Lesson Printables

Be a rockstar and only print what you need!

Planners: 2-3

Cards
(print double-sided)
Sunlight: 4-7
Twilight: 8-11
Midnight: 12-15

Extras
Recording Logs: 16
Rules: 17

**Printing in the US? Scale to 'fit to printable area' in order to get the best print.*

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LESSON 1: Algebra - Introduction to input and output tables

Starter	Main Activity and Input: Exploring rules to create input/output tables.	Plenary
Negative Numbers: If each row, column and diagonal should add up to the same total, what numbers could go in the empty boxes? **To support:** 1. Review how to use a number line to add and subtract negative numbers. 2. Students could complete just one of the puzzles. **To challenge:** 1. Solve both problems. 2. Find other negative number puzzles that students could solve.	**Input:** 1. Slide 6 shows a monster that 'eats' numbers, applies an operation and then 'spits' out a new number. Looking at the input/output table, can students work out the adding rule? Ask students to share ideas on how they would fill in the empty table. Slide 7 explains that the same amount has been added to each input number. How could subtraction help prove the rule? Elicit from students that the number sentences 4 - 2 and 5 - 3 help to prove that the rule is '+2'. 2. Slide 8 repeats this process, but this time students are not told which operation is being used in the rule. They are just given the input and output table. What could the rule be? Give students time to explore possible patterns between the first 2 input/output numbers. What do students notice about the input/output numbers? Do they have the same difference? Do they have anything in common? 3. Slide 9 explains possible thinking steps. Both output numbers are multiples of their input numbers. This could lead students to thinking that the rule most likely involves multiplication. Slide 10 models using inverse operations (division) to find the rule. Once students know the rule, can they fill in the rest of the table? 4. Slides 11 to 19 model the main activity: playing 'What's the Rule?' - Player 1 picks up a game card from the pile which contains a rule. This is for their eyes only. No one else should see the card. - Player 2 gives an input amount. Player 1 tells Player 2 the output amount using the rule on the card. - Player 2 keeps giving input numbers and Player 1 keeps calculating output numbers until Player 2 can guess the rule. - Once the rule has been guessed, players switch positions. **Activity: Play What's the Rule.** 1. Print and cut out 'What's the Rule?' cards for each learning zone. These could be laminated for repeated use. You do not need to print both pages for each zone if you feel students will not need them. Students could work in pairs or small groups and record their input/output numbers in the tables provided or make their own. Game cards could be shared amongst pairs or small groups. Students do not need to use all of the game cards. **To support:** 1. Sunlight Zone uses whole numbers and addition, subtraction and multiplication only. You could take out cards that you don't feel are appropriate for your students. 2. Negative numbers might come up depending on students' input numbers. You could provide students with a number line in order to help students calculate subtraction problems that involve numbers less than 0. **To challenge:** 1. Midnight Zone rules include decimal numbers. Students in this zone might come across output numbers with recurring decimals depending on their input number choices and the rule on the card. 2. Students could create their own rule cards.	**Input/Output:** Students are given a rule and asked what the input and outputs could be. Note, this is an open-ended task with many possible answers. **Check for understanding:** 1. Can students create input and output amounts that work with the rule?

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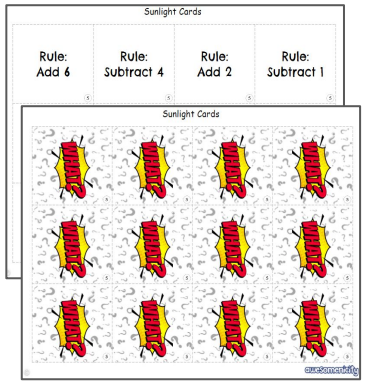
Things that might be useful for this lesson:

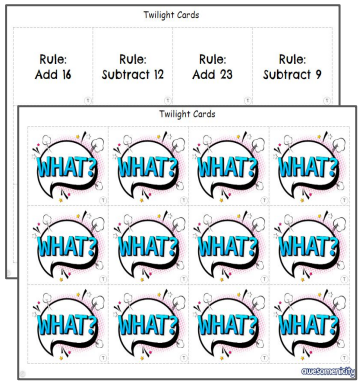
- Individual whiteboards:
  - ➔ Help students to record their thinking and share ideas with others.
  - ➔ Students can create input/output tables on these.
- Printed/laminated number lines:
  - ➔ Help students to solve problems that involve negative numbers.

