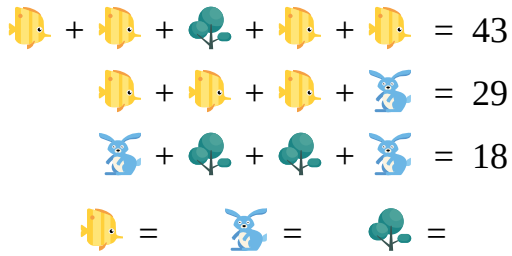
Mathemals Sheet 121



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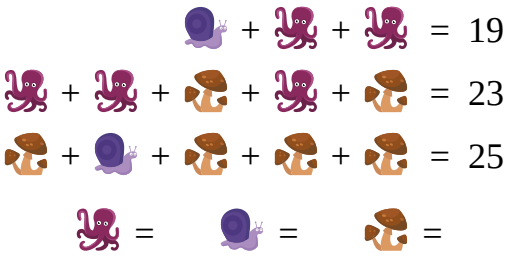

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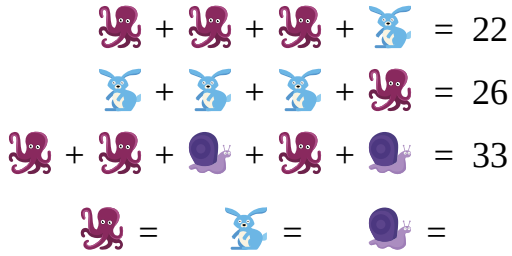

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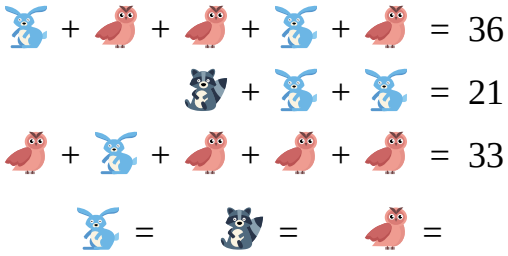

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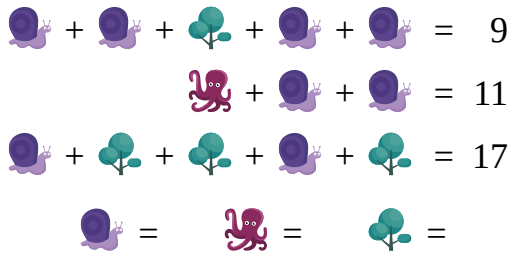

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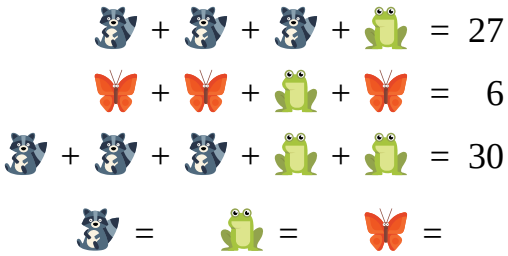

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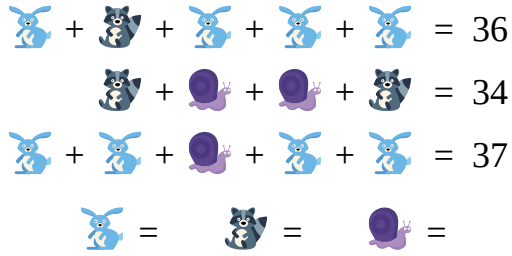

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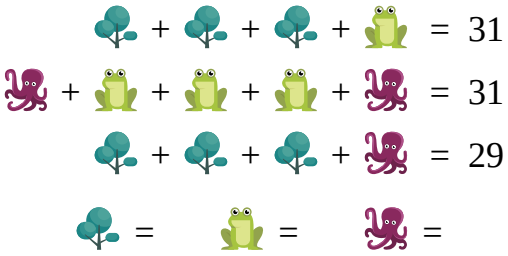

