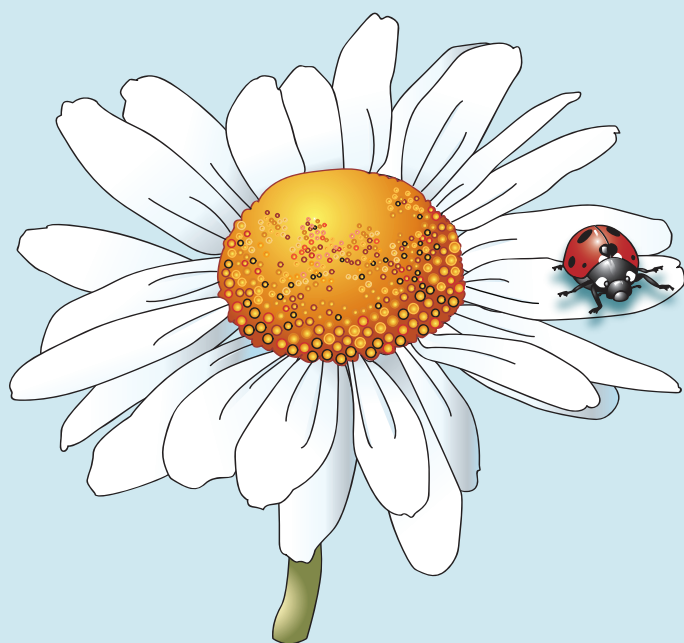


Playing to win

Student booklet



6

Mathematics

Queensland Comparable
Assessment Tasks (QCATs)
2010

Given name:

Family name:

School:

Setting the scene: Group discussion

Many games use a pair of six-sided dice.

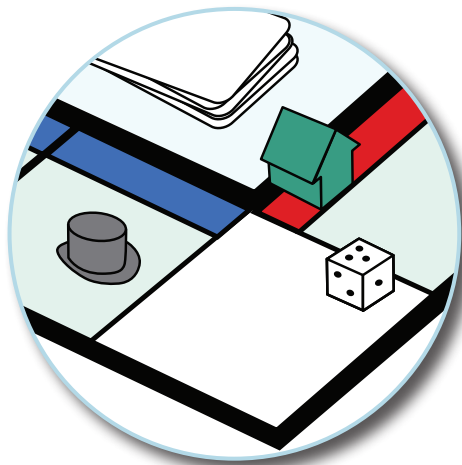
The **sum** of the two dice can determine:

- how far a playing piece moves around a board
- the total of the dice contributing to a score
- how much of something is gained or lost.

What other ways are dice used in games?

Some games that you may have played rely only on **chance** — dice give a **random** result and you do not need to make any decisions.

What are some examples of games that rely only on chance?



Many board games also have an element of **choice**, where you make decisions as a part of playing the game. These decisions might be to choose:

- a path to take
- whether or not to buy something
- where to place something on the board
- who to give or take something from.

What are some examples of games that rely on choice and chance?

What other decisions can be made in games?

Games that involve both choice and chance are won more often by people who have a clearly thought-out plan — a **strategy** — about the choices that they are going to make.



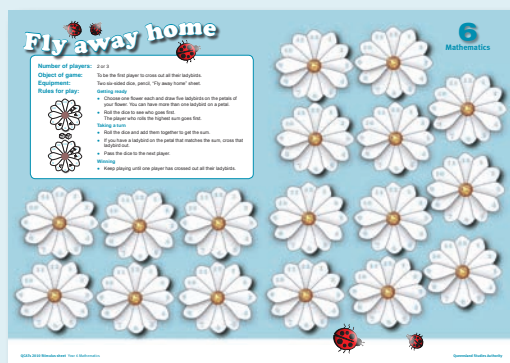


Activity

In the game “Fly away home”, players:

- draw ladybirds on flower petals
- take turns at rolling two dice and crossing out ladybirds on the petal that matches the total
- attempt to be the first player to cross out all their ladybirds.

Your teacher will now read through the rules to the game “Fly away home”, and will organise you into groups to play the game.



More group discussion

Your teacher will lead a discussion about the game “Fly away home”. Think about these questions:

- What parts of this game rely on chance?
- What choices are made in this game?

