VCAL – Numeracy unit:
What are the odds?
This unit has been written by the Mathematical Association of Victoria (MAV). The MAV has existed for more than 100 years and aims to promote mathematics in society. Most of the MAV’s work is with teachers, helping them to make mathematics better understood and more relevant to students’ lives. The MAV has joined with the Victorian Responsible Gambling Foundation to help students learn to avoid gambling-related harm while developing numeracy skills.

mav.vic.edu.au

Acknowledgements

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Victorian Responsible Gambling Foundation

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The Victorian Responsible Gambling Foundation is working towards reducing harm from gambling in our community by building greater awareness and understanding of the risks involved. We work with young people, educators, coaches and parents, to provide information and practical resources to prepare young people before they reach the legal gambling age.

The gambling environment has changed. Never before has gambling been so heavily promoted and accessible, especially through sport, making it feel like a normal part of the game. As a result, it can be difficult for students to recognise the potential harms of gambling. We want young people to love the game, not the odds.

Our School Education Program is one of a suite of Love the Game community programs that raise awareness about the way young people are increasingly exposed to gambling.

Drawing on the latest research, this free program supports your secondary school community to help students develop informed attitudes to gambling.

The program offers:

• face-to-face information sessions for teachers, parents and students

• units of work to incorporate in your curriculum plans across a variety of subject areas, including this unit

• useful resources for parents.

Helping students to understand the limited chances of winning is an important part in developing informed attitudes and building their resilience to future gambling harm. However, it is important to acknowledge that gambling attitudes and subsequent behaviour are a complex interplay of factors such as promotion as well as interpersonal and social influences. We encourage schools to take a holistic approach to this issue, and provide assistance with a suite of School Education Program resources with this, available at www.lovethegame.vic.gov.au/resources.

If, when teaching this unit, you become concerned that gambling is affecting a student, you can refer them to our free and confidential Gambler’s Help Youthline support service on 1800 262 376 or at gamblershelp.com.au/youthline. Concerned teachers and parents can also contact this service for advice or visit gamblershelp.com.au for more information.
Unit overview

Unit structure
This unit comprises of five lesson plans, each including:

• learning sequences with teacher notes
• PowerPoint presentations
• student worksheets for use in class activities
• spreadsheets for demonstrating gambling outcomes and data.

The most up-to-date version of this resource is available at lovethegame.vic.gov.au/resources.

VCAL
The VCAL curriculum indicates links to gambling harm and its effects on society.

Aims
Study in this strand is designed to:

• develop knowledge, skills and attributes relevant to reading, writing and oral communication and their practical application in the contexts of everyday life, family, employment, further learning and community
• develop knowledge, skills and attributes relevant to the practical application of numeracy in the contexts of everyday life, further learning, work and community
• provide pathways to further study and work.

(From VCAL Literacy and Numeracy Skills Strand Curriculum Planning Guide, 2018, page 1)

Numeracy Skills purpose statement
The purpose of the numeracy curriculum selected for this strand is to enable the development of knowledge, skills and attributes relevant to identifying, applying and communicating mathematical information in the contexts of everyday life, family, employment, further learning and community.

Numeracy skills corresponding with these social contexts include mathematical knowledge and techniques, financial literacy, planning and organising, measurement, data, representation, design, problem-solving, using software tools and devices, and further study in mathematics or related fields.

(From VCAL Literacy and Numeracy Skills Strand Curriculum Planning Guide, 2018, page 1)

Unit focus
The aim is to develop informed attitudes to gambling by clearly:

• illustrating that ‘chance has no memory’
• demonstrating that gambling games such as pokies involve random processes, and that previous results have no impact upon future outcomes, which are impossible to predict
• demonstrating that the real winners from gambling are betting agencies and gaming venues seeking to make profits by taking money from players.

Students learn about the randomness of gambling games and experience the difficulty of predicting outcomes.

Students explore firsthand how betting agencies design products to maximise profits.

Students are encouraged to think critically about the sports and race betting advertising they see to develop informed attitudes to gambling.
Planning your time

The time allocation for each lesson is 50–100 minutes. This is broad. The length of each lesson will depend on a number of factors, including:

- the amount of discussion generated
- the manner in which the activities are conducted
- the number of trials run for particular activities.

If there is insufficient class time to deliver all five lessons, it is recommended that Lesson 1 be included as it is key to debunking many of the gambling myths.

Suggested approach

As well as the learning outcomes outlined in the curriculum links above, this unit focusses on three key messages.

1. Chance has no memory.
2. The greater the number of bets, the greater the certainty of losing the money you start with.
3. Payouts are less than the amount bet, over time.

Ideally students will go through each lesson, but if time is limited the following components are recommended:

- Lesson 1 ‘Chance has no memory’ is essential as it lays the foundation work for the following lessons. The lesson includes an activity to help students define various gambling terminology.
- Lesson 2 ‘Who are the real winners?’ part A focuses on understanding payouts and how gambling agencies use these to make a profit.
- Lesson 3 ‘Pokies’ part A delves further into the risks involved with betting more. Although part B ‘Know your odds’, involves a short engaging activity, this can be omitted if pressed for time.

The final two lessons further explore the three key messages through sports betting (Lesson 4) and horseracing (Lesson 5), both prominent forms of gambling in Australia. Either lesson flows well from Lesson 3 and can be done in either order. Consider student’s interests if you have time for only one.

A student reflection Activity and Self-Assessment Record is located in the Appendix.

Resources

Students should have access to:

- computers and the internet
- an interactive whiteboard or a data projector
- the student resources contained and mentioned in this unit (see below)
- cards, coins and tokens as required.

Worksheets

Worksheets are provided for each lesson. Some worksheets are in order of difficulty from easiest to hardest.

There is also a reflection activity handout for students to complete after they have finished the unit. Parts of the reflection activity can be omitted if not all lessons are covered.

Spreadsheets

Spreadsheets are provided for some lessons. These enable the teacher to demonstrate gambling outcomes, and in some cases to collect data for completion of the worksheets, and should be projected in class using a data projector or screen.

It is recommended that teachers familiarise themselves with these spreadsheets prior to running a lesson, to ensure that they are set up and working properly. Teachers are also encouraged to run some simulations before starting lessons with students.
Instructions for preparing each spreadsheet are provided in each spreadsheet on the first tab that loads after opening.

Spreadsheets to be used:

<table>
<thead>
<tr>
<th>Lesson</th>
<th>Spreadsheet required</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Card sharp</td>
</tr>
<tr>
<td>2</td>
<td>Card sharp</td>
</tr>
<tr>
<td>2</td>
<td>Setting limits</td>
</tr>
<tr>
<td>3</td>
<td>Pokies</td>
</tr>
<tr>
<td>4</td>
<td>Sports betting</td>
</tr>
<tr>
<td>5</td>
<td>Melbourne Cup</td>
</tr>
<tr>
<td>5</td>
<td>A day at the races</td>
</tr>
</tbody>
</table>

Spreadsheets can be accessed from responsiblegambling.vic.gov.au/reducing-harm/schools/resources-teachers/.
## Curriculum links

<table>
<thead>
<tr>
<th>Foundation level</th>
<th>Intermediate level</th>
<th>Senior level</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aims to build confidence to:</td>
<td>Looks at mathematics applied to:</td>
<td>Explores mathematics beyond its familiar and everyday use to its applications in wider, less personal contexts such as:</td>
</tr>
<tr>
<td>• perform simple and familiar numeracy tasks</td>
<td>• normal routine tasks</td>
<td>• newspapers and other media reports</td>
</tr>
<tr>
<td>• make sense of mathematics in their daily personal lives</td>
<td>• workplace tasks</td>
<td>• workplace documents and procedures</td>
</tr>
<tr>
<td>• perform everyday single step mathematical tasks.</td>
<td>• tasks related to the community.</td>
<td>• specific projects at home or in the community.</td>
</tr>
<tr>
<td></td>
<td>The purpose is to develop everyday numeracy skills to make sense of daily, personal and public life.</td>
<td></td>
</tr>
</tbody>
</table>

### Lesson 1

<table>
<thead>
<tr>
<th>Learning outcome 1 (Unit 1) Numerical skills and processes</th>
<th>Learning outcome 1 (Unit 1) Numerical skills and processes</th>
<th>Learning outcome 1 (Unit 1) Numerical skills and processes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elements</td>
<td>Elements</td>
<td>Elements</td>
</tr>
<tr>
<td>• Recognise whole numbers and simple, familiar fractions and decimals in numeral and word form.</td>
<td>• Use whole, large numbers and fractions to interpret numerical information in familiar and unfamiliar contexts.</td>
<td>• Collect, organise and represent data in a range of formats. Use knowledge about chance and probability to estimate and interpret the outcomes of common chance events in both numerical and qualitative terms.</td>
</tr>
<tr>
<td>d. Writing and interpreting numerical expressions.</td>
<td>d. Writing and interpreting numerical expressions.</td>
<td>e. Applying mathematics.</td>
</tr>
<tr>
<td>• Collect and organise familiar data.</td>
<td>• Collect and organise familiar and unfamiliar data and construct tables, graphs and charts, manually or using software tools and devices.</td>
<td>• Use and apply knowledge about probability to a range of relevant contexts.</td>
</tr>
<tr>
<td>• Construct simple tables, graphs or charts manually or using software tools.</td>
<td>• Describe, compare and interpret the likelihood of everyday chance events using qualitative terms.</td>
<td>• Calculate theoretical probabilities and use tree diagrams to investigate the probability of outcomes in simple multiple-event trials.</td>
</tr>
<tr>
<td>• Perform simple calculations.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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### Lesson 2

<table>
<thead>
<tr>
<th>Learning outcome 1 (Unit 1) Numerical skills and processes</th>
<th>Learning outcome 1 (Unit 1) Numerical skills and processes</th>
<th>Learning outcome 1 (Unit 1) Numerical skills and processes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Elements</strong></td>
<td><strong>Elements</strong></td>
<td><strong>Elements</strong></td>
</tr>
<tr>
<td>• Demonstrate and apply the basic concept of average.</td>
<td>• Collect and organise familiar and unfamiliar data and constructed tables, graphs and charts, manually or using software tools and devices.</td>
<td>• Collect and organise familiar and unfamiliar data and constructed tables, graphs and charts, manually or using software tools and devices.</td>
</tr>
<tr>
<td>d. Writing and interpreting numerical expressions.</td>
<td>• Find the mean, median and mode of collected data.</td>
<td>• Find the mean, median and mode of collected data.</td>
</tr>
<tr>
<td>• Collect and organise familiar data.</td>
<td>• Construct simple tables, graphs or charts manually or using software tools.</td>
<td>• Perform simple calculations.</td>
</tr>
<tr>
<td>• Construct simple tables, graphs or charts manually or using software tools.</td>
<td>• Perform simple calculations.</td>
<td>• Perform simple calculations.</td>
</tr>
</tbody>
</table>

### Lesson 3

<table>
<thead>
<tr>
<th>Learning outcome 1 (Unit 1) Numerical skills and processes</th>
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<th>Learning outcome 1 (Unit 1) Numerical skills and processes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Elements</strong></td>
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<td><strong>Elements</strong></td>
</tr>
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<td>• Find the mean, median and mode of collected data.</td>
<td>• Find the mean, median and mode of collected data.</td>
</tr>
<tr>
<td>• Collect and organise familiar data.</td>
<td>• Perform simple calculations.</td>
<td>• Perform simple calculations.</td>
</tr>
</tbody>
</table>

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### Lesson 4

<table>
<thead>
<tr>
<th>Learning outcome 1 (Unit 1) Numerical skills and processes</th>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>Elements</strong></td>
<td><strong>Elements</strong></td>
<td><strong>Elements</strong></td>
</tr>
<tr>
<td>• Recognise whole numbers and simple, familiar fractions and decimals in numeral and word form.</td>
<td>• Use whole, large numbers and fractions to interpret numerical information in familiar and unfamiliar contexts.</td>
<td>• Use knowledge about chance and probability to estimate and interpret the outcomes of common chance events in both numerical and qualitative terms.</td>
</tr>
<tr>
<td>d. Writing and interpreting numerical expressions.</td>
<td>d. Writing and interpreting numerical expressions.</td>
<td>e. Applying mathematics.</td>
</tr>
<tr>
<td>• Perform simple calculations.</td>
<td>• Describe, compare and interpret the likelihood of everyday chance events using qualitative terms.</td>
<td>• Use and apply knowledge about probability to a range of relevant contexts.</td>
</tr>
</tbody>
</table>