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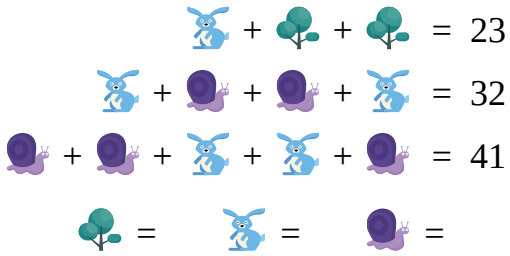

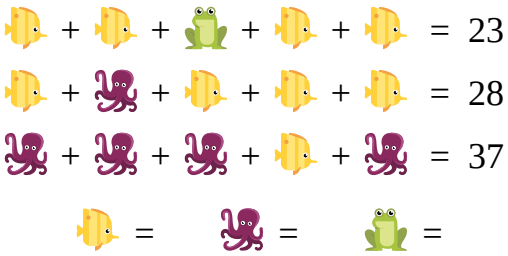

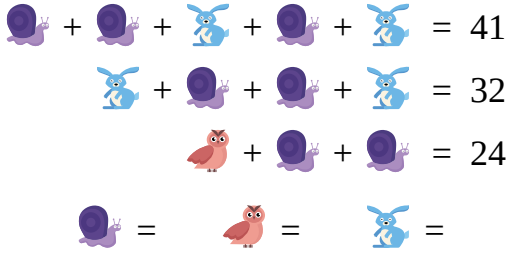

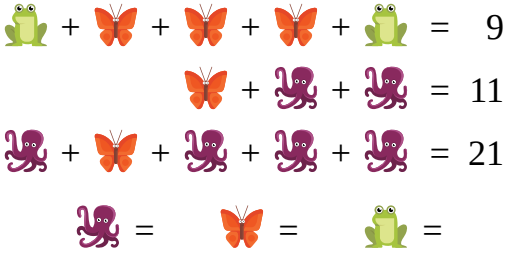

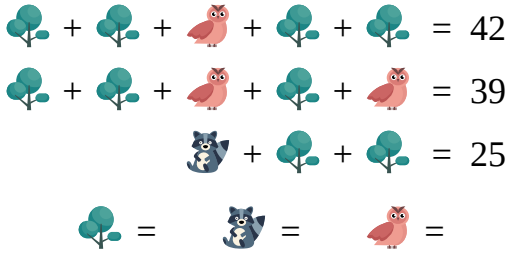

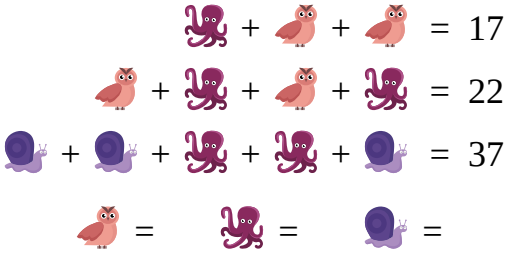

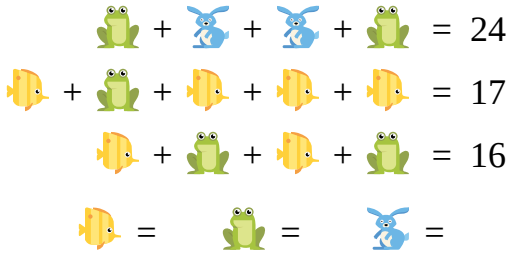

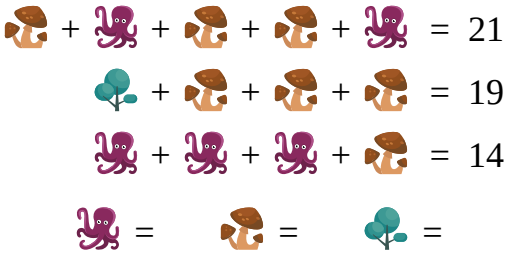

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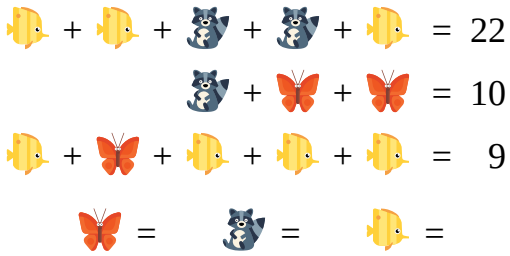

