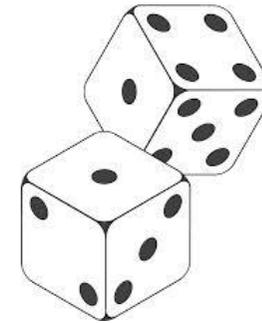




Dice Games

*Our guide to hours of fun
whilst practising
mathematical skills.*



If you know any other interesting and exciting dice games, please tell us. We would like to include them in the next edition.

With thanks to St. Peter-in-Thanel, Kent for sharing this booklet with St Andrew's.



St. Peter-in-Thanel
Church of England Junior School

Founded 1694



German dice game

Age: 6+

Players: 2 - 6

Math concepts: This game for two to six players teaches reading and writing large numbers and addition with 50's and multiples of 100 in the thousands. It also teaches probability and when risk taking is worthwhile in the context of the game.

The objective: The player reaching 10,000 points first wins.

How to play:

- Each turn starts with six dice. After each roll, a scoring dice or a combination of scoring dice have to be taken out. A running total is kept. The player has to decide when to stop and declare that score. Should a player not have scoring dice in the next run, s/he loses the score from that turn.
- If all six dice have a winning score, the player can take all six dice again and continue with his/her turn.
- Before the game starts, players should decide when to stop the game, i.e. whoever reaches 10,000 first is the winner. This can be reduced to 5000 depending on the players' concentration span. You will also have to decide whether to finish the round when a player has reached 10,000.
- One player has to keep score for everyone. We recommend that younger score keepers use written addition to add on each new score for a player; better mathematicians should do it mentally!
- Each player should find out ever so often how much s/he is behind or in front and how much is needed to catch up to decide on risk taking.

Scoring:



100 A single 1 is worth 100. Should you get another 1 when you carry on, that would add 100 to the score.



50

Multiplication

Use two 10-sided dice 0-9 and both numbers have to be multiplied. How many can you get in one minute?

Easier: Use the 10-sided dice and a normal dice and play the same way. This way only table facts up to 6x will be practised. (Year 3 objective)

Division

Use the 10-sided dice 0-9 and 00-90 to generate a two-digit number.

Example: You are focussing on the 4x table.

Roll the dice and generate a number. Is this number a product of the 4x table? If you get a multiple of 4, you get one point. Whoever gets more points within a minute is the winner.

For example, if the number is 32, the player can claim a point because 32 is in the 4x table. However, 33 is not.

Variation:

Use the two ten-sided dice 0-9. This way children can choose where they want each digit.

For example, your focus is the 5x table. If a 3 and a 5 is rolled, children can choose whether the number is 53 or 35. 35 is a multiple of 5 whereas 53 is not. This version combines knowledge of place value with knowledge of table facts and properties of numbers.

Number bonds to 20

10-sided dice 0-9 - You will need both dice 0-9.

Roll the dice. Add up both numbers. How many more do you need to reach 20?

Variation: Only use one 10-sided dice and find the difference to 20.

Number bonds to 100

Use the 10-sided dice 00-90 and 0-9 and generate a two-digit number. How many more do you need to reach 100?

Example:

$$64 + ??? = 100$$

From 64, go to the next ten (70) and from there to 100.

Therefore: $64 + 6 = 70$
 $70 + 30 = 100$
 $6 + 30 = 36$

Calculations

Addition

Use two or three dice and add up the score. Speed is important.

Progression of level:

1. two normal dice (highest possible score is 12)
2. two 10-sided dice 0-9
3. three normal dice (highest possible score 18)
4. two scores of two two-digit numbers (e.g. 74 and 39)
5. More difficult level: Go up in place value by using larger numbers. Write down the first score and then the second score. Use mental calculations to find the difference or to add them up.

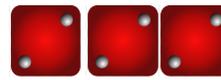
Subtraction

Use any of the different place value dice and find the difference.

Easiest level: two normal dice → numbers to 6

Number bonds to 10 → 10-sided dice 0 to 9

Level 2: 10-sided dice 00-90 and 0-9



200 Three of a kind in one go are worth their digit $\times 100$.



300



400



500 Should you get a 5 in the next roll, that's worth 50.

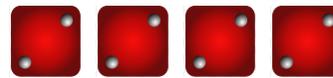


600



2000

You'd have to throw that in the first roll. After getting 1, 2, 3, 4, 5, 6 you have to take all six dice again and carry on at least one more go. Should you get nothing with the follow-up throw, you lose the 2000.



Should you get four of a kind, the fourth dice will always double the three-dice score. For example, four twos give you a score of 400. The first three twos give you a score of 200, the next two doubles that score to 400. Five twos would be 800 because it would be doubled again.

Crooked rule

This is a game to develop understanding of place value. This is a quick and easy game and only lasts a few minutes. You will need the whiteboard from your pack or a piece of paper to draw the following table.

	Hundreds	Tens	Units
Player A			
Player B			
Player C			

Age: 5+ (but can be adapted for different ages and levels)

Players: 2 - 6

Rules:

- Take turns to roll the dice.
- When you rolled the dice, you may put that number into any cell, your own or any cell of your opponents.
- Carry on until all the spaces are filled.
- The winner is the player with the smallest number.

