RICH MATHEMATICAL TASK BOOKLET

PROBABILITY

YEAR 3

Teacher Booklet

Task 1

For dinner, Tali is ordering a pizza with cheese.

She can either have a classic base, thin & crispy base, or deep pan base.

The options for her pizza toppings are:

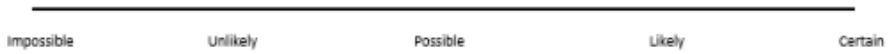
1. Pineapple
2. Ham
3. Mushroom
4. Pepperoni

Can you show the different pizza combinations that Tali might choose?

How many different combinations are there?

Teacher Notes

Before you launch the task, show the students the probability continuum:



Ask the students to think of things that they do after-school and put these on the continuum for themselves:
Have a snack - Go swimming - Read a book
Play a game - Do a chore - See a dragon
Watch TV - Build a snowman - Play sports
Ask different students to share their continuum and discuss why they might be different.
Provide the pictures of the different pizza toppings for the students.
Notice whether students are able to systematically record the different options for the pizza and work out how many different combinations are possible.
The possibility of each pizza combination could be linked to fractions in relation to the chance of each aspect and combination. This could be recorded as one third for the base, one quarter chance for each topping, and one twelfth for each combination.

Big Ideas

When there is a chance-based situation, there are sets of possible outcomes that can be arranged into events.

Probability is the chance of an event occurring. This can be represented with language or values (e.g., 0% - impossible or 100% certain).

Data visualisations can be used to show what outcomes are possible and more likely. They can also be used to represent the results of a probability investigation.

Curriculum Links

During Year 3

Engage in chance-based investigations about everyday situations to:
– anticipate and then identify possible outcomes
– collect and record data
– create data visualisations for frequencies of possible outcomes (e.g., lists, pictures, graphs)

Shareback

Select students to share that have worked systematically to find all the possible combinations.

Model to the students how to draw a tree diagram for the different combinations.

Mathematical Language

Probability, chance, impossible, unlikely, possible, likely, certain, quarter.

Connect

What is the chance that Tali will have a deep pan pizza?
What is the chance that Tali will have ham on her pizza?
What is the chance that Tali will have a thin & crispy pizza with mushroom?

Suggested Learning Outcomes

Represent the different outcomes for an event.

Find all of the possible outcomes for an event.

Independent Tasks

Here is a probability continuum:

Here is a list of things that you could have for breakfast. Think about what you eat and put them on the continuum.

Milk	Banana	Weetbix	Pizza
Socks	Rice	Bread	Candy floss
Cereal	Mango	Eggs	Broccoli

Add three more things to the continuum.

Compare your continuum with a classmate. Is it the same or different?

Anticipations

Solutions, Misconceptions

Task 2

Xiāng is choosing toppings for her baobing

She can choose two toppings from the following list:

Mango, strawberry, lychee, tapioca, red beans, blueberry.

What are the different topping combinations that Xiāng could choose?

How many different combinations are there?

Teacher Notes

During the launch, remind students of a tree diagram as a way to record different combinations.

Provide the pictures of the different baobing options to the students.

Notice whether students are able to systematically record the different options for the baobing and work out how many different combinations are possible.

During the connect, the possibility of each baobing option could be linked to fractions in relation to the chance of each combination being one fifteenth.

Shareback

Select students to share that have worked systematically to find all the possible combinations.

Select students to share who have used a tree diagram or model this to the students.

Big Ideas

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Data visualisations can be used to show what outcomes are possible and more likely. They can also be used to represent the results of a probability investigation.

Curriculum Links

During Year 3

Engage in chance-based investigations about everyday situations to:
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Explain and question statements about chance-based situations, with reference to data

Connect

What is the chance that Xiāng chooses mango and lychee?

How many combinations would there be if Xiāng could also choose grass jelly?

Mathematical Language

Probability, chance, unlikely, possible, likely, certain, half, quarter, equal chance.

Suggested Learning Outcomes

Represent the different outcomes for an event.
Find all of the possible outcomes for an event.

Independent Tasks

Wiri has to choose two things for his lunch. The things to eat are:

Sandwich

Apple

Muffin

Banana

Pie

Can you show the different combinations that Wiri might choose?

How many different combinations are there?

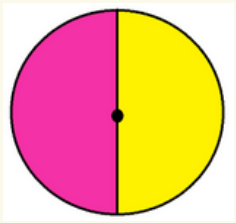
Anticipations

Solutions, Misconceptions

Task 3

Leilani and her brother Iosefa are making spinners to play a game.

