1.33	$4.00	$0.00	
payouts (less betting agency profit)	$1.07	$3.20	$0.00	
Bet to payout ratio 1/payout	**0.94**	**0.31**		

Result	**Australia**			**Total**
Total payout calculation	**150x$1.067**			#######
Total payouts	**$160**			
Betting agency keeps	**$40**			
	Australia	Japan	DRAW	
long-term results	1	0	0	
long term percentages	0%	0%	0%	



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Worksheet

Student worksheet 13
Sports betting

NAME: _____

1. In a game of heads and tails not involving a betting agency, a person collects $1 from each of two players who are prepared to bet on the toss of a coin.

   a. How much should be paid to the loser? _____

   b. How much should be paid to the winner? _____

   c. Which of these payouts should the person offer? Circle your choice.

      i. Heads $2 vs tails $2

      ii. Heads $1 vs tails $1

2. The Birds and the Felines are two equally good football teams.

   a. What payouts should be offered for $1 bets on this match if there is no betting agency involved?

      Birds $ _____ vs Felines $ _____

   b. Ant online betting agency sets its payouts at 95% of all bets placed. What would be the betting agency payouts for this match?

      Birds $ _____ vs Felines $ _____

3. A betting agency advertises Giants $1.05 vs Sharks $10.

   a. How much money would you win with a winning $1 bet on the Giants? _____

   b. How much money would you win with a winning $1 bet on the Sharks? _____

   c. Which team is favoured to win? _____

4. The Reds are only very slightly favoured towards the end of a very close match against the Blues.

   a. What payouts would you suggest for a $1 bet that doesn't involve a betting agency?

      Reds $ _____ vs Blues $ _____

   b. What payouts would an online betting agency be likely to offer in the same situation?

      Reds $ _____ vs Blues $ _____

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Key message

Higher payouts are matched with lower probabilities of winning.

Review your understanding:

1. Do you agree with this statement? Explain your answer.
2. How would you explain the meaning of this statement to someone else who didn't understand its meaning?
3. Why would a betting agency offer a large payout on something that is unlikely to happen?
4. Explain one other thing that you have learnt in this lesson.

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