In this assessment, you will:

- conduct a mathematics investigation to explore the question:

“What are the best number/s to place my five ladybirds on in order to cross them out the fastest?”









































































- consider what outcomes occur when rolling a pair of six-sided dice
- determine the likelihood of rolling the different outcomes
- plan and justify a strategy you think will increase your chances at winning the game “Fly away home”
- evaluate the strategy by collecting and analysing data
- use your findings to evaluate four different game strategies.



Stop here: Wait for your teacher’s directions.

Exploring outcomes and likelihood

This grid shows all possible outcomes when rolling two six-sided dice. Use the grid to answer the questions below.

  2	  3	  4	  5	  6	  7
  3	  4	  5	  6	  7	  8
  4	  5	  6	  7	  8	  9
  5	  6	  7	  8	  9	  10
  6	  7	  8	  9	  10	  11
  7	  8	  9	  10	  11	  12

The sum of 10 has

3 possible outcomes:



which can be written as:

$4 + 6$

$5 + 5$

$6 + 4$

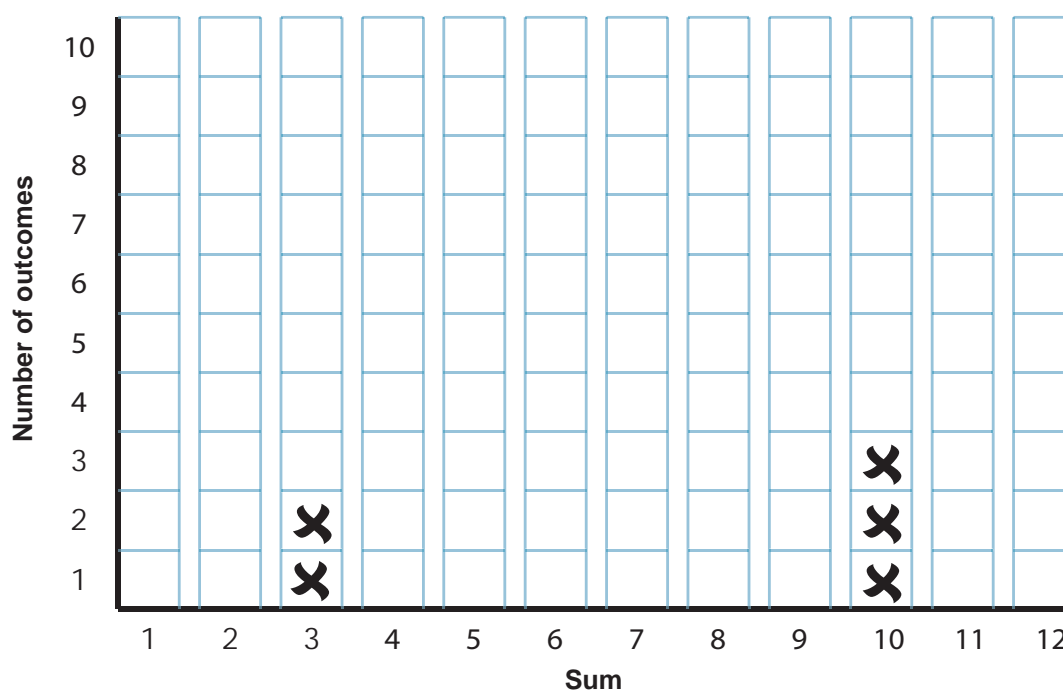
1. a) How many possible outcomes make a sum of 8?

b) Write all the possible outcomes that make a sum of 6.

.....

c) Complete Graph 1 by using a cross (X) to indicate the number of outcomes for each sum. The possible outcomes for the sums of 3 and 10 have been completed for you.

Graph 1: Number of outcomes for each sum



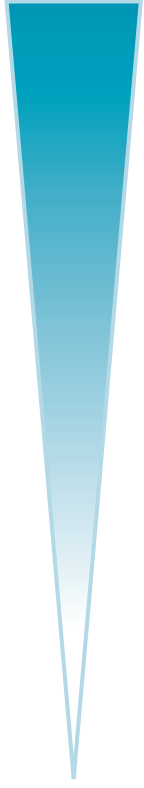
Use Graph 1 on page 4 to complete the following questions.

2. a) What sum/s will never be rolled?
- b) Another sum has the same number of outcomes as the sum of 9.
- Which sum is it?
- c) Name two other sums that have an equal number of outcomes.
- and
- d) Complete the Number of outcomes column in Table 1 below.
- e) In the Likelihood column, express the likelihood of rolling each sum as a common fraction. You do not need to simplify the likelihood by cancelling down.
- f) Order the sums from most likely to least likely in Diagram 1.