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### Lesson 5

<table>
<thead>
<tr>
<th>Learning outcome 1 (Unit 1)</th>
<th>Learning outcome 1 (Unit 1)</th>
<th>Learning outcome 1 (Unit 1)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Numerical skills and processes</strong></td>
<td><strong>Numerical skills and processes</strong></td>
<td><strong>Numerical skills and processes</strong></td>
</tr>
<tr>
<td><strong>Learning outcome 2 (Unit 1) Financial literacy</strong></td>
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<td></td>
</tr>
</tbody>
</table>

#### Elements

<table>
<thead>
<tr>
<th></th>
<th></th>
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</thead>
<tbody>
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<td>• Use whole, large numbers and fractions to interpret numerical information in familiar and unfamiliar contexts.</td>
<td>• Use knowledge about chance and probability to estimate and interpret the outcomes of common chance events in both numerical and qualitative terms.</td>
</tr>
<tr>
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<td></td>
</tr>
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<td>• Describe, compare and interpret the likelihood of everyday chance events using qualitative terms.</td>
<td>• Use and apply knowledge about probability to a range of relevant contexts.</td>
</tr>
<tr>
<td>• Perform simple calculations.</td>
<td></td>
<td>• calculate theoretical probabilities and use tree diagrams to investigate the probability of outcomes in simple multiple-event trials.</td>
</tr>
</tbody>
</table>

#### Elements (Learning outcome, 1 Unit 1)

<table>
<thead>
<tr>
<th>e. Applying mathematics.</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Convert between percentages, decimals, fractions and ratios as they relate to money.</td>
<td></td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Lesson</th>
<th>Learning outcomes</th>
<th>Activities</th>
<th>Resources and links to assessment</th>
</tr>
</thead>
</table>
| **1. Chance has no memory (50–100 minutes)** | F, I, S: Students will understand:  
• chance has no memory  
• outcomes are impossible to predict  
• previous outcomes do not affect future ones  
• no strategy can reliably predict future results in a gambling game.  
S: Students will understand that for equally likely events, after a very large number of outcomes, the results tend to even out. | • Initial activities and discussion  
• Whole class simulation  
• Worksheets  
• Final discussion | • Packs of cards  
• Activities 1 and 2 ‘Be aware of gambling: Terminology’  
• ‘Card sharp’ spreadsheet  
• Student worksheet 1 ‘Card sharp’  
• Student Worksheets 2A and 2B ‘Chance has no memory’ |
| **2. Who are the real winners? (50–100 minutes)** | F, I, S: Students will understand:  
• differences in payouts arise when a gaming venue is involved  
• total payouts are not always 100 percent of the amount bet  
• games provided by gaming venues are designed to make a profit.  
• the more a player gambles, the more likely they are to lose money  
• if a player sets a limit ahead of time and keeps to it, they will be less likely to lose money.  
F, I, S: Students will interpret graphs generated by a spreadsheet. | • Whole class simulations  
• Spreadsheet demonstrations  
• Use of appropriate levels of worksheets  
• Discussions | • A pack of cards  
• Tokens  
• ‘Card sharp’ spreadsheet  
• Student worksheets 3, 4 and 5 ‘Who are the real winners?’  
• ‘Setting limits’ spreadsheet  
• Student worksheets 6, 7 and 8 ‘Setting limits’ |
### 3. Poker machines (50–100 minutes)

**F, I, S:** Students will understand:
- random mathematical processes control poker machines,
- payouts are less than the amounts bet over time
- gaming machine venues can legally make payouts less than the amounts played
- the greater the number of bets the greater the certainty of losing all of the money they started with

**F:** Students will be able to read graphs to compare results of short-term and long-term gambling.

**I, S:** Students will be able to collect and analyse data to compare results of short-term and long-term gambling.

- Whole class simulation
- Spreadsheet demonstration
- Use of appropriate levels of worksheets
- Final discussions
- ‘Pokies’ spreadsheet
- Student worksheets 9, 10 and 11 ‘Pokies’
- Knowyourodds.net.au website
- Student worksheet 12 ‘Discover how much you can lose’
- Catalyst video

### 4. Sports betting (50 minutes)

**F, I, S:** Students will understand:
- the difference in potential winnings for players depending on whether or not a betting agency is involved
- that higher payouts are matched with lower probabilities of winning

**I, S:** Students will be able to explain expected gambling losses in terms of probabilities and payouts.

- Whole class simulations
- Spreadsheet demonstration
- Use of appropriate levels of worksheets
- Final discussion
- A pack of cards
- A coin
- Tokens
- ‘Sports betting’ spreadsheet
- Student record sheet ‘Sports betting simulation’
- Student worksheets 13, 14 and 15 ‘Sports betting’
### 5. Horseracing (50-100 minutes)

**F, I, S:** Students will understand:
- betting products provided by betting agencies are designed to make profits from players
- higher payouts are matched with lower probabilities of winning.

**I, S:** Students will be able to:
- calculate the probability of winning and the ‘bet-to-payout ratio’
- recognise that gaming venues make money when the bet-to-payout ratio is greater than the probability of winning.

<table>
<thead>
<tr>
<th>Whole class simulations</th>
<th>Horse name cards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spreadsheet demonstration</td>
<td>Suitable prizes to simulate money</td>
</tr>
<tr>
<td>Use of appropriate levels of worksheets</td>
<td>‘Melbourne Cup’ spreadsheet</td>
</tr>
<tr>
<td>Final discussions</td>
<td>A video clip of the 2017 Melbourne Cup</td>
</tr>
<tr>
<td>Student worksheets 16, 17 and 18 ‘The sweep’</td>
<td>Student record sheet ‘A day at the races’</td>
</tr>
<tr>
<td>Play money</td>
<td>Six-sided die</td>
</tr>
<tr>
<td>Six-sided die</td>
<td>Student worksheets 19, 20 and 21 ‘A day at the races’</td>
</tr>
</tbody>
</table>

**Assessment and feedback**

- Students may complete the student self-assessment at the start and/or end of the unit.
- Teachers will provide feedback to students via conferencing, reflecting on the key elements achieved and areas for future development and focus. Students complete the reflection activity (Appendix 2) and the self-assessment (Appendix 3).
Learning sequence with teacher notes

LESSON 1 CHANCE HAS NO MEMORY

Learning outcomes
F, I, S: Students will understand:
• chance has no memory
• outcomes are impossible to predict
• previous outcomes do not affect future ones
• no strategy can reliably predict future results in games of chance.

Senior students will understand that for equally likely events, after a very large number of outcomes, the results tend to even out.

Resources
• packs of cards (1 pack per pair)
• tokens to be used as $1 coins (optional)
• access to a data projector
• copies of activities 1 and 2 ‘Be aware of gambling: Terminology’
• copies of worksheet 1 ‘Card sharp’, and worksheets 2A and 2B ‘Chance has no memory’

1.1 Tuning in
Ask students to give examples of different forms of gambling. They may mention:
• racing
• sports betting
• crown casino
• pokies (electronic gaming machines) in hotels and clubs

• lotteries
• keno
• raffles
• spinning wheels.

Students complete activity 1 and/or activity 2 ‘Be aware of gambling: Terminology’. If time permits, enlarge these activities on A3 paper and cut them out ahead of time. Students can work in pairs or groups to match the words. Alternatively, you could conduct a word search. Mix up the terms and definitions among groups. Students then need to ask other groups if they have their matching pair. This encourages discussion and collaboration.

Discuss with students their responses to the activity sheets to build understanding of the term ‘gambling’.

Ask students in what other contexts they may have heard the term ‘gambling’ used. They may mention ‘gambling with your life’ or ‘gambling’ in financial markets. Ask whether they have heard of any other sayings that represent odds.

This discussion is supported by Appendix 1, Teacher resource: Definitions.
**Activity 1**

Be aware of gambling: Terminology

Match the word/term on the left with the meaning on the right. The first one has been done as an example.

<table>
<thead>
<tr>
<th>1. <strong>Bet</strong></th>
<th>A. The person who provides the product or opportunity to bet</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. <strong>Bookie/Bookmaker</strong></td>
<td>B. Electronic gaming machine that uses random numbers to decide on wins and losses</td>
</tr>
<tr>
<td>3. <strong>Chance</strong></td>
<td>C. The person placing the bet</td>
</tr>
<tr>
<td>4. <strong>Gambler</strong></td>
<td>D. Low odds offered on a likely winner</td>
</tr>
<tr>
<td>5. <strong>Each way</strong></td>
<td>E. Money lost from one or more bets</td>
</tr>
<tr>
<td>6. <strong>Loss</strong></td>
<td>F. Money won from one or more bets</td>
</tr>
<tr>
<td>7. <strong>Odds</strong></td>
<td>G. Likelihood</td>
</tr>
<tr>
<td>8. <strong>Pokie/Poker Machine</strong></td>
<td>H. A ratio for the possibility of something happening</td>
</tr>
<tr>
<td>9. <strong>Profit</strong></td>
<td>I. Bet for a win and a place</td>
</tr>
<tr>
<td>10. <strong>Short-priced favourite</strong></td>
<td>J. Put money at risk for the chance to win more</td>
</tr>
</tbody>
</table>

1. J

2.  

3.  

4.  

5.  

6.  

7.  

8.  

9.  

10.  
### Activity 2
**Be aware of gambling: Terminology**

Match the word/term on the left with the meaning on the right. The first one has been done as an example.

<table>
<thead>
<tr>
<th>1. Betting agency</th>
<th>A. Calculate or describe how likely something is to happen</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Expenditure</td>
<td>B. Decide beforehand how much money or time to spend in a gambling session</td>
</tr>
<tr>
<td>3. Gambling</td>
<td>C. All legal forms of betting on racing and sporting events</td>
</tr>
<tr>
<td>4. Payout</td>
<td>D. Any opportunity to bet provided by a betting agency</td>
</tr>
<tr>
<td>5. Pre-commitment</td>
<td>E. Put money at risk for the chance to win more</td>
</tr>
<tr>
<td>6. Probability</td>
<td>F. Total money bet on a race or game</td>
</tr>
<tr>
<td>7. Gambling option</td>
<td>G. The amount paid on a winning bet</td>
</tr>
<tr>
<td>8. Turnover</td>
<td>H. The business that provides the opportunity to bet</td>
</tr>
<tr>
<td>9. Wagering</td>
<td>I. Money won</td>
</tr>
<tr>
<td>10. Winnings</td>
<td>J. The amount a player loses from their gambling</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>1. H</th>
<th>2.</th>
<th>3.</th>
<th>4.</th>
<th>5.</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.</td>
<td>7.</td>
<td>8.</td>
<td>9.</td>
<td>10.</td>
</tr>
</tbody>
</table>
1.2 Class simulations

Game: Card sharp

Introduce and explain the game, and show Student worksheet 1 ‘Card sharp’ on the data projector.

Each student selects a suit, and then a card is pulled at random from the pack. If the card matches their selected suit, they win. The card is placed back into the deck and the deck is shuffled.

- Each student will start with an imaginary budget of $50.
- It costs $1 to play each round.
- If they win a round, they receive $4.

It may need to be explained that if a student wins Round 1, their balance will be $53, not $54. If they lose Round 1, their balance will be $49.

Discuss strategies that students might like to adopt when they play:

- ‘random guess’
- ‘hasn’t come up in a while’
- ‘lucky streak’
- ‘consistent guesses’.

Which strategy do students expect to be most successful?

- Once students have grasped how to play, distribute the worksheet.
- If sufficient counters are available, you could distribute 50 counters to each student.
- At the end of the game, ask who did the best, and whether any of the strategies were better than others.
- Show students how to tally the game on the dot plot at the bottom of Worksheet 1 by modelling it on a projection of the worksheet.

