RICH MATHEMATICAL TASK BOOKLET

PROBABILITY

YEAR 7-8 EVEN YEARS

Teacher Booklet

Task 1

At the Melbourne Cup, there is a ‘trifecta’ in a six-horse race. Each choice costs $1.

To win the ‘trifecta’, you need to pick the first three horses in the order they finish.

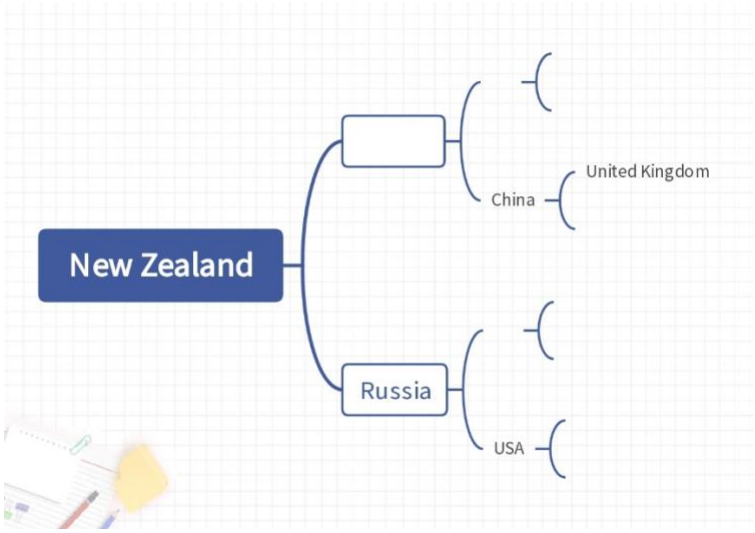
How much would it cost you to cover the field?

If the trifecta pays $83, is it a good idea to cover the field?

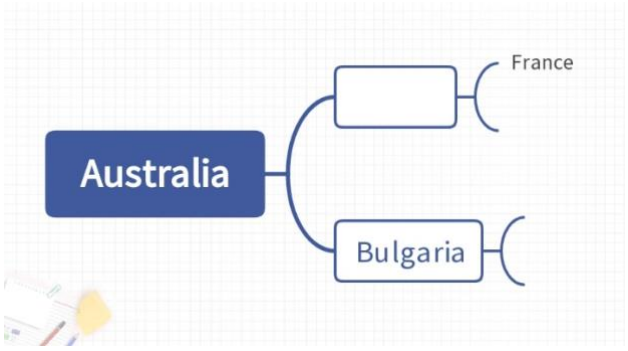
Task 1 (independent)

This diagram shows the draws for the World Chess Tournament. All the countries that lost their first round championship matches went into the consolation playoff.

First round:



Play off



Recreate the tree diagrams and fill all the entries of the draw.

Task 2

Z hao is playing a game with his sister. They put 10 beans in a bag with six blue beans and four yellow beans They choose one out and then replace it.

If you did this four times, what is the probability that you would pick at least one yellow bean?

What happens if you don't replace the bean each time?

Use the beans and a bag and test the game both ways by trialling picking out the beans for differing numbers of trials. Record your results and make statements about what you notice.

Task 2 (independent)

At the school fair, one of the stalls has a coin toss. To win you have to predict the outcome of tossing four coins. If your coin toss matches the prediction, you win a prize.

What are the possible outcomes? What is the chance of getting each outcome and likelihood of winning a prize?

Use the coin and test the game by trialling tossing the coins for ten trials. Record your results in the table and represent them on a column graph.

Now test the game by trialling tossing the coins 40 more times and record the results and total the outcomes.

Make statements about what you notice.

Task 3

Isla and Annabelle are playing Mastermind. To play the game you have multiple pegs of three different colours (green, yellow, and blue).

Player One chooses two pegs and puts them into the pegboard behind a screen.

Player Two has the guess the colour of the two pegs and their position on the board in front of the screen.

What is the minimum number of turns you would need to be sure you have it right?