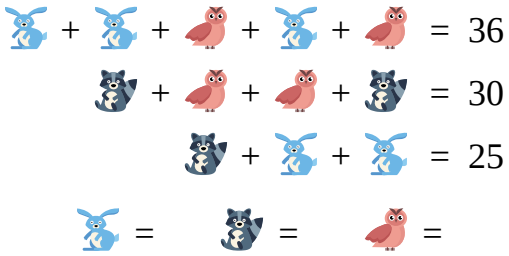

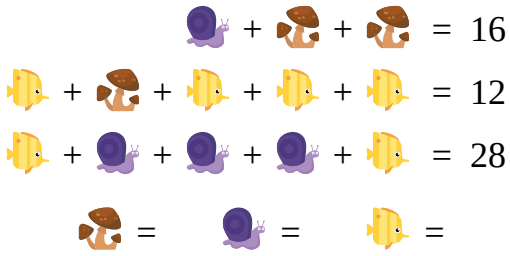

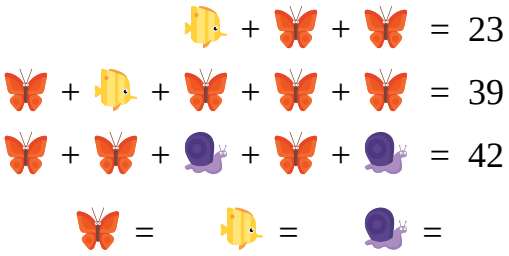

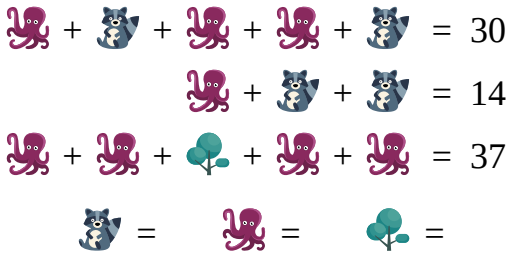

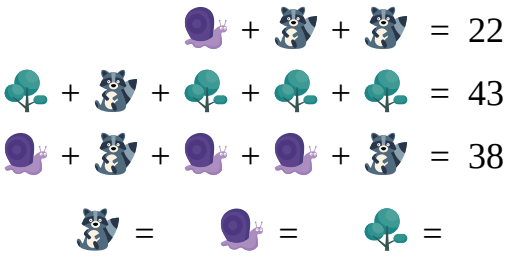

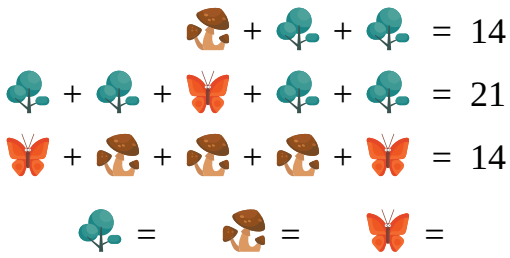

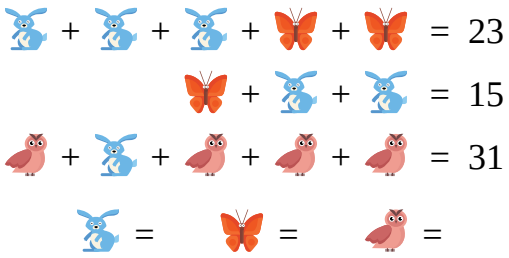

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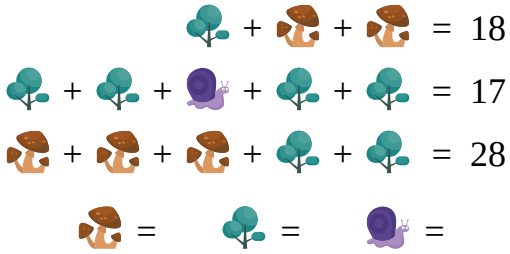