Leilani has made a spinner that looks like this:



She says that if it lands on pink, she will win and if it lands on yellow then Iosefa will win.

Is Leilani's game fair?

Spin the spinner twenty times and record what happens.

Iosefa has made a spinner that looks like this:

He says that if it lands on pink then Leilani can win otherwise he wins.

Is Iosefa's game fair?

Spin the spinner twenty times and record what happens.

Big Ideas

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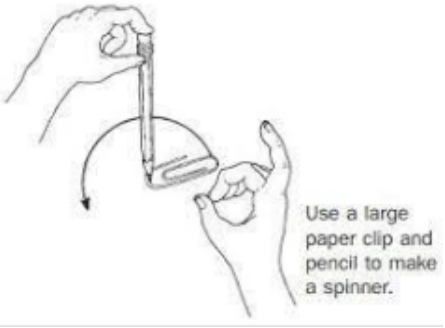
For some situations or games, the chance or probability of particular outcomes can be calculated (theoretical probability). Theoretical probability and what happens in an experiment will differ.

For some situations or games using repeated testing can give a sense of which outcomes are more likely (experimental probability).
A probability experiment involves repeated trials. Results can differ in different trials.

Teacher Notes

During the launch, remind students how to record outcomes using a tally chart.
Have copies of the spinner for each pair. Children can spin it using a pencil held upright in the middle and a paperclip.



Notice whether students are recording the results accurately and systematically and support them to do this.

Facilitate the students to notice that we can express probability as a fraction.

There is a half chance of landing on yellow and pink. There is a quarter of a chance of landing on each colour for Iosefa's spinner.

For the independent activity have colouring pens or pencils available, and the material for students to make the spinner and test their game.

Shareback

Select students to share who have used a systematic way of recording the data to show the results of their chance investigation.

Select students who have used tally-charts, or model this to the students. Ensure that you share the results from several pairs of students.

Curriculum Links

During Year 3

Engage in chance-based investigations about games to:
– anticipate and then identify possible outcomes
– collect and record data
– create data visualisations for frequencies of possible outcomes (e.g., lists, pictures, graphs)
– notice variations in outcomes

Explain and question statements about chance-based situations, with reference to data

Mathematical Language

Chance, half, quarter, equal chance, tally-chart, trial.

Connect

How could you change Iosefa's game to make it fair with an equal chance to win?

Who would be more likely to win for this spinner?

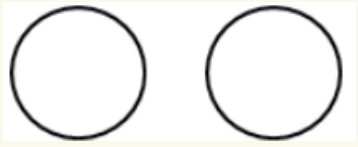
Could you design a game with this spinner that would have an equal chance of winning?

Suggested Learning Outcomes

Identify possible outcomes in a chance situation.
Make a prediction about a chance situation.
Collect and record data for a chance investigation.
Create a data visualisation to represent the results of a chance investigation.

Independent Tasks

Design some spinners and make the rules for the game of chance.



Make one spinner and rules that are fair and two players would have an equal chance to win.

Make one spinner and rules that are unfair and one player would be have more chance to win.

Test both the spinners and games and record what happens when you do multiple trials.

Anticipations

Solutions, Misconceptions

Task 4

Lin and Abdul were playing a game of beanz. They put one red bean and two blue beans in a bag.

Without looking, Lin picked a bean out of the bag and then Abdul picked one out.

If the two beans picked out were the same colour, Lin won the game.

If they picked out two differently coloured beans, then Abdul was the winner.

Is this a fair game?

Explain your answer.

Use the beans and bags and test the game by trialling picking out the beans 30 times. Record your results.

Make statements about what you notice.

Teacher Notes

During the launch remind students how to record outcomes using a tally chart.
Have feely bags and red and blue beans available for each group to experiment with the chance situation.

Notice whether students are recording the results accurately and systematically and support them to do this.

For the independent task have a feely bag available with beans for the students to use.

Shareback

Select students to share that have worked out the possible ways that the beans could be taken from the bag.

For the second part of the task, choose students to share that have recorded their outcomes systematically.

Model to the students how the different results could be represented on a column graph.

Big Ideas

When there is a chance-based situation, there are sets of possible outcomes that can be arranged into events. Probability is the chance of an event occurring. This can be represented with language or values (e.g., 0% - impossible or 100% certain).

For some situations or games, the chance or probability of particular outcomes can be calculated (theoretical probability). Theoretical probability and what happens in an experiment will differ.

For some situations or games using repeated testing can give a sense of which outcomes are more likely (experimental probability).