Alternatively, students could enter their individual results on the projected worksheet on the whiteboard.

Note that the ‘Card sharp’ spreadsheet has a ‘Matching cards’ tab that may be used to illustrate large numbers of trials.

1.3 Chance has no memory

- Arrange students in pairs. One student from each pair receives Worksheet 2A, ‘Chance has no memory’ and the other receives Worksheet 2B.
- Encourage students to complete the worksheets by modelling what they need to do on both sheets if, for example, a diamond is drawn.
- Either use cards or use the ‘Frequencies’ tab of the ‘Card sharp’ spreadsheet to carry out 50 trials, one at a time, as students add results to their worksheets.
- If time permits, use the ‘Sampling cards’ tab of the ‘Card sharp’ spreadsheet to show students associated bar graphs for 1000, 10,000 and 100,000 rounds. Use this to scaffold them filling out the second half of this sheet.
- Reinforce to students that ‘chance has no memory’.

This content is supported by the ‘Card sharp’ spreadsheet and worksheets 2A and 2B, ‘Chance has no memory’.

1.4 Class discussion and reflection

Ask questions about what happened and why students gave the answers they did on the worksheets. Discussion should centre on worksheet solutions, addressing student misconceptions and highlighting key points.

Key message

Chance has no memory; outcomes are impossible to predict.
# Student worksheet 1
## Card sharp (20 rounds)

**NAME: __________________________________________**

<table>
<thead>
<tr>
<th>Bet = $1</th>
<th>Payout = $4</th>
<th>Result: Did you win?</th>
<th>Your balance (start with $50)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Round number</strong></td>
<td><strong>Card suit</strong></td>
<td><strong>Guess first (circle one)</strong></td>
<td><strong>Total number of wins</strong></td>
</tr>
<tr>
<td>1</td>
<td>♠️ ♠️ ♥️ ♠️</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>♠️ ♠️ ♥️ ♠️</td>
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<td>20</td>
<td>♠️ ♠️ ♥️ ♠️</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Draw dot plots on the following number lines.

Number of wins for everyone:

Money won or lost:

Blank number lines for students who bet with different values:
**Student worksheet 2A**  
**Chance has no memory**

**NAME:** __________________________________________

**PART A**

You are now going to run through 100 rounds of ‘Card sharp’.

As you play the rounds, record your results in the grid by placing an X in the next free box immediately above the winning suit for that round.

**Before** you do the rounds, answer the following:

1. Pick one suit to be your winning suit (circle):
   - ♠  ♦  ♥  ♣

2. Complete this prediction:
   - I think that out of 100 rolls, the suit that I chose is going to come up ________ times.

3. For the following sentences tick those that you agree with and cross the ones you don’t.

   Note: The following assumes that after each card is drawn, it is replaced in the deck and the deck is shuffled.

   - [ ] At some point, one of the suits will probably have ‘a run’ and will come up a few times. This will make it more likely to come up again.
   - [ ] If a suit comes up lots of times in a row, it will be less likely to come up the next time.
   - [ ] In a game like this you’re better off picking a strategy (one suit) and sticking with it than choosing a different suit for each round.
   - [ ] The suit that comes up in one round does not affect the suit that comes up in the following round.

| Number of times the suit comes up | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 |
|----------------------------------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| ♠                                |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| ♦                                |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| ♥                                |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| ♣                                |   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
4. After the rounds, turn your tally table into a column chart by shading the columns. After some class discussion/demonstration for larger numbers, answer the following questions:

  - Out of the _________ rounds my suit came up _________ times.
  - How does this compare with what you expected to happen?

5. Look at your partner’s worksheet. What was the longest ‘winning streak’?

6. What was the main point of question 3?

7. In this game, with four equally likely outcomes, you can expect to win _________ time/s out of every 100 games.

   Therefore, the probability of winning at ‘Card sharp’ is: _________

8. If we played 1000 games, how many times would you expect your suit to come up?

9. Express the phrase ‘chance has no memory’ in your own words.
You are now going to run through 100 rounds of ‘Card sharp’. Before you do the rounds, complete the following tasks.

1. Pick one suit to be your winning suit (circle):
   ♠ ♦ ♥ ♣

2. Complete this prediction:
   • I think that out of 100 rolls the suit that I chose is going to come up _____________________ times.

3. Tick the box next to each of the sentences that you agree with and place a cross next to the ones you don't agree with.

   Note: The following assumes that after each card is drawn, it is replaced in the deck and the deck is shuffled.

   - [ ] One of the suits will be luckier and will come up more.
   - [ ] At some point, one of the suits will probably have ‘a run’ and will come up a few times. This will make it more likely to come up again.
   - [ ] If a suit comes up lots of times in a row, it will be less likely to come up the next time.
   - [ ] In a game like this you’re better off picking a strategy (one suit) and sticking with it than choosing a different suit for each round.
   - [ ] The suit that comes up in one round does not affect the suit that comes up in the following round.
4. As you play the rounds, keep a tally of which suit comes up in the chart below. Write ‘C’ for clubs, ‘D’ for diamonds, ‘H’ for hearts or ‘S’ for spades. Start in the top left and work to the right, then move to the beginning of the next row.

| Rounds 1-10 → |   |   |   |   |   |
| Rounds 11-20 → |   |   |   |   |   |
| Rounds 21-30 → |   |   |   |   |   |
| Rounds 31-40 → |   |   |   |   |   |
| Rounds 41-50 → |   |   |   |   |   |
| Rounds 51-60 → |   |   |   |   |   |
| Rounds 61-70 → |   |   |   |   |   |
| Rounds 71-80 → |   |   |   |   |   |
| Rounds 81-90 → |   |   |   |   |   |
| Rounds 91-100 → |   |   |   |   |   |

5. After the rounds, circle or highlight the longest ‘streak’ of the same suit. After some class discussion/demonstration for larger numbers, answer the following questions:

• Out of 100 rounds, my suit came up ___________ times.
• How does this compare with what you expected to happen?

• What was the longest ‘streak’? ___________

6. Were any of your choices in question 3 incorrect?
7. What was the main point of question 3?

8. In this game, with four equally likely outcomes, you can expect to win__________ time/s out of every 100 games.
   Therefore, the probability of winning at ‘Card sharp’ is: __________

9. If we played 1000 games, how many times would you expect your suit to come up?

10. Express the phrase ‘chance has no memory’ in your own words.
LESSON 2 WHO ARE THE REAL WINNERS?

Learning outcomes
F: Students will understand:
• differences in payouts arise when a gaming venue is involved
• total payouts are not always 100 percent of the amount bet
• games provided by gaming venues are designed to make a profit.

Resources
• A pack of cards
• Tokens (at least 20)
• A coin (not essential but will help illustrate the experiment)
• Five coloured counters: red, yellow, pink, green, blue (also not essential but handy to demonstrate)
• Copies of worksheets 3, 4 and 5 ‘Who are the real winners?’
• Copies of worksheets 6, 7 and 8 ‘Setting limits’
• ‘Card sharp’ spreadsheet
• ‘Setting limits’ spreadsheet

2.1 Tuning in
• Remind students of Lesson 1 ‘Chance has no memory’ – the games they played, the cost to play, the payout.

2.2 Class simulations Part A
Card sharp – with a difference
• Bring four students to the front of the class and give each student five tokens. Everyone pays one token to play a round.
• Each student is assigned to a suit. If a student’s suit is selected, they win the payout. Those who win receive two tokens; those who lose receive nothing.
• Explain that you are going to act as the gaming venue. Keep two tokens from each round.
• At some point students will likely object to the fact that they are losing their money. This stimulates a conversation and provides an opportunity for the teacher to contrast this game with the game in the previous lesson, in which no gaming venue was involved. Explain how this game is an example of commercial gambling in which a gaming venue is involved.
• Run the ‘Matching cards’ tab of the ‘Card sharp’ spreadsheet twice, first with a payout of $4 to show what happens when no gaming venue is involved, and then with a payout of $2 to show the outcome when the gaming venue takes half the money bet. Highlight the difference in payouts when no gaming venue is involved, compared with when a gaming venue is involved.
For those unable to run the ‘Card sharp’ spreadsheet, here are two sample screenshots.

Payout $4 per game – no gaming venue involved.

2.3 Individual worksheets

- Assign worksheets to students, or allow them to choose, based upon their readiness. Although very similar, the worksheets range in increasing difficulty. As a guide, Worksheet 3 could be suited to Foundation level students, Worksheet 4 to Intermediate level students and Worksheet 5 to Senior level students.

- Give students time to work on the appropriate worksheet. Monitor their work and help them to relate it to their understanding of the whole class activity.

- For the best post-activity discussion, see that each worksheet is completed by at least one or two students, make note of student responses, and consider an appropriate sequence in which to call upon various students. It is important to leave sufficient time for a full discussion.

2.4 Class discussion and reflection

As you circulate during the lesson, identify students who would like to share their answers. It can often be difficult to get students to share and this can be one way to scaffold them to talk in front of the class. (This situation will differ from class to class.)

Key messages

- Differences in payouts arise when a gaming venue is involved.

- Total payouts are not always 100% of the amount bet.

- Games provided by gaming venues are designed to make a profit.

- As a consequence, most gamblers must lose money in the long run if a gaming provider is involved.
Student worksheet 3
Who are the real winners?

NAME: ____________________________________________

Game 1: Think back to the ‘Card sharp’ game. A card is randomly pulled out of the pack and you win if it belongs to your selected suit.

Cost to play one round: $1  Payout if you win a round: $4

1. Based on this information, do you think that a gaming venue is involved? Explain your answer.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

Game 2: A coin is tossed and you win if it shows heads.

Cost to play one round: $5  Payout if you win: $8

2. Based on this information, do you think that a gaming venue is involved? Explain your answer.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

Game 3: Five coloured counters (red, yellow, pink, green, blue) are placed in a bag. You win if a red counter is pulled out.

Cost to play one round: $2  Payout if you win: $8

3. Based on this information, do you think that a gaming venue is involved? Explain your answer.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
**Game 4:** A spinner is split up into eight equal sections, with different colours and letters, as shown. Select one letter. The spinner is spun, and you win if the arrow lands on your letter.

Cost to play one round: $1  
**Payout if you win:** $7

4. Based on this information, do you think that a gaming venue is involved? Explain your answer.

**Game 5:** A die is rolled and you win if 1, 3 or 5 comes up.

Cost to play one round: $2  
**Payout if you win a round:** $3

5. Based on this information, do you think that a gaming venue is involved? Explain your answer.

**Explain**

6. Explain in your own words what happens to a player’s potential winnings when the gambling game is provided by a gaming venue.
Student worksheet 4
Who are the real winners?

NAME: __________________________________________

Game 1: Think back to the ‘Card sharp’ game. A card is randomly pulled out of the pack and you win if it belongs to your selected suit.

Cost to play one round: $1  Payout if you win a round: $4

1. Based on this information, do you think that a gaming venue is involved? Explain your answer.

Game 2: A coin is tossed and you win if it shows heads.

Cost to play one round: $5  Payout if you win: $8

2. Based on this information, do you think that a gaming venue is involved? Explain your answer.

3. What would the payout be if it was a game organised without a gaming venue?

Game 3: Five coloured counters (red, yellow, pink, green, blue) are placed in a bag. You win if a red counter is pulled out.

Cost to play one round: $2  Payout if you win: $8

4. Based on this information, do you think that a gaming venue is involved? Explain your answer.

5. What would the payout be if it were a game organised without a gaming venue?
Game 4: A spinner is split up into eight equal sections, with different colours and letters, as shown. Select one letter. The spinner is spun, and you win if the arrow lands on your letter.

Cost to play one round: $3

6. What would the payout be if this game was organised without a gaming venue?

7. a. Suggest a possible payout a gaming venue might offer for this game.

   b. Suggest a different payout amount, that a gaming venue might offer for this game.

Game 5: A die is rolled and you win if 1, 3 or 5 comes up.

Cost to play one round: $2

8. What would the payout be if this game was organised without a gaming venue?

9. a. Suggest a possible payout a gaming venue might offer for this game.

   b. Suggest a different payout amount that a gaming venue might offer for this game.