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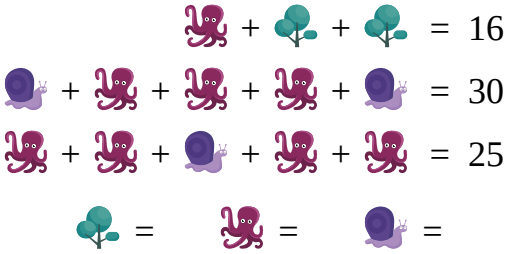

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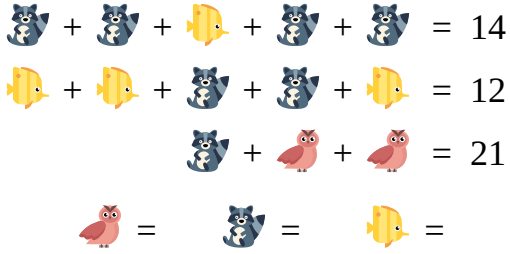

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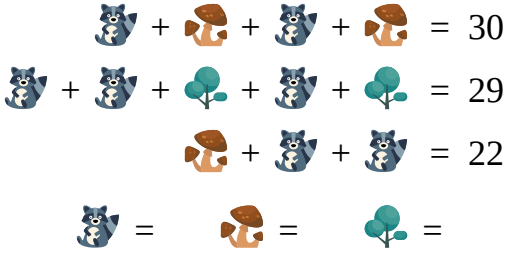

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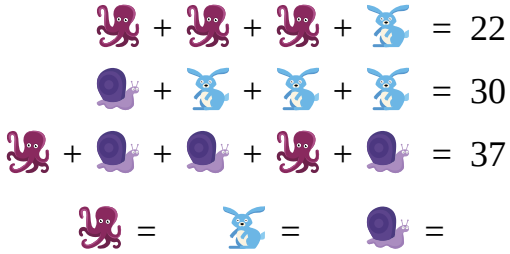

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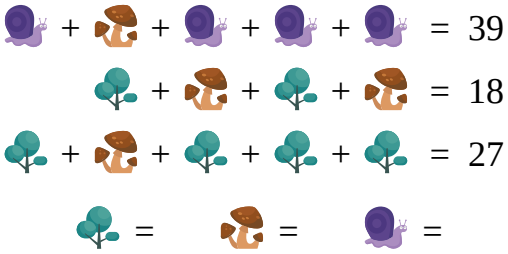

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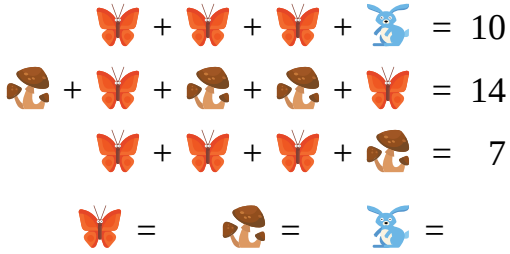

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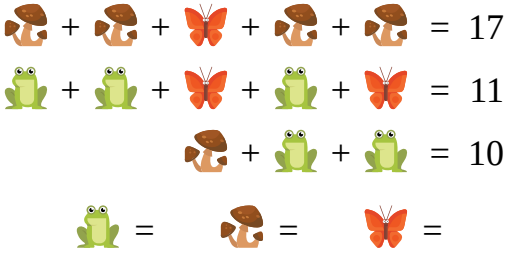

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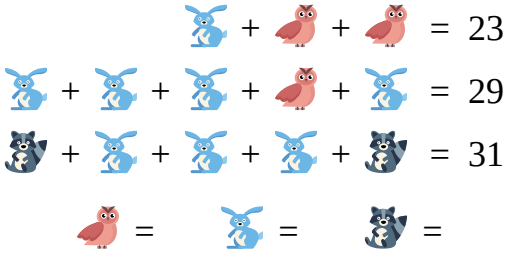