Table 1: Likelihood of rolling each sum

Sum	Number of outcomes	Likelihood
1	.....	.....
2	.....	.....
3	2	$\frac{2}{36}$
4	.....	.....
5	.....	.....
6	.....	.....
7	.....	.....
8	.....	.....
9	.....	.....
10	3	$\frac{3}{36}$
11	.....	.....
12	.....	.....
Total	36	

Diagram 1: Order of likelihood

Order	Likelihood
	most likely
	
	least likely



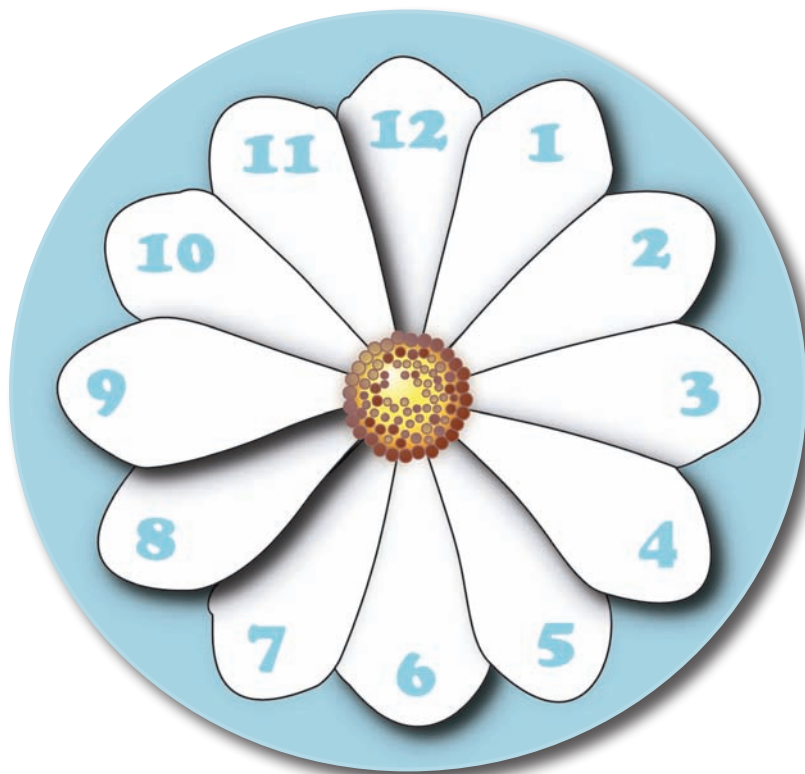
Stop here: Wait for your teacher's directions.

Making and justifying a strategy

On page 3 we posed the question:

“What are the best number/s to place my five ladybirds on in order to cross them out the fastest?”

3. a) **Predict which numbers will give you the best chance of winning this game.**
Draw your five ladybirds on the number/s you selected.



- b) **Justify the choices you made.**

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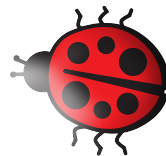
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Stop here: Wait for your teacher's directions.