Variations:

- Winner is whoever has the highest number.
- The winner is the player with the second highest or second lowest number.
- There may be a point in the game when an outright winner is established without all the cells being filled in. Discuss with your child how they know that there is already a winner and whether you should continue with that game or start another one. Let them decide how to change the rules to make it exciting until the last roll of die.
- If you decide that the highest or lowest number will win, leave the column with the highest place value empty. (In our table above, that would be the hundreds column.) This way the last roll each player has will decide winner and losers.

Developing place value

Place value game:

- Roll all dice. Write down your number and read it out allowed.
- Opponent rolls his dice.
- The player with the higher number wins. (The player with the lower number wins.)

Variation:

- Level 1: 10-sided dice 00-90 and 0-9. This will generate a two-digit number, for example $50 + 2 = 52$.
- Level 2/3: Generate two two-digit numbers. Work out what the difference between the two numbers is and only then can you claim your win.
- Level 3: If you have two throws each (or you have more than two players), the second highest number wins.
- Level 4: Calculate the difference between two four-digit numbers mentally.

Developing mental Maths skills

The dice can help to generate random numbers rather than working from a list or a set of number cards. Because you are using dice, the games element is strong and therefore your child's motivation is greater.

We included a sand timer in the pack so that you can limit each activity to one minute. You can challenge your child to get more than the previous day or more than another member of the family.

Number bonds

Number bonds to 10

10-sided dice 0 - 9

Roll the dice and say how many more you'd need to reach 10. For example: You rolled an 8, the answer would be 2 because $8 + 2 = 10$.

*Variation for level 1 or 2: To make it easier for players with a lower Maths level, just write the numbers from 2 to 12 on the strip of paper and only use addition to find sums. Whoever can cross all numbers off first is the winner. The name of this game would be **Two-Dice Sums**.*

Place value dice



10-sided dice

These dice can be used in many different ways, from generating random numbers to consolidating place value and table facts to practising addition and subtraction skills. The dice activities lend themselves to very quick games, for instance straight after dinner, before going to school or when on travels. Most of our suggestions would not be played for longer than ten minutes.

Place value, mental addition and subtraction and then leading on to times tables facts build the solid foundations of success in Maths. Only five minutes a day on these activities and following our suggested progression and your child will find more and more enjoyment and much higher attainment in Maths.

- You can play this up to seven-digit numbers (millions) but the players will have to read out their numbers at the end.
- You can include decimal numbers, e.g. four columns four tens, units, tenths and hundredths. (Children find it hard to understand that 4.3 is greater than 4.23.)
- You can have a set of cards, saying 'second highest number' or 'highest number' or 'number closest to ...' and the winner is established at the very end when the card is turned over revealing the target.
- Players have to say by how much they've won, encouraging mental calculation strategies.

Blue Eyes

Level: 1 - 3

Players: 2 - 6

Maths concepts: addition, properties of numbers

The objective: The player with the highest total wins.

How to play:

- You play with three dice.
- On a roll, a player only adds up the even numbers.
- The player with the highest number wins.
- You may keep a running total up to 100.

Variations:

- You only add up odd numbers.
- The player with the lowest number after 10 rolls wins.

House Numbers

Level: 1 - 3

Players: 2 - 6

Maths concepts: place value

The objective: The player with the highest three-digit number wins.

How to play:

- You play with three dice.
- Combine the three numbers to create the highest three-digit number.
- You could have three goes, taking the highest dice out each time.
- The highest possible score is 666.

Variations:

- The lowest number wins.
- The second highest number wins.

Probability is an area of mathematics that often doesn't get its fair share of attention in primary classrooms. Here are some activities to get you started that involve children in thinking about probability ideas while also providing practice with mental addition, experience with strategic thinking, and the opportunity to relate multiplication and geometry.

The Game of Pig

Level: 1 - 3

Math concepts: This game for two or more players gives students practice with mental addition and experience with thinking strategically.

The object: to be the first to score 100 points or more

How to play: Players take turns rolling two dice and following these rules:

1. On a turn, a player may roll the dice as many times as he or she wants, mentally keeping a running total of the sums that come up. When the player stops rolling, he or she records the total and adds it to the scores from previous rounds.
2. But, if a 1 comes up on one of the dice before the player decides to stop rolling, the player scores 0 for that round and it's the next player's turn.
3. Even worse, if a 1 comes up on both dice, not only does the turn end, but the player's entire accumulated total returns to 0.

Extension: After children have had the chance to play the game for several days, have a discussion about the strategies they used. You may want to list their ideas and have them test different strategies against each other to try and determine the best way to play.

Two-Dice Operations

Level: 3+

Math concepts: Students of all ages can play this game, as long as they're able to add the numbers that come up on two dice. While younger children benefit from the practice of adding, older students have the opportunity to think about the probability of the sums from rolling two dice.

The object: to remove all the counters in the fewest rolls possible.

How to play: Two or more players can play. Each player needs a strip of paper with the numbers 1 to 12 on it or they can be written on the whiteboard in rows for each player. You need two dice. Here are the rules for playing:

1. Each player has their number strip set up.
2. Players take turns rolling the dice.
3. For each roll, the player has to calculate a number sentence so that they can cross off one of their numbers. All four number rules can be used.

If 2 and 6 were rolled, one of these numbers could be crossed off:

- addition: $6 + 2 = 8$
- subtraction: $6 - 2 = 4$
- multiplication: $2 \times 6 = 12$
- division: $6 \div 2 = 3$

4. Whoever has all numbers crossed off first is the winner.