Each time Player Two has a turn then Player One gives them feedback in the following way:

1) If the peg is the right colour but in the wrong place, they give you one point.
2) If the peg is the right colour and right place, they give you two points.
3) Player Two tells you how many points that you have.

If you are given two points, what could this mean?

With the feedback, what would be the minimum number of turns to make sure you have it right?

Task 3 (independent)

If you flip a coin three times in a row, what is the probability that you will get a tail on at least one of the flips?

Draw a tree diagram to help you work this out.

What is the probability of getting no tails?

What would be a quick way to work out the probability of getting at least one tail if you flip the coin 4 times or 5 times or more?

Can you come up with a rule that you could use to work this out?

There is a class with 13 girls and 11 boys. Three children are chosen at random to help the teacher.

What is the probability there will be at least one boy chosen?

Task 4

The Department of Conservation runs a bird banding programme to help scientists learn about bird populations. This means they catch a sample of the birds and put a band on their foot.

Today you will be helping the scientists try and work out the fraction of six species of birds and how many birds are in a bird sanctuary area in the South Island.

Firstly, decide on how you will record the data. Then take 15 bird pictures from the bag and put a sticker on them to indicate a band and record the species.

Now return all the bird pictures to the bag and mix them up.

This time take 30 bird pictures from the bag and put stickers on those that are not banded. Record the species and indicate which have already been banded.

Use the samples that you have taken to predict the fraction of birds that are each species. What might the total number of birds be? How many of the total would you expect to be each species?

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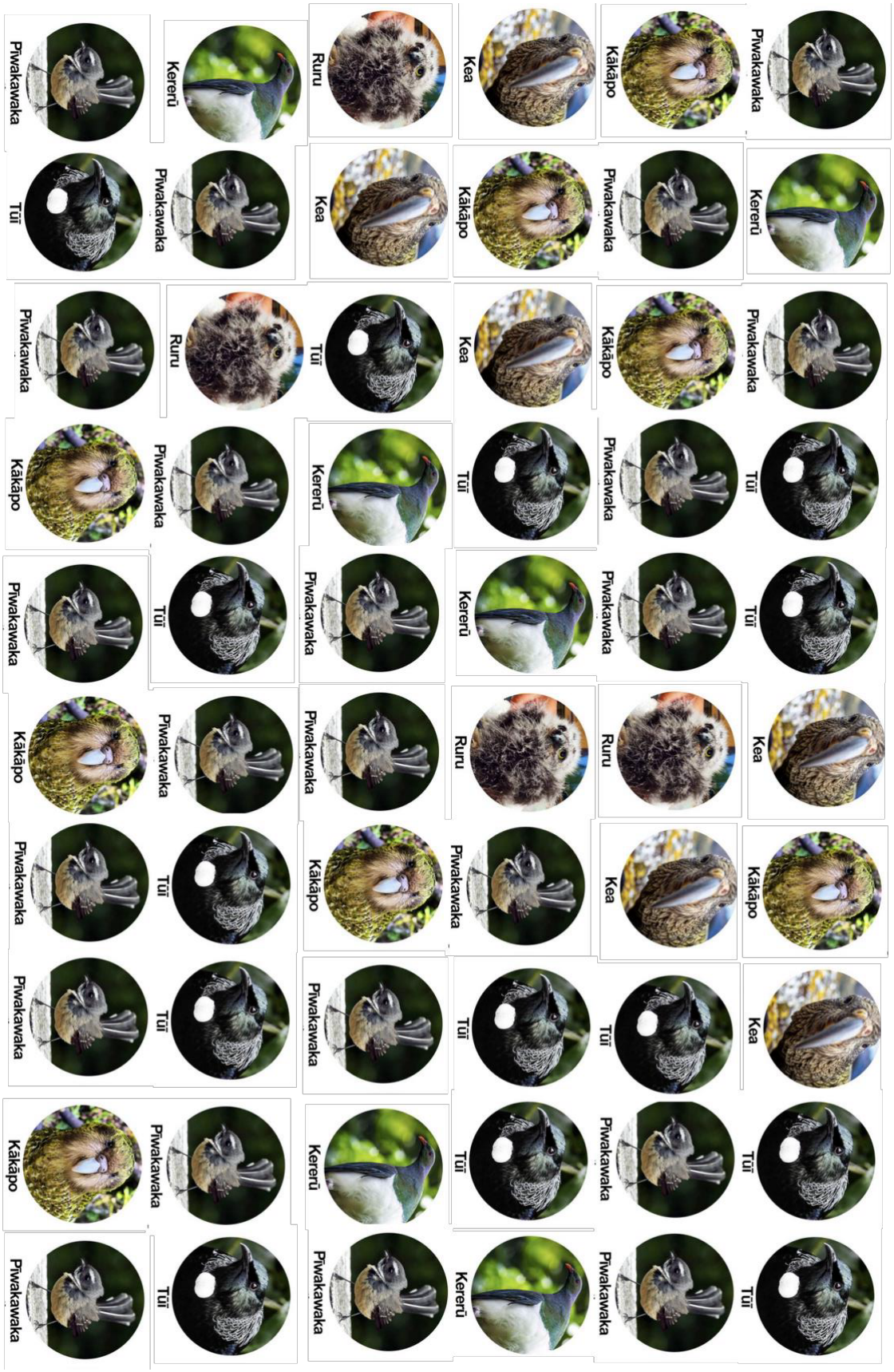
Task 4 (Bird Images)