Explain

10. Explain at least one difference between gambling informally with friends and with a gambling provider that exists to make a profit.
Student worksheet 5
Who are the real winners?

NAME: ____________________________________

Game 1: Think back to the ‘Card sharp’ game. A card is randomly pulled out of the pack and you win if it belongs to your selected suit.

Cost to play one round: $1  Payout if you win a round: $4

1. Based on this information, do you think that a gaming venue is involved? Explain your answer.

Game 2: A coin is tossed and you win if it shows heads.

Cost to play one round: $5  Payout if you win: $8

2. Based on this information, do you think that a gaming venue is involved? Explain your answer.

3. What would the payout be if it was a game organised without a gaming venue?

Game 3: Five coloured counters (red, yellow, pink, green, blue) are placed in a bag. You win if a red counter is pulled out.

Cost to play one round: $2  Payout if you win: $8

4. Based on this information, do you think that a gaming venue is involved? Explain your answer.
5. What would the payout be if it was a game organised without a gaming venue?

**Game 4:** A spinner is split up into eight equal sections, with different colours and letters, as shown. Select one letter. The spinner is spun, and you win if the arrow lands on your letter.

**Cost to play one round:** $3

6. What would the payout be if this was a game organised without a gaming venue?

7. If a gaming venue was going to run this game, suggest two possibilities for the payout that they might offer.

**Game 5:** A die is rolled and you win if a 1, 3 or 5 comes up.

**Cost to play one round:** $2

8. What would the payout be if this was a game organised without a provider profit?

9. If a gaming venue was going to run this game, suggest two possibilities for the payout that they might offer.

**Game 6:** A card is selected out of a full pack. You win if it’s an ace. (There are 52 cards in a pack and four of them are aces.)

**Cost to play one round:** $3

10. What would the payout be if this was a game organised without a gaming venue?
11. If a gaming venue was going to run this game, suggest two possibilities for the payout that they might offer.

12. For each person who plays this game, how much money could the gaming venue expect to make for each round that was played?

Explain

13. Explain at least one difference between gambling informally with friends and with a gaming venue that exists to make a profit.
2.5 Class simulations Part B

Card sharp – with a difference and a spending limit

• Introduce the idea of a pre-commitment – a spending limit.

• Explain that, when playing the game ‘Card sharp’ at a gaming venue, a player could choose to limit their spending to a set amount.

• Ask students what amounts they might set for themselves. After some responses, suggest a limit of $20.

• Remind students that it costs $1 per round to play and the payout is $2.

• Get predictions from students of how many games a player would play if they limited their spending to $20.

• Introduce the ‘Setting limits’ spreadsheet and run a few simulations to demonstrate how it works, using the ‘Play 200’ tab. The ‘Play 400’ option can be used as an extension.

Alternatively, students could play the game in pairs, small groups or as a whole class.

Three sample snapshots from the simulation are below.

This content is supported by the ‘Setting limits’ spreadsheet.
2.6 Individual worksheets

• Assign worksheets to students, or allow them to choose, based upon their readiness. As a guide, Worksheet 6 could be suited to Foundation level students, Worksheet 7 to Intermediate level students and Worksheet 8 to Senior level students.

• Students complete the ‘Predict’ section of the worksheet.

• In the ‘Observe’ section of the worksheet, invite each student to have a go at operating the spreadsheet to see how long their pre-commitment of $20 would last if they were to play such a game. As many students as would like to participate can do so, and the data can be used for the ‘Observe’ section of the worksheet.

• Encourage students to complete the ‘Explain’ section.

• Prior to the ‘Second prediction’, you might like to conduct a conversation about how long it took each student to spend their $20. If this was a game at a casino, do they think this would be a good use of their $20?

• Move on to the ‘Second prediction (extension)’ part of the worksheet, followed by the ‘Observe’ and ‘Explain’ sections.

You can project the worksheet and complete the dot plots.
Predict
A player has a pre-commitment of $20. A gaming venue’s card game costs $1 to play with a $2 payout when the correct suit is chosen randomly from a standard pack without jokers.

1. How many $1 bets do you think it will take the player, on average, to spend their $20?

Observe
Nineteen people at a casino set a pre-commitment of $20 and each played this game until they had spent their entire pre-commitment. Here are the numbers of rounds it took for them to spend all of their $20.

40, 34, 30, 28, 44, 36, 32, 34, 52, 34, 40, 38, 34, 32, 33, 41, 51, 29, 37

2. Use these numbers to construct a dot plot on the number line below.

3. Investigate who is the ‘luckiest’ person in your class. That is, who can make their pre-commitment of $20 last the longest? Use the ‘Setting limits’ spreadsheet to see how long your $20 will last. In the table below, record the initials of your classmates and how many rounds it took them to spend their limit.

<table>
<thead>
<tr>
<th>Initials</th>
<th>How long to spend their limit?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. Use the results from your class trials to construct a dot plot on the number line below.
Explain

5. Who had the most successful results in your class?

6. What was the average of the 19 values?

7. What was the average for the values from your class trials?

8. Which group was luckier: the 19 people at the casino or your class? Why?

Application

9. **Second prediction:** If someone started with a pre-commitment of $100, do you think they would ever spend their limit?

10. **Observation:** Your teacher will now use the simulator to test your prediction. Did the person with a pre-commitment of $100 spend their limit? If they did, how many rounds did they last?

11. **Explain:** If someone is gambling with a pre-commitment or limit in a gambling venue, what do you think is going to happen in the long run?
Student worksheet 7
Setting limits

NAME: __________________________________________

Predict
A player has a pre-commitment of $20. A gaming venue’s card game costs $1 to play with a $2 payout when the correct suit is chosen randomly from a standard pack without jokers.
1. How many $1 bets do you think it will take the player, on average, to spend their $20?

Observe
Nineteen people at a casino set a pre-commitment of $20 and each played this game until they had spent their entire pre-commitment. Here are the numbers of rounds it took for them to spend all of their $20.

40, 34, 30, 28, 44, 36, 32, 34, 52, 34, 40, 38, 34, 32, 33, 41, 51, 29, 37

2. Use these numbers to construct a dot plot on the number line below.

3. Investigate who is the most successful person in your class. That is, who can make their pre-commitment of $20 last the longest? Use the ‘Setting limits’ spreadsheet to see how long your $20 will last. In the table below, record the initials of your classmates and how many rounds it took them to spend their limit.

<table>
<thead>
<tr>
<th>Initials</th>
<th>How long to spend their limit?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. Use the results from your class trials to construct a dot plot on the number line below.
Explain
5. Who was the most successful person in your class? ____________________________
6. What was the average of the 19 values?
7. What was the average for the values from your class trials?
8. Which group was luckier: the 19 people at the casino or your class? Why?

9. Suppose, in real life, it took 30 seconds to play each round. How long would you expect to be able to play for if you set your pre-commitment at $20?

Application
10. **Second prediction:** If someone started with a pre-commitment of $100, do you think they would ever spend their limit?

11. **Observation:** Your teacher will now use the simulator to test your prediction. Did the person with a pre-commitment of $100 spend their limit? If they did, how many rounds did they last?

12. **Explain:** If someone is gambling with a pre-commitment or limit in a gambling venue, what do you think is going to happen in the long run?
Student worksheet 8
Setting limits

NAME: ______________________________________

Predict
A player has a pre-commitment of $20. A gaming venue’s card game costs $1 to play with a $2 payout when the correct suit is chosen randomly from a standard pack of cards without jokers.

1. How many $1 bets do you think it will take the player, on average, to spend their $20? _______________

Observe
Nineteen people at a casino set a pre-commitment of $20 and each played this game until they had spent their entire pre-commitment. Here are the number of rounds it took for them to spend all of their $20.

40, 34, 30, 28, 44, 36, 32, 34, 40, 38, 34, 32, 33, 41, 51, 29, 37

2. Use these numbers to construct a dot plot on the number line below.

3. Investigate who is the most successful person in your class. That is, who can make their pre-commitment of $20 last the longest? Use the ‘Setting limits’ spreadsheet to see how long your $20 will last. In the table below, record the initials of your classmates and how many rounds it took them to spend their limit.

<table>
<thead>
<tr>
<th>Initials</th>
<th>How long to spend their limit?</th>
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4. Use the results from your class trials to construct a dot plot on the number line below.
Explain
5. Which group was luckier: the 19 people at the casino or your class? Why?

6. Suppose, in real life, it took 30 seconds to play each round. How long would you expect to be able to play for if you set your pre-commitment at $20?

7. It usually costs about $17.50 to see a movie and a movie runs for between an hour-and-a-half and two hours.

   If a person was to get the same amount of enjoyment per minute from watching a movie or playing the game described above, which activity do you think would be the ‘better value’ for them? Explain your answer.

Application
8. Second prediction: If someone started with a pre-commitment of $100, do you think they would ever spend their limit? If you think they will spend their limit, how many rounds do you think they will last?

9. Observation: Your teacher will now use the simulator to test out your prediction. Did the person with a pre-commitment of $100 spend their limit? If they did, how many rounds did they last and how did this compare to your prediction?

Explain
10. If someone is gambling with a pre-commitment or limit in a gambling venue, what do you think is going to happen in the long run?
2.7 Class discussion and reflection

Foundation students present their predictions, observations and explanations for Worksheet 6. Ask:

• How did your own simulations compare with your prediction in question 1?

• Why do you think these players are persisting? Do they want to spend money or do they want to win money?

Intermediate students present their predictions, observations and explanations for Worksheet 7. Ask:

• How did you answer the question ‘Which group was luckier: the 19 people at the casino, or your class’? Discuss whether they based their answers on the average and whether or not that would have been appropriate.

Senior students share with the class what they discovered, in particular how they thought the value for money of gambling compared to seeing a film.

Extension opportunity

Ask students to predict the outcomes of a simulation with the unfair payout changed to $3 (and the fair payout still at $4). Ask:

• What might the graph look like? (If time is available, sketch a graph.)

• How would this have changed the answers to Worksheet 8?

Key messages

• No matter how much you start out with, you’re likely to lose money if you gamble.

• Set a limit you are prepared to lose and stick to it to avoid harm from gambling and spending/losing a significant amount of money.
LEsson 3 Pokies

Learning outcomes

F: Students will understand:

• random mathematical processes control poker machines
• payouts are less than the amounts bet over time
• gaming machine venues can legally make payouts less than the amounts played
• the greater the number of bets, the greater the likelihood of losing all of the money they started with.

F: Students will be able to read graphs to compare results of short-term and long-term gambling.

Resources

• ‘Pokies’ spreadsheet
• Catalyst video
• Copies of worksheets 9, 10 and 11 ‘Pokies’

3.1 Tuning in

• Point out that poker machine players lost $2.7 billion on pokies in 2017–18, which was about 46 percent (or approximately half) of total gambling losses of $5.8 billion.
• In 2017–18, Victorian gamblers lost $2.7 billion on pokies, or $533 per adult, on average.
• The areas with the largest losses were Brimbank, Casey and Greater Dandenong.

Ask students to tell you what they know about how poker machines work.

• Point out that ‘chance has no memory’ applies to the random numbers that determine the outcomes of each spin. The outcome of each spin of a poker machine is random, with no reference to previous outcomes. This means that a winning spin or a jackpot is never ‘due’.

• The “Return to player” (RTP) rate is the percentage of the money gambled in games of chance that is required by law to be paid back to gamblers as ‘winnings’, over time.
• Point out that poker machines in Victoria are required to return as payouts at least 85 percent of the amount bet over a calendar year. This means that the operator of the machine can retain up to 15 percent.
• Ask students what an ‘average return of 85 percent’ means. This means that, over a year, 85 percent of money bet is returned to players; it does not mean that you will end up with 85 percent of your starting money from a single gambling session.
• It is also important to note that ‘Return to player’ is useful as an indicator of the machines performance over the long term but is highly unlikely to describe the outcome over anything like the time period a single player is using it.

This can be explained further by watching the short Catalyst video ‘Pokie probability’ 3 min 31 sec available at www.abc.net.au/catalyst/stories/3608469.htm.

