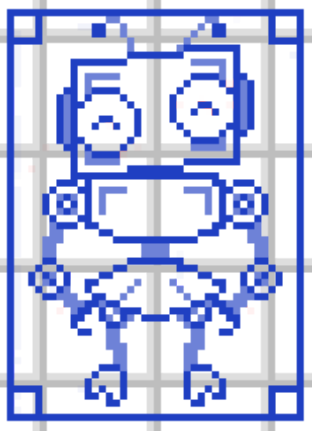
EQUATIOBOTS



Oh nuts and bolts! Your airship has just crash landed on **Scrap Island**! You and your fellow tinkerers will have to work together to fix your broken airship and continue on your journey.

Luckily, it seems like **Scrap Island** has all the parts you'll need!

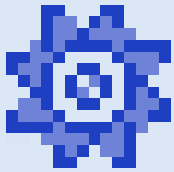
Use your mathematical tinkering skills to build robots out of scrap parts who can help you repair the airship!

GAME PIECES

Dice - a set of 7 polyhedral dice, representing the scrap parts you can find to build your robots.

Tool Cards - these cards have maths symbols (operations and brackets), which represent the tools you'll use to build your robots.

Epiphany Cards - these cards allow you to perform actions such as switching or rerolling dice, representing bright new ideas you might have while tinkering.



Tinker Tokens - these tokens are what you need to repair your airship, you collect more tokens by building better robots.

Blueprint - this is where you'll place your dice, cards and tokens to help you build your robots.

2 - 6 Players
20 - 40 mins
Ages 10+

HOW TO PLAY

Each round has three phases: **COLLECTING PARTS**, **BUILDING A ROBOT**, and **FIXING THE AIRSHIP**. Keep playing until you have fully fixed your airship to fly away and escape **Scrap Island**!

To set up, shuffle the **Tool cards** and **Epiphany cards** separately, then place each pile on their spot on the **blueprint**.

PHASE 1: COLLECTING PARTS

Draw **Tool cards** until you have 12. Lay them out on the table so everyone can see them.

Roll **dice** to find some scrap parts you can use. For each robot part, you roll a different kind of **dice**.

Place the **dice** on their respective boxes in your **blueprint**, and make sure to keep the numbers you rolled. These are the numbers you have to work with when building your bot.

Eyes: 4-sided dice

Head: 6-sided dice

Arms: 8-sided dice

Legs: 12-sided dice

Body: 20-sided dice

Draw 3 **Epiphany cards** and lay them on the **blueprint**, face up so everyone can see. Each round, every player chooses one of these 3 cards to take, starting with the youngest player and then going clockwise. After each **Epiphany card** is chosen, draw another to replace it for the next player.

Roll the two **10-sided dice** and place them on the finished robot in the **blueprint**. You'll have one tens digit and one units digit. Together, they make your **target number**. If you roll 00 and 0, it's up to you whether this counts as 0 or 100.

PHASE 2: BUILDING A ROBOT

Now it's time to get tinkering and build a robot! Working together, players must place **Tool cards** between each of the **dice** to make a mathematical **expression**. You have to use all the numbers in the order they appear. The goal is to get as close as possible to the **target number**.

You can either discuss your ideas with each other out loud, or each work quietly, then share when you have an **expression** you're happy with. Anyone can suggest to use their own **Epiphany card** (or another player's), but everyone has to agree before it can be used. You can use pencil and paper to help, but there are no calculators on **Scrap Island**!

Once someone has an **expression**, pause and let everyone check the result using the **order of operations**. If it's not equal, players can suggest changes that might get the **expression** closer to the **target number**.

PHASE 3: FIXING THE AIRSHIP

After everyone agrees to stop tinkering, evaluate your final **expression,** then calculate the difference between your result and the target number, and collect the right number of **Tinker tokens**.

Discard all used **Tool cards** and all **Epiphany cards** (whether or not they were used) by putting them at the bottom of their respective piles.

Difference from target number	Number of Tinker tokens to collect
Zero (equal)	5
One	3
Two to five	2
Six to ten	1
More than ten	0

On the **blueprint**, you'll see a diagram of your airship and the number of **Tinker tokens** needed to fix each part. The balloon needs **6 tokens**, the deck needs **4** and the propeller needs **3**.

Keep building robots until you have enough tokens to completely repair your airship, and fly away from **Scrap Island** to continue your journey!

TIPS FOR TEACHERS

Rules Clarifications:

- **Using brackets**: players can place **Tool cards** with brackets either side of any dice, but must make sure that all brackets are closed, and they must always place an operation in between each pair of dice - that means no implicit multiplication by juxtaposition!
- **Leading/unary '–'** : players may place the **Tool card** '–' before the first dice (or at the start of an expression in brackets) to act as a unary minus, negating the first value.
- **Non-integer expressions**: players can make an expression which evaluates to a non-integer. In this case, they should round to the nearest integer when it comes to scoring **Tinker tokens**.
- **Impossible targets**: due to the randomness of the dice, it is occasionally possible that there is no way to score any **Tinker tokens** in a round. If this happens, players should still make a valid expression and evaluate it, but they can use it as an opportunity to discard some **Tool cards**.

Example Expression:

The following expression evaluates to 20, scoring two **Tinker tokens**.

Optional Challenges:

- Some students may find the game more motivating if there is an element of competition. While the game is still fundamentally designed to be played collaboratively in small groups, each group could compete to escape **Scrap Island** in the fewest number of rounds.
- Try adding 100 to the **target number** each time you build a robot!
- Use mental arithmetic only when building your robots. No pencil and paper allowed!
- Set a 1 minute timer after rolling the **target number**. Once the timer is up, you have to use whatever expression you've got!
- Try playing without **Epiphany cards**!