Task 4 (independent)

You can work with a buddy or by yourself for this activity.

Select a question about a game from the questions that were brainstormed with your teacher at the beginning of the mathematics lesson.

Begin by considering how you will investigate the question.

What outcomes are possible in relation to your question?

What is the theoretical probability of the different outcomes?

Develop a representation that shows this including a graph.

Write a plan for how you will investigate the experimental probability of the outcomes. This will need to have trials with different sample sizes. Develop representations that show these results including graphs.

Make statements about what you have found out.

Make a poster that has the following information;

1) An introduction including what you choose to investigate.
2) The theoretical probability and related representations.
3) The plan to investigate the probability outcomes.
4) The outcomes of your trials with different sample sizes and the related representations.
5) Statements related to your findings.
6) A conclusion.

Task 5

Lola has some unusual dice and has invented a game with these.

There is a white dice with the numbers: 1, 1, 6, 6, 8, 8 on each face.

There is a yellow dice with the numbers: 2, 2, 4, 4, 9, 9 on each face.

There is a green dice with the numbers; 3, 3, 5, 5, 7, 7.

To play you each choose one of the dice and roll it at the same time. The player with the biggest number wins.

Does it make a difference who chooses the dice first?

Which dice should you select dependent on what the first player chooses?

Task 5 (independent)

Work on developing your Chance investigation and poster.

Select a question about a game from the questions that were brainstormed with your teacher at the beginning of the mathematics lesson.

Begin by considering how you will investigate the question.

What outcomes are possible in relation to your question?

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Task 6

Read the statements below and discuss whether you agree or disagree with them.

In Lotto it is very likely that the balls selected will be a mixture of tens numbers. You are more likely to win if you select numbers from a mixture of tens numbers.	The weather is completely random. It's so mixed, and even if the forecasters try very hard, they don't always get it right.
No-one can work out how tall you will be when you grow up, you have to wait and see. This means it is random.	You make a dice with the numbers 4, 4, 4, 4, 4, 6. If you roll it a lot and write down the numbers, they are random numbers.
The weather tomorrow isn't random, it depends on the weather today.	If you flip a coin 10 times and get heads every time, then something must be wrong with the coin or how you are flipping it.
In Lotto, you should not pick consecutive numbers because it would be almost impossible for them to come up.	If you do 5 divided by 19 on a calculator the answer is 0.263157894… this means the decimal digits are random.

Everyone in your group must agree and you should provide a range of reasons for your argument.

Task 6 (independent)

Finish developing your Chance investigation and poster so it is ready to present tomorrow.

Make a poster that has the following information;

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2) The theoretical probability and related representations.
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Task 7

Read the probability experiment poster.

What is interesting?

What is something you have learned from the poster?

What is a question that you have about the experiment?