Teacher's Guide – Teaching MathDice to Your Class

Included in this packet is everything you'll need to help your students learn the game of MathDice. All you have to do is use the overhead transparencies with your students and they'll be playing in no time flat!

We recommend you devote 45 minutes to teach and play the game. Your session should roughly be half-teaching and half-playing. If you have a shorter time frame, make sure that your students get a chance to roll the dice and play the game for a little while. In other words, don't teach for 30 minutes if that means having no time left to play.

> **Teaching –** Go through the overheads with your students and make sure they grasp the basic concept of the game. After you feel that everyone understands the concept, you can start focusing more on the actual rules of the game. The complete rules can be found in the actual MathDice game. Be very casual with the rules in this first session. For example, MathDice is a mental math game, but you can let students use paper in the first sessions.

> **Playing –** After you think that everyone understands the rules, divide the students into groups of 2 or 3, and have them play for 15-20 minutes. They can keep score if they want. It would also help if you paired students of the same math ability together to minimize the chances that a student will become frustrated.

> **Coach Power and his dog Minus –** In the overheads, you'll notice drawings of Coach Powers and his dog. These are characters that occur in other materials that we've developed for MathDice, so be sure to mention them briefly while you're explaining the game.

After this page, you'll find a guide to the overheads followed by a page explaining other ways to play MathDice.

Good luck and have fun!

Teacher's Guide - How to Play MathDice

First, let's roll the two 12-sided target dice and multiply the numbers together. This product is our target number.

$$2 \times 3 = 6$$

Then, we roll the three scoring dice to get our scoring numbers.

Using each scoring number only once, we create a math expression that equals an answer as close as possible to the target number. We may use addition, subtraction, multiplication, division, and even powers (if you know them!).

$$(1 + 2) + 3 = 6$$

or

$$(1 \times 2) \times 3 = 6$$

NOTES

Talk about how fun the game is and how you're going to briefly go over the rules, solve some MathDice puzzles, and then play!

Show the students the two sets of dice and explain the difference between the two sets. (The 12-sided dice are dodecahedrons!)

Cover up the bottom answers and see if your students can figure out how to reach the target.

For a simpler version of the game, add the two target numbers together to create a much smaller target number.

It's probably best to avoid powers until your students understand the basics of the game. They can be excluded altogether, but you will often have trouble reaching the higher target numbers.

Teacher's Guide - Target Practice

Okay. Let's try a quick exercise. Suppose we have a target of 5.

$$5 \times 1 = 5$$

Our scoring numbers are 2, 3, and 4.

Did you know there are three different ways to reach our target number? Let's see if we can find them all!

Operations	Answer
Addition and subtraction	(3 + 4) - 2 = 5
Multiplication and subtraction	(2 x 4) - 3 = 5
Division and addition	(4 ÷ 2) + 3 = 5

NOTES

Explain that many times you can find the best answer in a variety of ways. In this exercise, there are three different ways to get the answer.

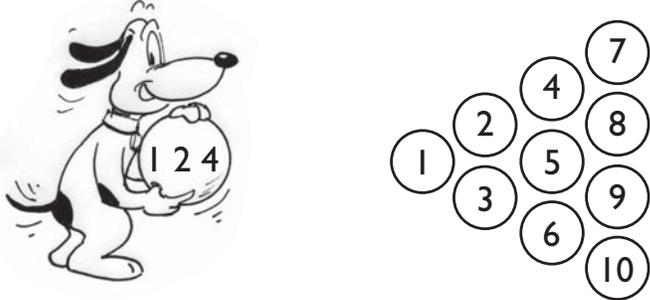As your students call out an equation, write it in the space provided.

There's a good chance a student will find an equation that is not technically different from another (e.g. 4+3-2 and 3-2+4). This is good time to review the commutative property.

This is also a good time to mention order of operations and using parentheses. For example, (2+3)x4 is different from 2+3x4.

Answers are listed above.

Teacher's Guide - Bowling Game

Can you hit all ten target pins, and get a strike?

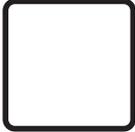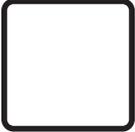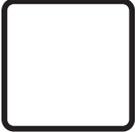| Target Ball	Expression	Target Ball	Expression
1	(4 - 2) - 1	6	(2 x 1) + 4
2	(4 - 2) x 1	7	(4 x 2) - 1
3	(4 - 2) + 1	8	(4 x 2) x 1
4	(2 - 1) x 4	9	(4 x 2) + 1
5	(4 + 2) - 1	10	(4 + 1) x 2

NOTES

This is a fun MathDice puzzle that your class can solve as a group. It's nice because it allows more students to participate, especially those who might not grasp the game as quickly as others.

Use the numbers on the bowling ball to knock down every target pin using a different equation.

As the students get one of the answers, write down the equation and put an X through the pin at the top. You can either go in order or have the students answer for any of the ten pins.

Answers are listed above.

Teacher's Guide - Sample MathDice Problem

Target Dice

Target Number

Scoring Dice

Answers

NOTES

If you wish you do more problems as a class, hand out the dice to two different students, have them roll the dice, and write the results on this blank template.

Emphasize that unlike the other problems we've done, often in the real game, we won't be able to equal the target number. Just try to get as close as you can.

You can also use this template to create a MathDice Problem of the Day to be posted on the wall.

Teacher's Guide - Sample Point of MathDice

NOTES

This overhead shows how to play a point of competitive MathDice. If you plan on having your students play as a cooperative group exercise, then you can omit this slide. However, it works nicely in explaining the "back and forth" nature of the game.

It's important to note that once a player answers, he/she must wait for his opponent(s) to answer before he/she can answer again. So, if you're going to answer, you need to be fairly close.

Also, you don't have to hit the target to win! If coach can't beat Minus' answer of "12," for example, then Minus would win the point.

To avoid arguments, fighting, and sharing issues, have one student roll the target dice and another student roll the scoring dice.

Make sure that the target number is agreed upon before rolling the target dice.

Teacher's Guide – Other Ways to Play MathDice

Cooperative Group Play
Organize the students into groups of three or four. Have them play as a team, rolling the dice and trying to find the best answer as a group. Tell the students as soon as anyone in the group has calculated a number (even if it's not close), to tell everyone else in the group. By doing this, you'll get every kid playing and understanding the basics of the game.

Team Play
Organize the students into groups of three or four. Roll the dice and write a problem on the board (or use the blank template). Each team has one minute to get as close as they can. After one minute, have the teams announce their answers. If you wish, you can award points for closest, second closest, etc.

Ten Rounds
Play ten rounds. In each round, roll the dice. Players secretly write down the closest answer they can find along with their equation. At the end of ten rounds, compare scores. The lowest total score wins!

How Many Answers?
Roll the scoring dice only. In a designated amount of time, players calculate and write down as many different answers as they can. Score one point for each different answer.

Algebra MathDice
This one's pretty advanced! Only roll two of the three scoring dice. Leave the third die off to the side. Players must use the third die as any number from 1 to 6, and they form their math expressions using the two rolled dice along with this third "wild card" die.

Many More!
Be flexible. Come up with new ways to play or even have your students invent new ways to play. If you find any great new ways to play, we'd love to hear about them!