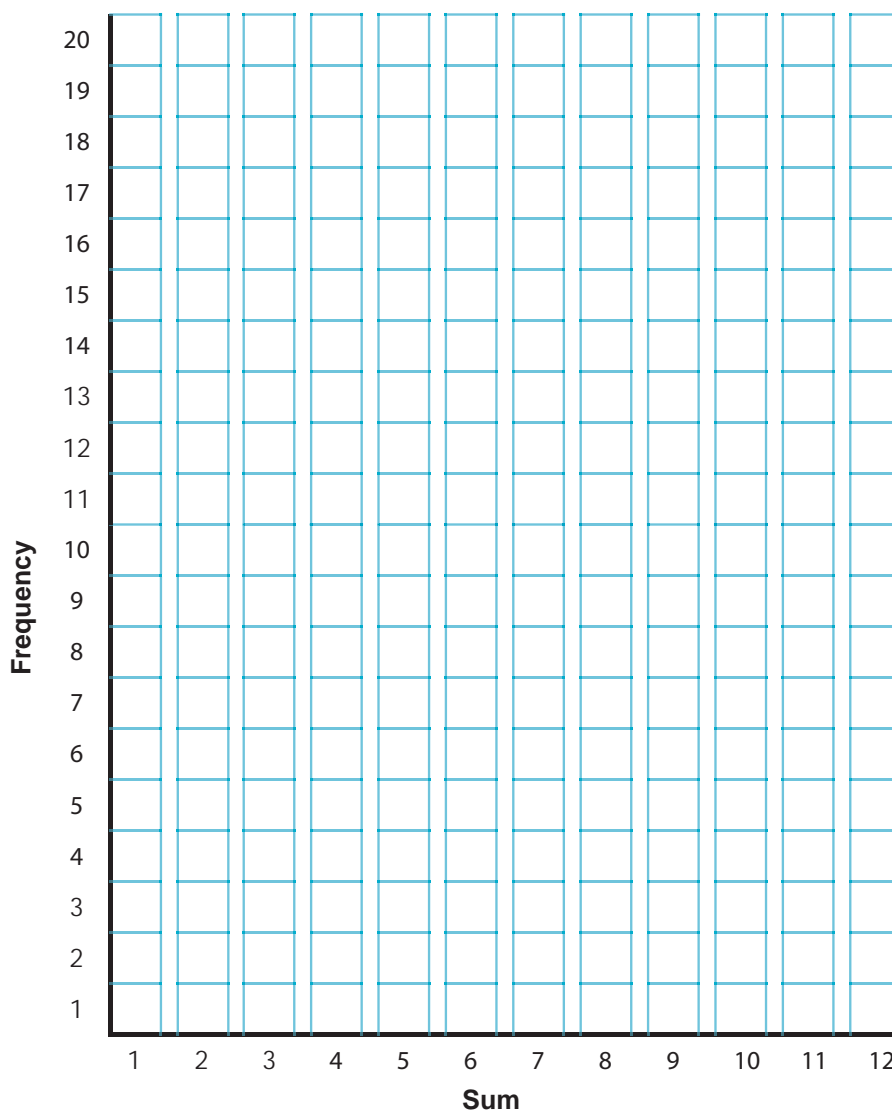
Evaluating your strategy

Your teacher will organise you into your groups to play the game again for fifteen minutes. Use your strategy from page 6.

- Use a cross (X) to record each of the sums rolled by you and your partner while you play the game. Stop recording all rolls if one of the sums reaches a frequency of 20.



Graph 2: Frequency of each sum



Look at the shape of Graphs 1 and 2 on pages 4 and 8, and complete the sentence below.

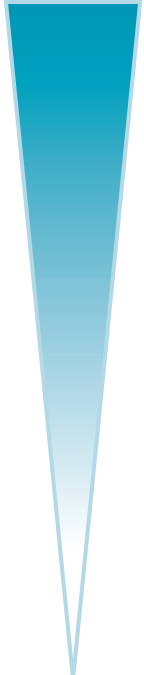
- The two graphs may not be the same shape because:
-
-
-
-

6. a) Use Graph 2 on page 8 to help you complete the table below. You do not need to simplify the likelihood by cancelling down.
- b) Complete Diagram 2 by ordering the sums in Table 2.

Table 2: Likelihood of rolling each sum

Sum	Frequency	Likelihood
1
2
3
4
5
6
7
8
9
10
11
12
Total	

Diagram 2: Order of likelihood

Sum	Likelihood
	<div> <div>most likely</div>  <div>least likely</div> </div>

- c) What are the best numbers to put the five ladybirds on according to the data?

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- d) Would these numbers always be the best numbers to pick? **Yes / No**
(circle one)

Explain:

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- e) Was the strategy you developed on page 6 an effective strategy? Explain your answer.

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Stop here: Wait for your teacher's directions.

Applying your learning

Sarah-Jane, Mickey, John and Romana played “Fly away home”. Each player has a different strategy, which is shown below. They use the same strategy for every game they play.