Peek at the Printables:

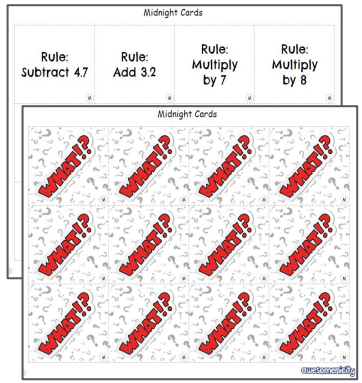
Sunlight Zone



Twilight Zone



Midnight Zone



Greener Alternatives:

- ➔ Print and cut out just one copy of the *What's My Rule* cards for each learning zone. These could be stuck up around the classroom. Students could 'secretly' choose a rule and their partner gets to work out which one it is.
- ➔ Prior to the lesson, you could write rules on sticky notes or whiteboards instead of printing out paper copies.

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Sunlight Cards

Rule: Add 6	Rule: Subtract 4	Rule: Add 2	Rule: Subtract 1
Rule: Add 4	Rule: Add 3	Rule: Add 10	Rule: Subtract 7
Rule: Add 15	Rule: Subtract 13	Rule: Add 20	Rule: Add 8

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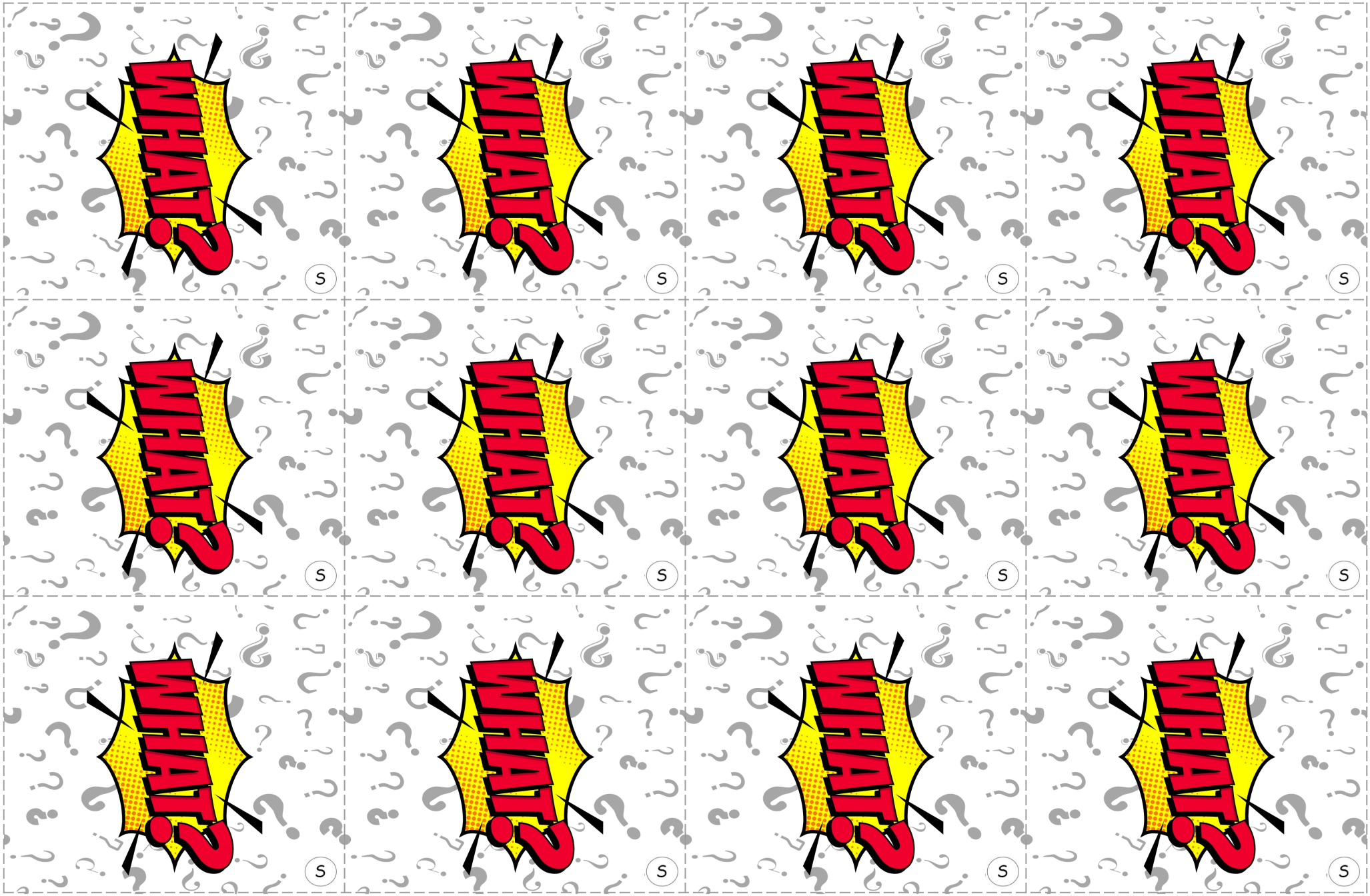
Sunlight Cards