A probability experiment involves repeated trials. Results can differ in different trials.

Connect

How could you design the game and number of beans so that it was an equal chance of winning?

How could you design the game and number of balls so that Lin had a higher chance of winning?

Suggested Learning Outcomes

Identify possible outcomes in a chance situation.
Compare the likelihood of events.
Make a prediction about a chance situation.
Collect and record data for a chance investigation.

Independent Tasks

Beanz challenge games

Hemi is deciding which beanz challenge game would have an equal chance for him to win.

The first challenge has a bag with the following beans inside:

Hemi wins if he picks a blue bean without looking.
Is this fair? Why or why not?

Use the beans and test the game 20 games and record the results.
Make statements about what you found.

The second challenge has a bag with the following beans inside:

Hemi wins if he picks a yellow bean.
Is this fair? Why or why not?

Use the beans and test the game 20 games and record the results.
Make statements about what you found.

Can you design a beanz challenge where Hemi would have an equal chance of winning?

Curriculum Links

During Year 3

Engage in chance-based investigations about games to:
– anticipate and then identify possible outcomes
– collect and record data
– create data visualisations for frequencies of possible outcomes (e.g., lists, pictures, graphs)
– describe what these visualisations show
– answer the investigative question
– notice variations in outcomes

Explain and question statements about chance-based situations, with reference to data

Mathematical Language

Chance, unfair, fair, equal chance, trial, tally chart.

Anticipations

Solutions, Misconceptions

Task 5

Moana and Tangi are playing a dice game.

If an even number is rolled on the dice then Moana wins.

If a three is rolled on the dice then Tangi wins.

Who is more likely to win the game? Why?

Use the dice to play the game and do 30 trials and record the results. Represent the results on a column graph.

Was your prediction correct?

Teacher Notes

During the launch, ask the students to roll the dice ten times and record the results. Model how to record the results on a tally chart and then a column graph.

Have dice available for students and squared paper to draw a graph.

Notice whether students are recording the results accurately and systematically and support them to do this.

Support students to make connections between probability and fractions.

Facilitate them to represent the chance of rolling a 3 as a sixth while the chance of rolling an even number is half or model this if they don't represent in that way.

For the independent task have dice available and squared paper for the graph.

Shareback

Select students to share who have used a systematic way of recording the data to show the results of their chance investigation.
Select students who have used tally-charts or a column graph, or model this to the students. Ensure that you share the results from several pairs of students.

Big Ideas

When there is a chance-based situation, there are sets of possible outcomes that can be arranged into events. Probability is the chance of an event occurring. This can be represented with language or values (e.g., 0% - impossible or 100% certain).

For some situations or games, the chance or probability of particular outcomes can be calculated (theoretical probability). Theoretical probability and what happens in an experiment will differ.

For some situations or games using repeated testing can give a sense of which outcomes are more likely (experimental probability).

A probability experiment involves repeated trials. Results can differ in different trials.

Connect

What are the possible results?
What is the likelihood of Moana winning?
What is the likelihood of Tangi winning?

Predict what the results would be if you played the game 100 times.
How could you make the game fair?

Suggested Learning Outcomes

Identify possible outcomes in a chance situation.
Make a prediction about a chance situation.
Collect and record data for a chance investigation.
Create a data visualisation to represent the results of a chance investigation.

Independent Tasks

Lily and Noah are playing a dice game. They roll a dice.

If it lands on 1, 2, or 3 then Lily wins.

If it lands on 4, 5, or 6 then Noah wins.

Is the game fair? Why or why not?

Use the dice and roll it 40 times and record the results.

What do you notice?

Represent your results using a column graph.

Curriculum Links

During Year 3

Engage in chance-based investigations about games to:
– anticipate and then identify possible outcomes
– collect and record data
– create data visualisations for frequencies of possible outcomes (e.g., lists, pictures, graphs)
– describe what these visualisations show
– answer the investigative question
– notice variations in outcomes

Explain and question statements about chance-based situations, with reference to data

Mathematical Language

Chance, fair, unfair, trial, tally-chart, column graph.

Anticipations

Solutions, Misconceptions

Task 6

Sunny and Jacoba have designed a dice game. They roll two dice together.

If they roll a double then Player 1 wins, otherwise Player 2 wins. If you win, you take a counter and the first to 20 counters wins the game.

Is it easier for Player 1 to win or Player 2?

Work out the combinations and test your prediction using the dice and counters. Who got to 20 first?

Sunny thinks that to make the game fairer that Player 1 should get four counters each time doubles are rolled.

Do you think this is fairer?