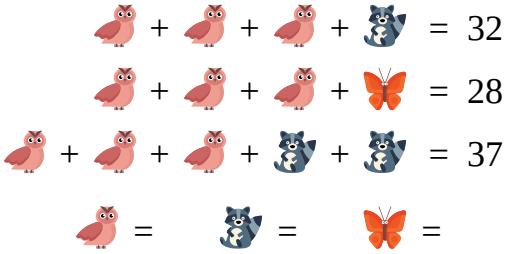

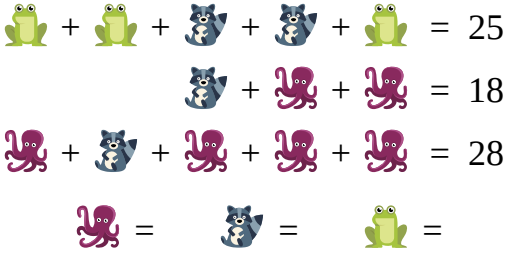

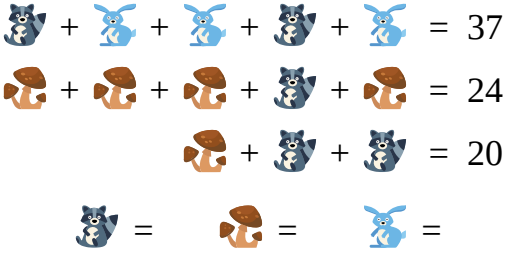

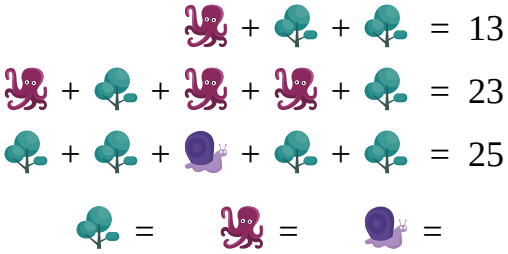

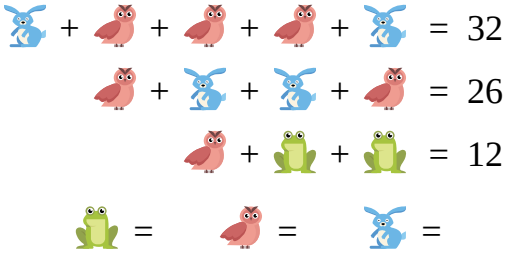

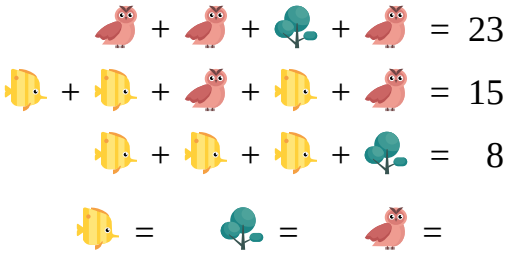

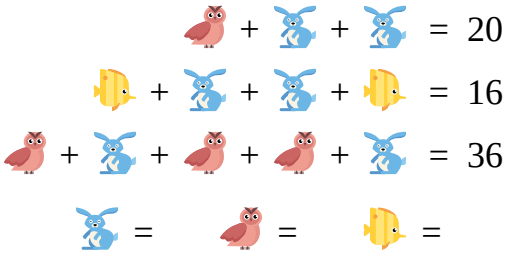

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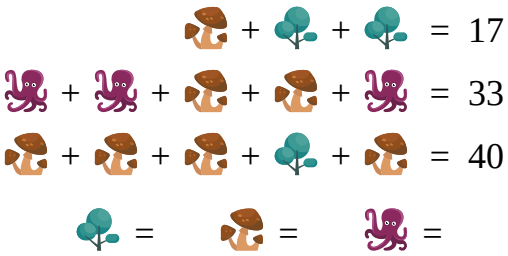