• You may wish to stop and start the video on a second viewing to make sure the class understands what Simon is saying, as he covers the content quite quickly. There is also transcript you can read. Here is the numerical example in the video:
  – I started with $120.
  – From that I won $1080 over a one-hour period.
  – So, I ‘played’ a total of $1200.
  – But then I lost 10 percent of that, which is all of the $120 that I started off with.
• The conclusion is that even though the machine
paid back most of what was bet, he still lost all the money he started with.

• Note: You may need to make it clear that the $1200 Simon bet consisted of his $120 and the $1080 he ‘won’ as he was playing. Other examples may be needed to help students understand this.

3.2 Class simulations linked to worksheets

• Distribute the worksheets (assign worksheets or allow students to choose, based upon their readiness).

• Ask 10 students to volunteer to be your ‘players’. All students enter the volunteers’ initials into their worksheets.

• Each player simulates 10, 100 and 1000 trials for all students to record in their worksheets. (Students may need to be shown how to use the ‘Pokies’ spreadsheet.)

• Run through the ‘predict, observe, explain’ cycle, as supported by the worksheet and spreadsheet simulation.

• Run the simulation using the appropriate tab on the ‘Pokies’ spreadsheet.

This content is supported by the ‘Pokies’ spreadsheet.

Sample snapshots of the 10-, 100- and 1000-game simulations are below.

3.3 Class discussion and reflection

Have students sit together or in small groups. A few discussion questions that you may like to use are:

• The average loss per dollar is the same for all gamblers, so why do the small time gamblers have the greatest chance of winning money?

• What is likely to happen in the long run if someone continues to play the pokies?

You could ask students who completed Worksheet 10 or 11 to share some of what they found in the final section of their worksheet.

A role play (regarding question 17 of each worksheet) would be an engaging way to elicit these discussions.

Key messages

• The more a person bets, the greater the likelihood of losing all of the money they started with.

• If you keep gambling in the hope of winning back your losses, you are very likely to fail and lose even more.
Student worksheet 9  
Pokies

NAME: _____________________________________

10 GAMES
Enter the initials of 10 players from your class into the boxes below.

Predict
1. If each of these players plays 10 games on the pokies, betting $1 per game, how many of them do you think will win money by the end of the 10 games? _______________

Observe
2. Each player can now do a simulation using the ‘Pokies’ spreadsheet. Record their initials and how much they won or lost.

<table>
<thead>
<tr>
<th>Initials</th>
<th>How much won or lost?</th>
</tr>
</thead>
</table>

Explain
3. What percentage of the students ended up losing money after playing 10 games? _______________
4. What was the average amount won or lost for a player playing 10 games at the pokies? _______________

100 GAMES

Predict
5. All 10 players come back the next day to play again. Maybe some of them are feeling ‘lucky’ and others want to try to win their money back!

If each of these players plays 100 games, again betting $1 per game, how many of them do you think will win money by the end of 100 games? _______________

Observe
6. Each player can now do a simulation using the ‘Pokies’ spreadsheet. Record their initials and how much they won or lost.

<table>
<thead>
<tr>
<th>Initials</th>
<th>How much won or lost?</th>
</tr>
</thead>
</table>
Explain
7. What percentage of the students ended up losing money after playing 100 games? 

8. What was the average amount won or lost for a player playing 100 games at the pokies?

1000 GAMES

Predict
9. The players now really want to play again. A week later they all go back, but this time they each play 1000 games, each betting $1 per game.
   How many of them do you think will win money by the end of 1000 games?

Observe
10. Each player can now do a simulation using the ‘Pokies’ spreadsheet. Record their initials and how much they won or lost.

<table>
<thead>
<tr>
<th>Initials</th>
<th>How much won or lost?</th>
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</table>

Explain
11. What percentage of the students ended up losing money after playing 1000 games?

12. What was the average amount won or lost for a player playing 1000 games at the pokies?

Noticing patterns
13. Based on what you have seen, complete the following sentence:
   If you’re playing the pokies, the more you play, the more ________________________________

14. A relative comes back from an afternoon at the pokies and tells you that they have just lost $100.
   They suggest to you that they weren’t lucky today, but if they play more they might win all of their money back. Based on your observations above, what would you say to your relative?
Student worksheet 10
Pokies

NAME: __________________________________________

10 GAMES
Enter the initials of 10 players from your class into the boxes below.

Predict

1. If each of these players plays 10 games on the pokies, betting $1 per game, how many of them do you think will win money by the end of 10 games? ________________

Observe

2. Each player can now do a simulation using the ‘Pokies’ spreadsheet. Record their initials and how much they won or lost.

<table>
<thead>
<tr>
<th>Initials</th>
<th>How much won or lost?</th>
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</tbody>
</table>

Explain

3. What percentage of the students ended up losing money after playing 10 games?

4. What was the average amount won or lost for a player playing 10 games at the pokies?

5. Assuming that each round cost $1, what was the player’s average loss per dollar spent?
100 GAMES

Predict
6. All 10 players come back the next day to play again.
   If each of these players plays 100 games, again betting $1 per game, how many of them do you think will win money by the end of 100 games?

Observe
7. Each player can now do a simulation using the ‘Pokies’ spreadsheet. Record their initials and how much they won or lost.

<table>
<thead>
<tr>
<th>Initials</th>
<th>How much won or lost?</th>
</tr>
</thead>
</table>

Explain
8. What percentage of the students ended up losing money after playing 100 games? ________________
9. What was the average amount won or lost for a player playing 100 games at the pokies? __________
10. Assuming that each round cost $1, what was the player’s average loss per dollar spent? ___________

1000 GAMES

Predict
11. The players now really want to play again. A week later they all go back but this time they each play 1000 games, each betting $1 per game.
12. How many of them do you think will win money by the end of 1000 games?

Observe
13. Each player can now do a simulation using the ‘Pokies’ spreadsheet. Record their initials and how much they won or lost.

<table>
<thead>
<tr>
<th>Initials</th>
<th>How much won or lost?</th>
</tr>
</thead>
</table>
14. What percentage of the students ended up losing money after playing 1000 games? __________
15. What was the average amount won or lost for a player playing 1000 games at the pokies? _________
16. Assuming that each round cost $1, what was the player’s average loss per dollar spent? ____________

**Noticing patterns**

17. Based on what you have seen, complete the following sentence:
   - If you’re playing the pokies, the more you play, the more ________________________________

18. A relative comes back from an afternoon at the pokies and tells you that they have just lost $100. They suggest to you that they weren’t lucky today, but if they play more they might win all of their money back.
   
   Based on your observations above, what would you say to your relative?

19. Look at the average loss per dollar spent for 10, 100 and 1000 plays. How do they compare?

20. How does the loss per dollar spent compare to the programmed return of 85 percent?
Student worksheet 11
Pokies

NAME: __________________________________________

10 GAMES
Enter the initials of 10 players from your class into the boxes below.

Predict
1. If each of these players plays 10 games on the pokies, betting $1 per game, how many of them do you think will win money by the end of the 10 games? _____________

Observe
2. Each player can now do a simulation using the ‘Pokies’ spreadsheet. Record their initials and how much they won or lost.

<table>
<thead>
<tr>
<th>Initials</th>
<th>How much won or lost?</th>
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</table>

Explain
3. What percentage of the students ended up losing money after playing 10 games? _______________
4. What was the average amount won or lost for a player playing 10 games at the pokies? ______________
5. Assuming that each round cost $1, what was the player’s average loss per dollar spent? ______________

100 GAMES

Predict
6. All 10 players come back the next day to play again. If each of these players play 100 games, again betting $1 per game, how many of them do you think will win money by the end of 100 games?


Observe

7. Each player can now do a simulation using the ‘Pokies’ spreadsheet. Record their initials and how much they won or lost.

<table>
<thead>
<tr>
<th>Initials</th>
<th>How much won or lost?</th>
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</table>

Explain

8. What percentage of the students ended up losing money after playing 100 games? ______________

9. What was the average amount won or lost for a player playing 100 games at the pokies? __________

10. Assuming that each round cost $1, what was the player’s average loss per dollar spent? ____________

1000 GAMES

Predict

11. The players now really want to play again. A week later they all go back but this time they each play 1000 games, each betting $1 per game. How many of them do you think will win money by the end of 1000 games?

Observe

12. Each player can now do a simulation using the ‘Pokies’ spreadsheet. Record their initials and how much they won or lost.

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<th>Initials</th>
<th>How much won or lost?</th>
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</tbody>
</table>

Explain

13. What percentage of the students ended up losing money after playing 1000 games? ______________

14. What was the average amount won or lost for a player playing 1000 games at the pokies? __________

15. Assuming that each round cost $1, what was the player’s average loss per dollar spent? ____________
Noticing patterns

16. Based on what you have seen, complete the following sentence:
   • If you’re playing the pokies, the more you play, the more _____________________________

17. A relative comes back from an afternoon at the pokies and tells you that they have just lost $100. They suggest to you that they weren’t lucky today, but if they play more they might win all of their money back.

   Based on your observations above, what would you say to your relative?

----------------------------------------------------------------------------------------

18. Look at the average loss per dollar spent for 10, 100 and 1000 plays. How do they compare?

----------------------------------------------------------------------------------------

19. How does the loss per dollar spent compare to the programmed return of 85 percent?

----------------------------------------------------------------------------------------

20. If the government made a rule that changed the programmed return to a player per dollar spent from 85 percent to 90 percent, how would you expect the average amount won or lost for 1000 games to change?

----------------------------------------------------------------------------------------
3.4 Know your odds

Resources
• Tasmanian Government pokies loss calculator http://knowyourodds.net.au/
• Copies of Student worksheet 12 ‘Discover how much you can lose’

3.5 Tuning in

• Discuss with students how much money they would likely lose in a year if they played the pokies regularly.
• Discuss with students what factors would influence the amount of money lost.

Explain that the purpose of this part of the lesson is to understand the factors that cause the amounts of money lost from playing the pokies to vary.

3.6 Class simulation and worksheet

Simulation: Discover just how much you can lose
Distribute Worksheet 12 ‘Discover how much you can lose’ to each student.

Have each student make the first prediction, then demonstrate the ‘Discover just how much you can lose’ simulator. https://knowyourodds.net.au/.

If you are playing the pokies 3 times a month for about 30 minutes each time, and betting $2 each button press, you can expect to lose $2,160.00 per year to the house edge.
NAME: ______________________________________

Pretend you play the pokies three times a week for 30 minutes each time and each bet is $4. You make a spin about every six seconds.

The amount of each bet depends on the bet per line and the number of lines played per spin. These can be changed.

**Prediction: How much money could you lose in a year? (Circle your choice.)**

$18   $180   $1,800   $18,000   $180,000

After you have made your prediction, the simulator will show the likely result.

1. What is the likely amount of losses in a year? ________________

2. Was your prediction close? ________________

3. What are the three factors that influence the amount you are likely to lose?

A relative plays the pokies two times per week for an hour each time and each bet is $4. Again, each spin is about six seconds long.

**Prediction: Compared to the amount you could lose, how much will your relative lose? (Circle your choice.)**

A lot less   A little less   About the same   A little more   A lot more.

After you have made your prediction, the simulator will again show the likely result.

1. What is the likely amount? ________________

2. How does the likely amount compare with your prediction? ______________________________________

3. Which parameters would you change to decrease your losses? ________________________________
Another relative plays the pokies once a month for about 15 minutes with each bet being $0.40. Again, each spin is about six seconds long.

**Prediction: About how much will this relative lose in a year? (Circle your choice.)**

$7  $70  $700  $7000  $70,000

1. After you have made your prediction, the simulator will again show the likely result.

2. What is the likely amount? ________________

3. Is this amount surprising? ________________

This simulator is set to pay back 90 percent of the money played over the year. How would the three lost amounts from above change if the simulation was for Victoria, where 85 percent of the money played over the year is paid back? How much will be lost? (Circle your choice.)

A lot less  A little less  About the same  A little more  A lot more
LESSON 4 SPORTS BETTING

Learning outcomes
F, I, S: Students will understand:

• the difference in potential winnings for players depending on whether or not a betting agency is involved

• that higher payouts are matched with lower probabilities of winning.