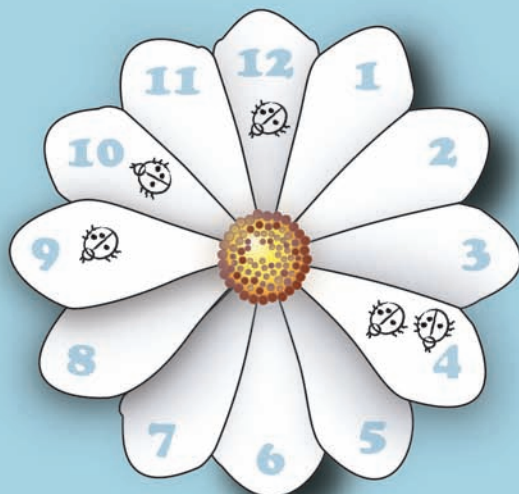
Sarah-Jane



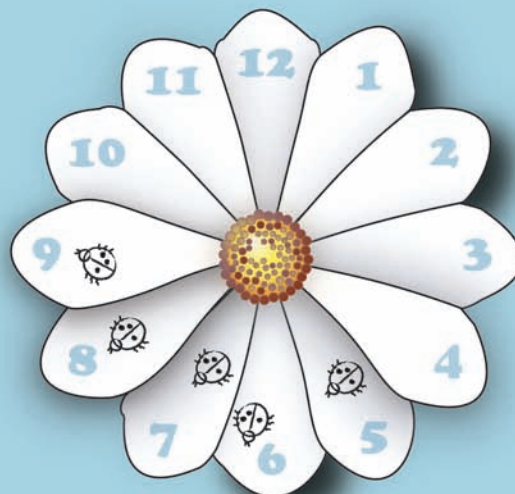
Mickey



John



Romana



7. Examine the strategies that the students developed for playing the game. Decide on what chance they have of winning, and justify your thinking.

a) Sarah-Jane has **a good**
a poor chance of winning because:
no
(circle one)

.....

.....

.....

.....

b) Mickey has **a good**
a poor chance of winning because:
no
(circle one)

.....

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.....

.....

c) John has **a good**
a poor chance of winning because:
no
(circle one)

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d) Romana has **a good**
a poor chance of winning because:
no
(circle one)

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Guide to making judgments — Year 6 Mathematics

Name

Focus: Apply knowledge of chance events and variation to make predictions, explain results and evaluate game strategies.

Knowledge and understanding	Thinking and reasoning	Thinking and reasoning Reflecting	Communicating
<p>Uses possible outcomes and frequency to estimate likelihood as a common fraction. Compares and orders estimates of likelihood. Identifies and explains investigation results and differences between graphs.</p> <p>Questions 1a–b, 2, 5, 6a–d</p>	<p>Makes and justifies a prediction of the best placement of ladybirds.</p> <p>Question 3</p>	<p>Reflects on learning and applies new understandings to evaluate the effectiveness of game strategies.</p> <p>Questions 6e, 7</p>	<p>Communicates using mathematical language and representations to justify thinking and reasoning.</p> <p>Questions 1c, 3b, 4, 5, 6d–e, 7</p>
<p>Explains investigation results and differences between graphs using an understanding of the factors influencing chance events and variation.</p> <p>Correctly compares and orders estimates of likelihood in Diagrams 1 and 2.</p> <p>Correctly expresses likelihoods as common fractions in Tables 1 and 2. Identifies obvious mathematical differences between graphs.</p> <p>Expresses likelihoods as common fractions in Table 1, which are generally correct. Identifies outcomes with equal likelihoods.</p> <p>Translates information from graphs into tables. Identifies a most and least likely outcome, and an impossible event.</p> <p>Identifies numbers of outcomes from grid.</p>	<p>Justifies placement of each ladybird using comprehensive mathematical interpretation of chance events and variation.</p> <p>Considers chance events in prediction and explanation.</p> <p>Supports placement of ladybirds with an appropriate explanation.</p> <p>Makes a prediction by placing ladybirds on petals.</p>	<p>Considers and uses quantitative data from multiple sources to support judgment about the ability of own strategy to win.</p> <p>Accurately judges each of the four player's chance of winning, and justifies using an understanding of chance events.</p> <p>Considers and uses a mathematical source to support judgment about the ability of own strategy to win.</p> <p>Supports judgments about the four player's chance of winning with relevant explanations.</p> <p>Makes judgments about the effectiveness of own and four player's strategies.</p>	<p>Communicates and justifies thinking and reasoning using clear mathematical language.</p> <p>Makes logical and well-reasoned explanations.</p> <p>Communicates thinking and reasoning using appropriate mathematical language.</p> <p>Records possible outcomes and frequency in graphs.</p>
			A
			B
			C
			D
			E

Feedback

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