Test your prediction using the dice and counters and play five rounds.

Record the results. Who got to 20 first the most times?

Is the first game fairer or Sunny's idea?

Teacher Notes

During the launch, model rolling two dice and record the possible results.

Have dice available for students to roll to play the game.

Notice whether students are recording the results accurately and systematically and support them to do this.

Support students to understand that the outcome or results of trials can vary but the more trials undertaken help you to get a sense of the probability of outcomes.

For the independent task, provide students with dice and counters.

Big Ideas

When there is a chance-based situation, there are sets of possible outcomes that can be arranged into events. Probability is the chance of an event occurring. This can be represented with language or values (e.g., 0% - impossible or 100% certain).

For some situations or games, the chance or probability of particular outcomes can be calculated (theoretical probability). Theoretical probability and what happens in an experiment will differ.

For some situations or games using repeated testing can give a sense of which outcomes are more likely (experimental probability).

A probability experiment involves repeated trials. Results can differ in different trials.

Shareback

Select students to share who use evidence that they have developed from undertaking trials of the game to decide which version is fairer.

If no students do this, then model how you would use evidence from playing the games to justify your argument.

Connect

How could you adapt the game that Sunny and Jacoba designed to make it as fair as possible?

Suggested Learning Outcomes

Identify possible outcomes in a chance situation.
Make a prediction about a chance situation.
Collect and record data for a chance investigation.
Adapt a game to make it fairer.

Independent Tasks

Work with a buddy or by yourself to design a game with the dice that has an equal chance for people to win.

Write the rules for the game and then use repeated trials to test whether the game is fair. Record the outcomes of the trials and represent these.

Make statements about the game that you have designed.

Work with a buddy or by yourself to design a game with the dice that is unfair and gives one player a greater chance to win.

Write the rules for the game and then use repeated trials to test whether the game is unfair. Record the outcomes of the trials and represent these.

Make statements about the game that you have designed.

Curriculum Links

During Year 3

Engage in chance-based investigations about games to:
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– collect and record data
– create data visualisations for frequencies of possible outcomes (e.g., lists, pictures, graphs)

Explain and question statements about chance-based situations, with reference to data.

Mathematical Language

Chance, fair, unfair, trial, tally-chart.

Anticipations

Solutions, Misconceptions

Task 7

Luci and Mary have made up a dice game. To play, you each choose six different numbers between 1 to 12. You then roll two dice together and add up the total. You can mark the box for the total on the table:

1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								

The winner is the first to reach the end of the box.

Play the game a few times and see what you notice.

Are there numbers that seem to win more? Why do you think this is?

Teacher Notes

Have dice available for the students to use.

Notice students who are able to record and represent the results of the trials accurately using tally marks.

Expect students to use the language of probability with terms such as more likely, less likely, half chance, greater chance.

Notice whether students consider the different possibilities when throwing two dice and which may be more likely.

For the independent task, have digit cards available.

Big Ideas

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For some situations or games using repeated testing can give a sense of which outcomes are more likely (experimental probability).

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Shareback

Select students to share who notice and explain that particular numbers are more likely to be the sum of adding both dice.

Ask students to share which numbers they think are the best to choose.

Connect

Can you work out the possibilities for rolling two dice?

How does this relate to what you found out when playing the game?

Suggested Learning Outcomes

Collect and record data for a chance investigation.
Create a data visualisation to represent the results of a chance investigation.
Make statements about a chance investigation and use data to support the statements.

Independent Tasks

Select one or more of the following assessment tasks (attached at the end of the document) as the independent activity:

Task 1: Lolly game

Task 2: Bean game

Curriculum Links

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Mathematical Language

Chance, fair, unfair, trial, tally-chart, experimental probability.

Anticipations

Solutions, Misconceptions

Assessment Task 1 - Probability - Year 3

A bag contains 4 lollies. There are 2 blue lollies and 1 green lolly and 1 red lolly. If you take out one lolly without looking and then another lolly, what are the different combinations you might get? What is most likely? What is least likely?

Now test your predictions by using the counters and feely bag and pick out one lolly and then another and record the results. Play the game 20 times and record and represent your results. What do you notice?

Assessment Task 2 - Probability - Year 3

A bag contains 5 beans. There is 1 blue bean, 1 red bean, and 3 yellow beans. If you take out one bean without looking and then another bean, what are the different combinations you might get? What is most likely? What is least likely?

Now test your predictions by using the beans and feely bag and pick out two beans one at a time and record the results. Play the game 20 times and record and represent your results. What do you notice?