I, S: Students will be able to explain expected gambling losses in terms of probabilities and payouts.

Resources
• A coin and a pack of playing cards
• Tokens to represent $1
• The ‘Sports betting agency’ spreadsheet (teacher needs to be familiar with its use)
• Copies of the student record sheet ‘Sports betting simulation’
• Copies of worksheets 13, 14 and 15 ‘Sports betting’

4.1 Tuning in
Discuss with students how many sports betting ads they have seen in the past week, the purpose of these ads and the likelihood of these ads showing the risks involved and limited chances of winning.

Discuss with students how sports betting agencies, through their advertising, are changing the way young people think about sport and why it’s important to ‘love the game, not the odds’.

Mention how sports betting advertising portrays betting as less risky than it is, and an easy way to make money, and why this is of concern.

Explain that the purpose of this part of the lesson is to understand the full story about sports betting, especially how agencies design their products to maximise their profits at the expense of most players.

4.2 Class simulations
Simulation 1: Even chances
Ask two students to each bet a token on who will win a match between two equally good teams. The outcome of the match will be decided by a coin toss. For example: heads = Matildas (Australia) versus tails = USA.

A third student acts as the ‘bookie’, collecting a token from each student, tossing a coin and then giving the ‘payout’ to the winner.

Ask students the following questions:
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 percent was involved?

Note: Typically, betting agencies that set their payouts before the event pay out about 95 percent of all bets collected.

Show how this simulation can be repeated with the ‘Sports betting agency’ spreadsheet. At the bottom of the screen there is a ‘Soccer’ tab and an ‘Other’ tab. Choose the ‘Other’ tab.
$20 bet on each team, USA won this trial, only 1 trial run

Simulation 2: One chance in four
Repeat this experiment, this time with four students each betting a token on a card chosen at random from a pack of cards. A fifth student acts as the bookie, collecting a token from each student, selecting a card at random and then giving the ‘payout’ to the winner.

Ask students the following questions:
1. What is the probability of a diamond ‘winning’ (being selected)?
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 should the fifth student give for:
   - diamond $______ vs not diamond $______?
6. What might the payouts be if a betting agency that keeps 15 percent was involved?

Show how this simulation can be repeated with the ‘Sports betting agency’ spreadsheet. Use the ‘Other’ tab with no draw.

The following is a screenshot of 12 trial runs with a $30 bet on diamond, $60 on not diamond, at a ‘percentage profit’ of 15 percent for the betting agency. This trial was won by not diamond.

Simulation 3: Soccer matches
Now distribute the Student record sheet. Using the ‘Sports betting agency’ spreadsheet, click on the ‘Soccer’ tab with a possible draw, to simulate the results of five matches for which each student bets $10 on a win, lose or draw.

Start with Australia vs Japan and the betting agency percentage set at 20 percent.

Set one amount bet at three times the other. For example, with 20 students the entries could be:

- 15 × 10 = $150 for Australia
- 5 × 10 = $50 for Japan
- $0 for a draw.

Ask the students:
1. Does that mean Australia is three times more likely to win than Japan?
2. Does that mean Australia has three chances out of four of winning, a probability of 75 percent?
The spreadsheet uses the ratio of the amounts bet on each team to determine the relative chances of winning – the probabilities – just as the sports betting agency does.

As the simulation progresses, look for opportunities to ask how the figures produced by the spreadsheet are related to each other.

Students complete the calculations required on their record sheets. While some may have ended up winning, the overall losses must equal the betting agency’s gain, which is 20 percent of $50 \times \text{number of students}.

This content is supported by the ‘Sports betting agency’ spreadsheet.

A snapshot from the Sports betting agency spreadsheet

Note: As a betting agency is involved, the payout for an Australian win is $1.07 for each $1 bet. For a winning bet of $10 the amount paid will be $10.70, making a gain of $0.70.

4.3 Class discussion and reflection

Foundation students should be given the chance to provide their answers and explanations:

- Payouts not involving a betting agency for equally likely results are Birds $2 vs Felines $2.
- Payouts not including a betting agency for more likely vs less likely are Less than $2 vs More than $2.
- A team most likely to win would be offered the minimum payout of $1.01.
- A team with little hope of winning would be offered a very high payout – say $10.

Answers to the last question can open up debate for the whole class. The key results are:

- Payouts not including a betting agency, times probability = 1 or 100 percent.
- Payout involving a betting agency times probability = less than 100 percent, say 95 percent or 85 percent.
- The average return to the punters will be close to this percentage of all the bets placed.

Intermediate and senior students should be given the chance to use the spreadsheet as a way of confirming and explaining the solutions they have obtained.

All students can join in a final discussion of two different betting agencies:

- one which sets the payouts before the event and plans to keep 5 percent of all bets placed
- one which keeps 15 percent of all bets placed and distributes payouts after the event

Key message

- Higher payouts are matched with lower
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.

<table>
<thead>
<tr>
<th>My choice (circle one)</th>
<th>Bet</th>
<th>Payout, if any result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Match 1</td>
<td>Win</td>
<td>Lose</td>
</tr>
<tr>
<td></td>
<td>$10</td>
<td></td>
</tr>
<tr>
<td>Match 2</td>
<td>Win</td>
<td>Lose</td>
</tr>
<tr>
<td></td>
<td>$10</td>
<td></td>
</tr>
<tr>
<td>Match 3</td>
<td>Win</td>
<td>Lose</td>
</tr>
<tr>
<td></td>
<td>$10</td>
<td></td>
</tr>
<tr>
<td>Match 4</td>
<td>Win</td>
<td>Lose</td>
</tr>
<tr>
<td></td>
<td>$10</td>
<td></td>
</tr>
<tr>
<td>Match 5</td>
<td>Win</td>
<td>Lose</td>
</tr>
<tr>
<td></td>
<td>$10</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total payout less $50</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Did you win or lose?________________________ How much?________________________

**Application task**

Use the spreadsheet with the following set-up: Betting agency percentage 20 percent, 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?
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 percent 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 $ ________________
5. A betting agency advertises Gold Coast $2.82 vs St Kilda $1.41 on a match to be played soon.
   a. A player betting $1 on St Kilda would end up either losing $1 or winning a small amount.
      How much would that be? _________________
   b. How much money would a player win if they bet $10 on Gold Coast and they ended up winning?
   c. Based on these figures, which team is more likely to win the match? ____________________________

6. If the payout on the match described in question 5 had not involved a betting agency, it would have been Gold Coast $3.00 vs St Kilda $1.50.

   What does this tell you about the percentage return that the betting agency has planned for?

7. A person collects $1 from two players who are prepared to bet on a game in which the Giants are three times as likely to win as the Doggies.
   a. What is the probability that the Doggies will win? __________________
   b. What is the probability that the Giants will win? ___________________
   c. What should be the payout if the Doggies win? ______________________
   d. What should be the payout if the Giants win? _______________________
   e. A betting agency returns only 95 percent of all bets placed. What would be the betting agency payout on
      a Doggies win? __________________

8. How are payouts on a game related to the probabilities of each team winning?

   ____________________________

   ____________________________

   ____________________________
**Student worksheet 14**  
**Sports betting**

**NAME:** ____________________________________________

1. The Birds and the Felines are two equally good football teams.
   a. Which of these payouts should be offered for $1 bets without a betting agency? Circle your choice.
      i. Birds $2 vs Felines $2
      ii. Birds $1 vs Felines $1
   b. How do you know?

   c. A player received a $10 payout when the Birds won. How much richer were they than before they placed the bet?

   d. An online betting agency sets its payouts at 95 percent of all bets placed.  
      What payouts would the betting agency offer for this game?
      Birds $ ___________________ vs Felines $ ___________________

2. A person collects $1 from two players who are prepared to bet on a game in which the GWS Giants are three times as likely to win as the Doggies.
   a. What is the probability that the Doggies will win? _________________
   b. What is the probability that the GWS Giants will win? _________________
   c. What should the payouts be?
      GWS Giants $__________________ vs Doggies $__________________
   d. A betting agency returns only 95 percent of all bets placed.  
      What would the betting agency’s payouts be for this game?
      GSW Giants $__________________ vs Doggies $__________________
3. There were some mistakes made in copying the following payouts from last week’s newspaper.

<table>
<thead>
<tr>
<th>Match</th>
<th>Odds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fremantle $1.16 vs Carlton $5.25</td>
<td></td>
</tr>
<tr>
<td>Adelaide Crows $1.19 vs West Coast Eagles $4.75</td>
<td></td>
</tr>
<tr>
<td>Gold Coast Suns $1.33 vs St Kilda $3.35</td>
<td></td>
</tr>
<tr>
<td>Melbourne $1.65 vs Brisbane $2.25</td>
<td></td>
</tr>
<tr>
<td>Collingwood $2.15 vs Port Adelaide $2.70</td>
<td></td>
</tr>
<tr>
<td>Sydney $1.22 vs Essendon $4.35</td>
<td></td>
</tr>
<tr>
<td>Richmond $0.97 vs GWS Giants $8.50</td>
<td></td>
</tr>
<tr>
<td>Nth Melbourne $2.20 vs Geelong Cats $1.68</td>
<td></td>
</tr>
<tr>
<td>Hawthorn $1.11 vs Western Bulldogs $6.75</td>
<td></td>
</tr>
</tbody>
</table>

If these figures were correct:

a. There is one match where you would lose money no matter whether the team you bet on won or lost. Which match and team is that, and how much could you lose?

b. There is one match where you could win money if you bet $1 on each team. Which match is that, and how much could you win?
1. Based on the bets placed, which team is more likely to win? ________________

2. The bets are used to calculate the probabilities and the payouts. How did they get 0.250 (¼) for the probability of a draw?

3. If there is no betting agency involved, how is a payout of $4.00 for a draw calculated?
4. If there is a betting agency involved, how is a payout of $3.20 for a draw calculated?

5. Josie and Lin each started with $50. Josie bet $10 on Australia and Lin bet $10 on Japan. How much money would they each have left at the end of the match?
Josie $ _____________
Lin $ ______________

6. In the next game, the bets placed were $200 for a win, $500 for a loss and $300 for a draw. Under the same arrangements, what will the betting agency keep?

7. This betting agency must always win while most of the players will lose. Explain why.
LEsson 5 HOrseracIng

Learning outcomes
F, I, S: Students will understand:
• betting products provided by gaming venues and betting agencies are designed to make profits from players
• gaming venues make money because there are more losses and fewer winnings over the long-term
• higher payouts are matched with lower probabilities of winning.

I, S: Students will be able to:
• calculate the probability of winning and the ‘bet-to-payout ratio’
• recognise that gaming venues make money when the bet-to-payout ratio is greater than the probability of winning.

Resources
• A set of cards with the 2017 Melbourne Cup horses’ names, one name for each student. In classes of more than 24, ask students to share horses. A printable sheet is provided
• A video clip of the 2017 Melbourne Cup. This should be available online. One such video is at: www.youtube.com/watch?v=rjKtYir06m0
• A container to be used for random selection of horse name cards. Alternatively, cards can be well shuffled and then dealt out
• 48 suitable objects to be used as prizes (e.g. counters, blocks, stickers)
• ‘Melbourne Cup’ spreadsheet
• Copies of worksheets 16, 17 and/or 18 ‘The sweep’ for students

5.1 Tuning in
Recap with students the following terms that will be used throughout this lesson:
• gambling/betting/wagering (these terms can be used interchangeably, see Appendix 1 and/or Word match activities from Lesson 1)
• betting agencies (also known as bookmakers, or ‘bookies’)
• payout
• player (or punter, gambler)
• sweep.
Discuss with students examples of sports and race betting advertising that they have seen recently.
Consider the purpose of this advertising and how it only paints betting/gambling in a positive light. Discuss the potential influence of this advertising on how students think about betting/gambling and the importance of understanding the limited chances of winning and the risks involved.