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Sunlight Cards

Rule: Subtract 9	Rule: Multiply by 2	Rule: Add 10	Rule: Subtract 9
Rule: Add 11	Rule: Add 3	Rule: Multiply by 1	Rule: Subtract 5
Rule: Add 50	Rule: Multiply by 5	Rule: Multiply by 10	Rule: Multiply by 3

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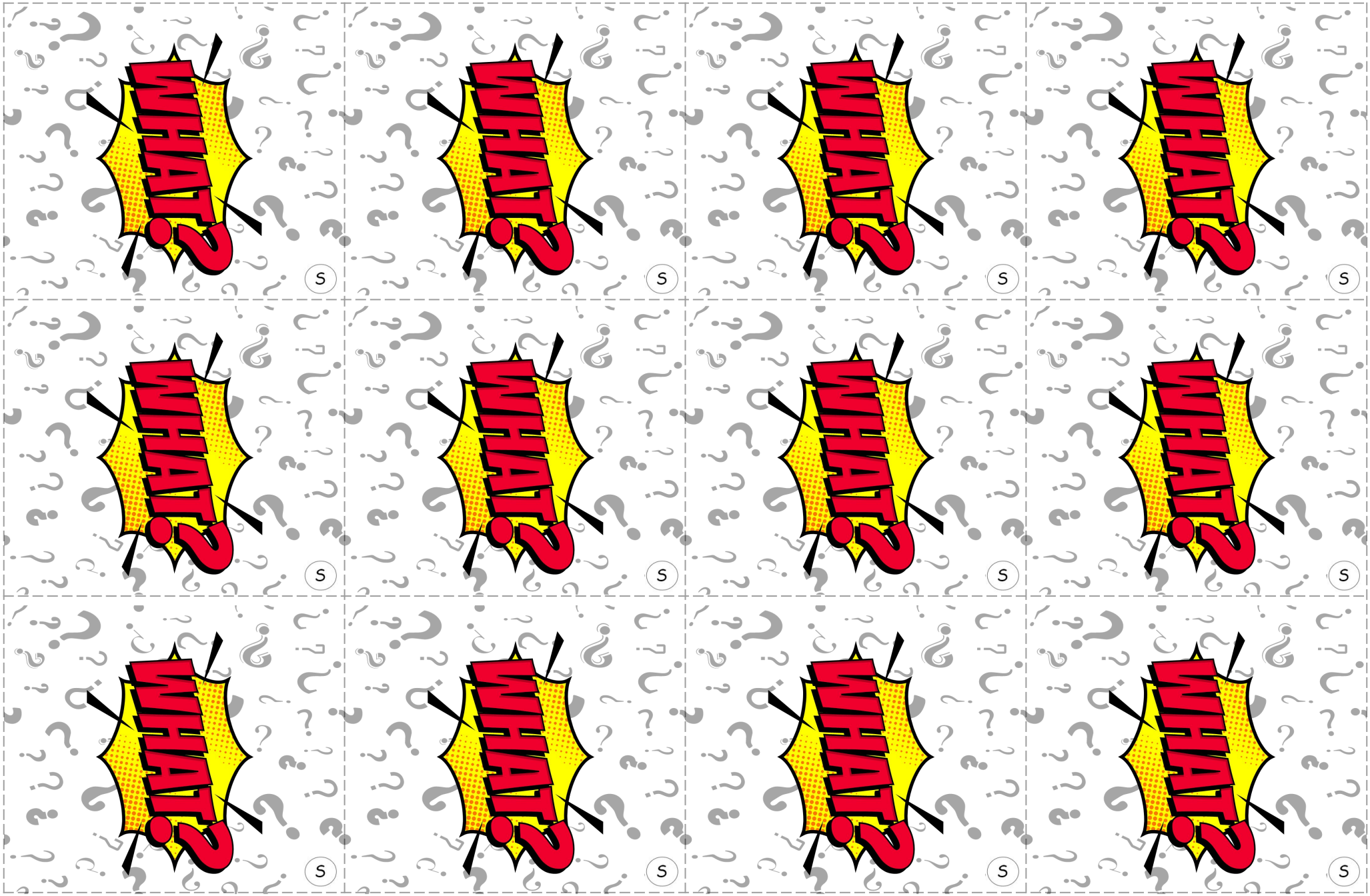
Sunlight Cards