5.2 Class simulations
There will be two simulations, allowing each student to have two bets.

Simulation 1: Sweep with no betting agency
• Students can decide how the ‘prizes’ will be distributed. The important requirement is that all of the bets are distributed to the students (players) and not to a betting agency, which is not included in this first simulation.
• Distribute two of the prizes to each student to be used for their bets, one in each simulation.
• Explain that this first sweep will not involve a betting agency. Ask students to predict how this will affect their potential winnings.

• Ask students to place their bets. Collect one prize from each student and give them a horse card selected at random.

• Using the ‘Melbourne Cup’ spreadsheet, choose a horse for 1st, 2nd, 3rd and last places.

• Distribute the prizes as agreed.

• Calculate the average payout per student.

Simulation 2: Sweep with a betting agency

• Explain to students that this time the sweep will involve a betting agency. Ask them to predict how this will affect their potential winnings.

• Run another sweep by repeating the instructions above, this time using the 2017 Melbourne Cup video clip to decide 1st, 2nd, 3rd and last places. As the betting agency, take away half of the prizes available for students to win. Distribute the remaining prizes as agreed.

• Discuss how involving a betting agency reduces the potential winnings for players because, as a business, a betting agency will seek to make a profit.

This content is supported by the ‘Melbourne Cup’ spreadsheet and the Teacher resource: ‘Field for the 2017 Melbourne Cup’.

5.3 Individual worksheets

Give students time to work on Worksheet 16, 17 or 18 ‘The sweep’ appropriate to their learning level.

These explore some of the issues to be considered in the discussion.

5.4 Class discussion and reflection

For the first sweep:

• What was the average payout per student?

There are two ways to answer this. Let the students decide how they will work it out.

The long way: Get the payout received by each student, add them and divide by the number of students.

The short way: Because all the money bet is returned to someone in the student group, the total is 100 percent of what they bet, so the average payout is 100 percent of the amount each student bet.

Therefore, the average payout is one prize per student.

For the second sweep:

• What was the average payout per student?

Because the betting agency (you) took half the money bet, the total amount returned to the students was half of the total that was bet.

Therefore, the average payout is only half a prize per student.

The average payout for commercial gambling activities (activities that involve a betting agency) is approximately 85 percent of the total amount bet.

Key message

• The amount paid back to the players is less when a betting agency is involved.
Teacher resource  
**Field for the 2017 Melbourne Cup**

This set of cards with horses’ names from the 2017 Melbourne Cup can be copied and cut out to provide one card for each student.

<table>
<thead>
<tr>
<th>17</th>
<th>LIBRAN</th>
<th>5</th>
<th>MARMELO</th>
<th>20</th>
<th>WALL OF FIRE</th>
<th>2</th>
<th>ALMANDIN</th>
</tr>
</thead>
<tbody>
<tr>
<td>23</td>
<td>AMELIE’S STAR</td>
<td>3</td>
<td>HUMIDOR</td>
<td>14</td>
<td>US ARMY RANGER</td>
<td>24</td>
<td>CISMONTANE</td>
</tr>
<tr>
<td>6</td>
<td>RED CARDINAL</td>
<td>7</td>
<td>JOHANNES VERMEER</td>
<td>18</td>
<td>NAKEETA</td>
<td>8</td>
<td>BONDI BEACH</td>
</tr>
<tr>
<td>4</td>
<td>TIBERIAN</td>
<td>15</td>
<td>BOOM TIME</td>
<td>19</td>
<td>SINGLE GAZE</td>
<td>16</td>
<td>GALLANTE</td>
</tr>
<tr>
<td>9</td>
<td>MAX DYNAMITE</td>
<td>21</td>
<td>THOMAS HOBSON</td>
<td>12</td>
<td>WICKLOW BRAVE</td>
<td>1</td>
<td>HARTNELL</td>
</tr>
<tr>
<td>13</td>
<td>BIG DUKE</td>
<td>22</td>
<td>REKINDLING</td>
<td>10</td>
<td>VENTURA STORM</td>
<td>11</td>
<td>WHO SHOT THE BARMAN</td>
</tr>
</tbody>
</table>

Cut out the cards and distribute them randomly to 24 students. (Note: Who Shot The Barman was scratched on the day of the race, after most sweeps were organised.)

If the class numbers under 24, the teacher can ‘buy’ the other tickets. If the class is over 24, ask students to share horses.

To use reality instead of chance, these are the results:

1st: Rekindling  
2nd: Johannes Vermeer  
3rd: Max Dynamite  
Last: Gallante
The table below shows the entries in a major horserace on which you will run sweeps.

<table>
<thead>
<tr>
<th>1</th>
<th>Dunaden</th>
<th>2</th>
<th>Green Moon</th>
<th>3</th>
<th>Red Cadeaux</th>
<th>4</th>
<th>Sea Moon</th>
<th>5</th>
<th>Brown Panther</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Fiorente</td>
<td>7</td>
<td>Foreteller</td>
<td>8</td>
<td>Dandino</td>
<td>9</td>
<td>Ethiopia</td>
<td>10</td>
<td>Fawkner</td>
</tr>
<tr>
<td>11</td>
<td>Mourayan</td>
<td>12</td>
<td>Seville</td>
<td>13</td>
<td>Super Cool</td>
<td>14</td>
<td>Masked Marvel</td>
<td>15</td>
<td>Mount Athos</td>
</tr>
<tr>
<td>16</td>
<td>Royal Empire</td>
<td>17</td>
<td>Voleuse De Coeurs</td>
<td>18</td>
<td>Hawkspur</td>
<td>19</td>
<td>Simenon</td>
<td>20</td>
<td>Ibicenco</td>
</tr>
<tr>
<td>21</td>
<td>Verema</td>
<td>22</td>
<td>Dear Demi</td>
<td>23</td>
<td>Tres Blue</td>
<td>24</td>
<td>Ruscello</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. Suppose you have collected $2 for each of the 24 entries in the sweep and have agreed that all the money collected will be shared as prizes as follows:
   - one half for 1st place
   - then one half of the remaining money for 2nd place
   - then one half of the remaining money for 3rd place
   - the rest of the money for last place.
   a. How much would each of these prizes be for your class?
      1st:  
      2nd:  
      3rd:  
      Last:
   b. In advertising the sweep, you say that, on average, people will get their $2 back. Is this true? Explain.

2. Now you decide to keep $4 of the $24 collected to cover the costs of organising the sweep.
   a. How much would each of the four prizes be? (Use the same rules as above.)
      1st:  
      2nd:  
      3rd:  
      Last:
   b. What is the average amount paid to each of the 24 participants? (Remember to include the 20 zero payments in your calculation.)
NAME: _________________________________________

1. Each of 24 people in an office puts $10 in a sweep. Each gets a horse with a chance to win. This is the ‘prize pool’.
   a. If the betting agency does not take out any expenses, half the pool goes to the winner, one quarter to 2nd and one eighth to each of 3rd and last places. Calculate the prizes.

   _____________________________________________________________
   _____________________________________________________________
   _____________________________________________________________
   _____________________________________________________________

   b. Now the betting agency takes $120 for expenses. What percentage is this of the total bets?

   _____________________________________________________________
   _____________________________________________________________
   _____________________________________________________________
   _____________________________________________________________

   c. Calculate the new prizes.

   _____________________________________________________________
   _____________________________________________________________
   _____________________________________________________________
   _____________________________________________________________

   d. What percentage of the total bets has been returned to the gamblers?

   _____________________________________________________________
   _____________________________________________________________
   _____________________________________________________________
   _____________________________________________________________

2. Imagine you started with $100 and bet $10 on a sweep in which the gamblers lost half their money, day after day. How long do you think your $100 might last?

   _____________________________________________________________
   _____________________________________________________________
   _____________________________________________________________
   _____________________________________________________________
1. Imagine you started with $1000 and bet all your remaining money on a sweep in which players lost half their money, day after day. How long do you think your $1000 might last?

2. Assuming that, on average, you lose half your money each day, complete the table below using only whole numbers.

<table>
<thead>
<tr>
<th>Day number</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Money remaining, on average ($)</td>
<td>1000</td>
<td>500</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. Use the graph below to show the numbers in the table. Join the points with a line in one colour.
4. In some Australian gambling situations, 85 percent of the money must be repaid to gamblers (on average) at each gamble. This means the betting agency may only take 15 percent. At this rate, how long do you think your $1000 might last?

5. Assuming that, on average, you lose 15 percent of your money each day, complete the table below using only whole numbers.

<table>
<thead>
<tr>
<th>Day number</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Money remaining, on average ($)</td>
<td>1000</td>
<td>850</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

6. Using a different colour this time, show the numbers in the table on the graph in question 3.
LESSON 5 (CONTINUED)

5.5. A day at the races

Resources
- A six-sided die
- Name tags numbered 1 to 6
- Play money: 30 × $5 notes
- ‘A day at the races’ spreadsheet
- Copies of student record sheet ‘A day at the races’
- Copies of worksheets 19, 20 and 21 ‘A day at the races’

5.6 Tuning in

Ask students what they know about horseracing and betting.

Show them the payouts (or ‘prices’) offered for races on practically any day in a newspaper.

Explain that the purpose of this lesson is to understand the full story about horserace betting, especially how agencies design their products to maximise their profits at the expense of players and that, the higher the potential payout, the lower the chances of winning.

5.7 Class simulations

Simulation 1: Using a die with equal payouts
- Conduct this simulation using $5 play money notes for eight races. Each race has six horses (numbered 1 to 6) with equal payouts of $25 on a $5 bet. Roll a die to decide the result of each race.
- Students use the Student record sheet ‘A day at the races’ to fill in their choice of horse numbers for each race, and fill in their payouts and balances as the simulation continues.
- Organise six students at the front of the room, with name tags indicating which horse they will bet on for each of the eight races. Each of these students starts with five $5 play money notes.
- Collect one $5 note from each of the six students ($30 in total) then toss a die to determine the result of each race. A payout of $25 is then handed to the winner, with the bookie keeping $5.
- Conduct eight race simulations, with students dropping out once they have lost all their initial $25.
- At the end, students report their overall wins or losses - an average loss of one-sixth of all bets placed. The bookie reports the amount they have gained from the six students.

Simulation 2: Using the ‘A day at the races’ spreadsheet
- Run the ‘A day at the races’ spreadsheet 20 times with equal payouts of $5. Students record the results in a table and on a number line, then analyse them to compare average losses with any predictions they have been able to make.
- Run the spreadsheet 20 times with unequal payouts, such as those used in Worksheet 3 ‘A day at the races’. Students record and analyse the results as above.

5.8 Individual worksheets

It is important to leave sufficient time for a full discussion.

This content is supported by worksheets 19, 20 and 21 ‘A day at the races’.
5.9 Class discussion and reflection

Give foundation students the chance to provide their answers and explanations.

The key results relating to the last two questions are:

• Probability times payout = \( \frac{1}{6} \times 5 = 0.83 \) or 83 percent of bets placed.

• This 83 percent is the expected (or predicted average) return to the punters on all bets placed. It means that the betting agency (e.g. the TAB) expects to take 17 percent of all bets placed.

Ask students:

• Imagine you had been allowed to spend more than $5 on any of the eight races. Would you still expect to go home with about $20.75 of your original $25?

Support intermediate students to explain the key results:

• The sum of the bet-to-payout ratios is greater than one.

• The expected (or predicted average) return to the punter can be calculated by comparing this sum to the sum of the probabilities, which must be 1.

Ask senior students to confirm these conclusions using their different figures. Their solutions to questions 4 and 5 offer an alternative explanation:

• For horse 4, \( \frac{1}{10} \div 1.3 = 0.077 \), so probability \( \times \) payout = \( 0.077 \times 10 = 77 \) percent.

Key message

• Higher payouts are matched with lower probabilities of winning. The only party that is guaranteed to make money at the races is the bookmaker, at the expense of players.

Assessment and feedback

• Provide students with Appendix 2 ‘Student self-assessment record’ near the end of the unit.

• Provide students with Appendix 3 ‘Student reflection activity’ near the end of the unit.

• Provide feedback to students via conferencing, reflecting on the key elements they achieved and areas for future development and focus.

Teachers familiar with websites such as Kahoot, Plickers or Quizzes can use these to complete the reflection activity and/or self-assessment record.

Further assessment suggestion

Students can create a brochure, poster, fact sheet, video, or any multimedia advertisement encouraging people to stop gambling. The criteria could be that the advertisement needs to:

• address common misconceptions/beliefs

• use mathematics to explain the misconceptions, giving examples of payout figures etc

• discuss the different forms of gambling mentioned in these lessons

• be engaging.
Play money: 15 × $5 notes
A day at the races

<table>
<thead>
<tr>
<th>$5</th>
<th>$5</th>
<th>$5</th>
</tr>
</thead>
<tbody>
<tr>
<td>$5</td>
<td>$5</td>
<td>$5</td>
</tr>
<tr>
<td>$5</td>
<td>$5</td>
<td>$5</td>
</tr>
<tr>
<td>$5</td>
<td>$5</td>
<td>$5</td>
</tr>
<tr>
<td>$5</td>
<td>$5</td>
<td>$5</td>
</tr>
<tr>
<td>$5</td>
<td>$5</td>
<td>$5</td>
</tr>
</tbody>
</table>
**Student record sheet**

**A day at the races**

NAME: __________________________________________

1. Fill in your choices and results for the dice simulation of a day at the races.

<table>
<thead>
<tr>
<th>Race number</th>
<th>My horse</th>
<th>My bet</th>
<th>My win or loss</th>
<th>Balance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>$5</td>
<td></td>
<td>$25 at the start</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>$5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>$5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>$5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>$5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>$5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
2. Fill in the table as you play the ‘A day at the races’ spreadsheet game 20 times with payouts of $5 for each horse.

Use positive numbers for wins and negative numbers for losses.
Then plot the results on the number line and complete the calculations.

<table>
<thead>
<tr>
<th>Trial number</th>
<th>Win (+$) or lose (–$)</th>
<th>Trial number</th>
<th>Win (+$) or lose (–$)</th>
<th>Trial number</th>
<th>Win (+$) or lose (–$)</th>
<th>Trial number</th>
<th>Win (+$) or lose (–$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6</td>
<td>6</td>
<td>11</td>
<td>16</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>7</td>
<td>7</td>
<td>12</td>
<td>17</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>8</td>
<td>8</td>
<td>13</td>
<td>18</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>9</td>
<td>9</td>
<td>14</td>
<td>19</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>10</td>
<td>10</td>
<td>15</td>
<td>20</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Sum of losses = $
Sum of wins = $
Difference = $
Average loss per game = $
Average return on the $100 bet = $
3. Fill in the table as you play the 'A day at the races' spreadsheet game 20 times with the following unequal payouts.

<table>
<thead>
<tr>
<th>Horse</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Payouts</td>
<td>$5</td>
<td>$2.50</td>
<td>$5</td>
<td>$10</td>
<td>$2.50</td>
<td>$5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Trial number</th>
<th>Win (+$) or lose (–$)</th>
<th>Trial number</th>
<th>Win (+$) or lose (–$)</th>
<th>Trial number</th>
<th>Win (+$) or lose (–$)</th>
<th>Trial number</th>
<th>Win (+$) or lose (–$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6</td>
<td>11</td>
<td>16</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>7</td>
<td>12</td>
<td>17</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>8</td>
<td>13</td>
<td>18</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>9</td>
<td>14</td>
<td>19</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>10</td>
<td>15</td>
<td>20</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Sum of losses = $
Sum of wins = $
Difference = $
Average loss per game = $
Average return on the $100 bet = $
This worksheet is based on the following screenshot from the ‘A day at the races’ spreadsheet.

1. The player placed eight bets of $5 each, a total of $40, and had two winning bets that each paid $25. How much did they end up winning or losing?

2. Were two wins out of eight better or worse than you would expect to get by random selection of one of the six horses? Explain your answer.

3. How much would the player have won or lost if they had bet on horse 6 in every race?
4. What is the probability that horse 4 will win race 1 next time?

5. Calculate the payout × probability for horse 1.

6. The expected return is 83.3 percent (% as a fraction). What does that mean?
A player participated in the ‘A day at the races’ game 20 times with the following payouts.

<table>
<thead>
<tr>
<th>Horse</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Payouts</td>
<td>$5</td>
<td>$2.50</td>
<td>$5</td>
<td>$10</td>
<td>$2.50</td>
<td>$5</td>
</tr>
</tbody>
</table>

Their results are shown in this table.

<table>
<thead>
<tr>
<th>Wins</th>
<th>Losses</th>
</tr>
</thead>
<tbody>
<tr>
<td>$20</td>
<td>$10, $22.50, $22.50</td>
</tr>
<tr>
<td>$50</td>
<td>$25, $10, $10</td>
</tr>
<tr>
<td>$50</td>
<td>$25, $25, $25</td>
</tr>
<tr>
<td>$7.50</td>
<td>$25, $10, $22.50</td>
</tr>
<tr>
<td>$7.50</td>
<td>$22.50, $25, $25</td>
</tr>
<tr>
<td>Total</td>
<td>$135</td>
</tr>
</tbody>
</table>

1. Find the total losses. Then compare the total losses to the total wins.

Total losses = $________________

Losses - wins = $________________

2. How many times out of 20 did they lose all the initial $25?

3. How much of the 20 × $25 = $500 did the player keep?

4. What percentage of their $500 did the player keep?

5. Use a calculator to confirm that the sum of the bet-to-payout ratio is 1.5.

$$\frac{1}{5} + \frac{1}{2.5} + \frac{1}{5} + \frac{1}{10} + \frac{1}{2.5} + \frac{1}{5} =$$  

In the long run the player can expect an average of a 66.7 percent (⅔) return on the bets placed. How close was this to your answer to question 4?
Student worksheet 21
A day at the races

NAME: __________________________________________

With payouts as shown below, a player bet on horse number 4 in every one of the eight races.

<table>
<thead>
<tr>
<th>Horse</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Payout</td>
<td>$3</td>
<td>$4</td>
<td>$5</td>
<td>$10</td>
<td>$4</td>
<td>$6</td>
</tr>
</tbody>
</table>

1. The largest amount the player could lose is $25, and this is quite likely. Explain why.

2. How much money would the player win if horse number 4 was the winner in every race?

3. Use a calculator to confirm that the sum of the bet-to-payout ratios is 1.5.
   \[ \frac{1}{3} + \frac{1}{4} + \frac{1}{5} + \frac{1}{10} + \frac{1}{4} + \frac{1}{6} = \]

4. The probability that horse 4 will win the first race is less than 1/10. Explain why.


6. On average, the player should expect to end up keeping about $19.75 of the original $25. Explain why.

7. If horse 1 was scratched at the last minute, the player would have a better chance of winning than the bookie. Explain why.

8. Make up a set of six payouts for which the player could expect to break even on wins and losses in the long term. Enter these in the table below. (There is more than one answer to this question.)

<table>
<thead>
<tr>
<th>Horse</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Payout</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Defining gambling/betting

Gambling/betting requires a person to risk losing something of value (usually money) for the chance of winning more, which is dependent on an uncertain outcome such as a particular horse coming first in a race, a particular team winning a sporting match, or having a certain combination of cards in a card game.

Common gambling terms

Gaming venue is the business that provides gambling products, often associated with poker machines. Examples of gaming venues include clubs and hotels. As with betting agencies, these businesses seek to make a profit at the expense of players.

Betting agency (bookmaker, bookie) is the business that provides the betting product or opportunity to bet/gamble. This term is often associated with sports or race betting. Like any business, betting agencies seek to make a profit at the expense of the players.

Expenditure is the expression used to describe the amount lost by a player or players from their gambling. It is calculated by deducting winnings paid out from the amount wagered (turnover).

Gambler is the person placing the bet.

Payout is the amount returned to the person for a winning bet, commonly understood to be for a bet of $1.

Pokie or poker machine is the popular name for an electronic gaming machine. These are found in Victorian hotels and clubs. They use random numbers to decide on wins and losses.

Pre-commitment is a way in which a player can decide beforehand how much they are prepared to lose in a gambling session.

Probability is a way of calculating and describing how likely something is to happen.

Product (in this context) is any opportunity to bet provided by a betting agency.

Turnover is the expression used to describe the amount wagered. It is all the money bet before any winnings are paid out or losses incurred.

Wagering refers to all legal forms of betting/gambling on racing and sporting events.
Student self-assessment record

NAME: ________________________________________

To be completed by students as a self-assessment and moderated by teachers through a feedback conversation.

How have your thoughts changed as a result of doing this unit, ‘What are the odds?’

<table>
<thead>
<tr>
<th>Key message</th>
<th>Before the unit</th>
<th>After the unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chance has no memory; outcomes are impossible to predict.</td>
<td>☐ I knew</td>
<td>☐ I know</td>
</tr>
<tr>
<td></td>
<td>☐ I didn’t know</td>
<td>☐ I still need practice</td>
</tr>
<tr>
<td>Differences in payouts arise when a gaming venue is involved.</td>
<td>☐ I knew</td>
<td>☐ I know</td>
</tr>
<tr>
<td></td>
<td>☐ I didn’t know</td>
<td>☐ I still need practice</td>
</tr>
<tr>
<td>Total payouts are not always 100 percent of the amount bet.</td>
<td>☐ I knew</td>
<td>☐ I know</td>
</tr>
<tr>
<td></td>
<td>☐ I didn’t know</td>
<td>☐ I still need practice</td>
</tr>
<tr>
<td>Games provided by gaming venues are designed to make a profit.</td>
<td>☐ I knew</td>
<td>☐ I know</td>
</tr>
<tr>
<td></td>
<td>☐ I didn’t know</td>
<td>☐ I still need practice</td>
</tr>
<tr>
<td>Gamblers must lose money in the long run if a gaming venue is involved.</td>
<td>☐ I knew</td>
<td>☐ I know</td>
</tr>
<tr>
<td></td>
<td>☐ I didn’t know</td>
<td>☐ I still need practice</td>
</tr>
<tr>
<td>No matter how much you start out with, you’re likely to lose money if you gamble.</td>
<td>☐ I knew</td>
<td>☐ I know</td>
</tr>
<tr>
<td></td>
<td>☐ I didn’t know</td>
<td>☐ I still need practice</td>
</tr>
<tr>
<td>Setting a limit and sticking to it avoids harm from gambling and spending a significant amount of money.</td>
<td>☐ I knew</td>
<td>☐ I know</td>
</tr>
<tr>
<td></td>
<td>☐ I didn’t know</td>
<td>☐ I still need practice</td>
</tr>
<tr>
<td>The amount paid back to the players is less when a betting agency is involved.</td>
<td>☐ I knew</td>
<td>☐ I know</td>
</tr>
<tr>
<td></td>
<td>☐ I didn’t know</td>
<td>☐ I still need practice</td>
</tr>
<tr>
<td>The more a person bets, the greater the likelihood of losing all of the money they started with.</td>
<td>☐ I knew</td>
<td>☐ I know</td>
</tr>
<tr>
<td></td>
<td>☐ I didn’t know</td>
<td>☐ I still need practice</td>
</tr>
<tr>
<td>If you keep gambling in the hope of winning back your losses, you are very likely to fail and lose even more.</td>
<td>☐ I knew</td>
<td>☐ I know</td>
</tr>
<tr>
<td></td>
<td>☐ I didn’t know</td>
<td>☐ I still need practice</td>
</tr>
<tr>
<td>Higher payouts are matched with lower probabilities of winning.</td>
<td>☐ I knew</td>
<td>☐ I know</td>
</tr>
<tr>
<td></td>
<td>☐ I didn’t know</td>
<td>☐ I still need practice</td>
</tr>
</tbody>
</table>
Student reflection activity

NAME: ________________________________________

Rate yourself on the effort scale! 0 means you didn’t try at all in the lesson and 10 means you tried your best the whole time. Circle the number that best suits how much effort you put into this lesson.

0 1 2 3 4 5 6 7 8 9 10

In one sentence, explain something that you learnt in the lesson.

________________________________________________________________________

Write below an example of what you learnt.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

Complete the following sentence.
Something I’d like to learn more about is ______________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
Notes
lovethegame.vic.gov.au/schools