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Twilight Cards

Rule: Add 16	Rule: Subtract 12	Rule: Add 23	Rule: Subtract 9
Rule: Divide by 2	Rule: Multiply by 8	Rule: Divide by 10	Rule: Multiply by 3
Rule: Multiply by 4	Rule: Multiply by 5	Rule: Multiply by 9	Rule: Add 14

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Twilight Cards

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Twilight Cards

Rule: Subtract 15 T	Rule: Subtract 8 T	Rule: Multiply by 100 T	Rule: Add 17 T
Rule: Subtract 7 T	Rule: Add 52 T	Rule: Add 40 T	Rule: Subtract 5 T
Rule: Add 15 T	Rule: Add 14 T	Rule: Subtract 8 T	Rule: Multiply by 6 T

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Twilight Cards

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Midnight Cards

Rule: Subtract 4.7 M	Rule: Add 3.2 M	Rule: Multiply by 7 M	Rule: Multiply by 8 M
Rule: Divide by 2 M	Rule: Divide by 6 M	Rule: Multiply by 1.5 M	Rule: Add 9.8 M
Rule: Add 56 M	Rule: Subtract 44 M	Rule: Subtract 7.6 M	Rule: Multiply by 15 M

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Midnight Cards

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Midnight Cards

Rule: Divide by 100	Rule: Add 109	Rule: Add 6.3	Rule: Subtract 10.4
Rule: Multiply by 17	Rule: Multiply by 9	Rule: Add 0.9	Rule: Add 601
Rule: Subtract 8.5	Rule: Multiply by 3	Rule: Subtract 3.5	Rule: Divide by 10

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Midnight Cards

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Recording Logs

Input	Output

Rule:

Input	Output

Rule:

Input	Output

Rule:

Input	Output

Rule:

Input	Output

Rule:

Input	Output

Rule:

Input	Output

Rule:

Input	Output

Rule:

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What's the Rule

1. Place all cards face down in a pile.
2. Player 1 picks up a card.
   ➔ Don't show other players your card.
3. Player 2 gives an input number.
4. Player 1 tells Player 2 the output number using the rule on the card.
5. Player 2 keeps giving inputs and Player 1 keeps calculating the outputs until Player 2 guesses the rule.
6. Switch positions.

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