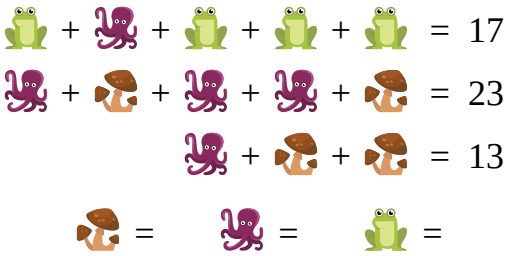

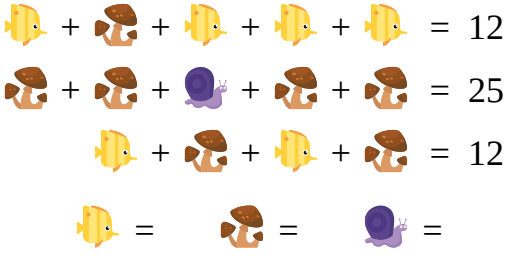

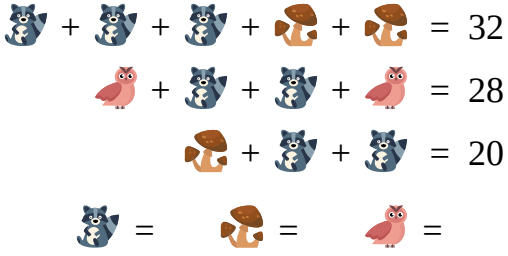

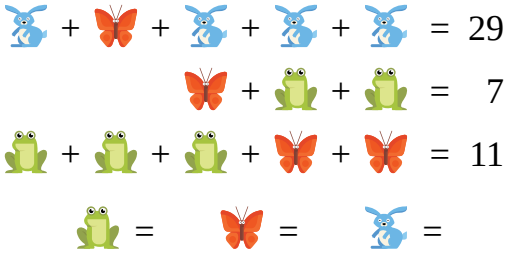

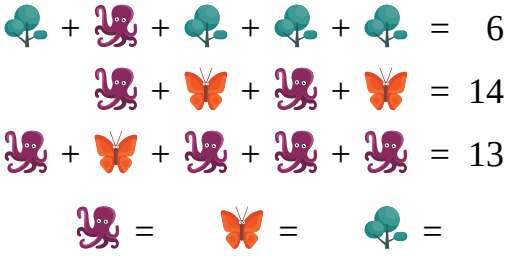

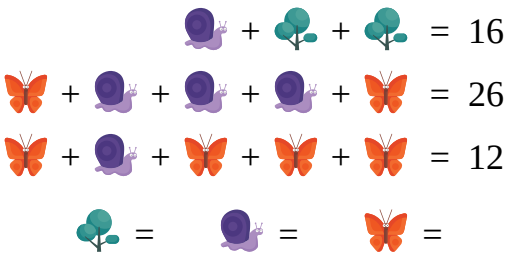

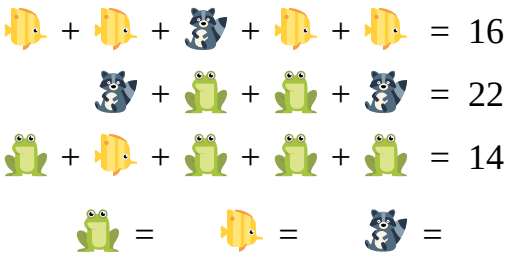

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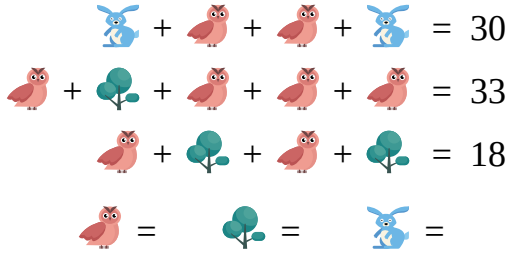

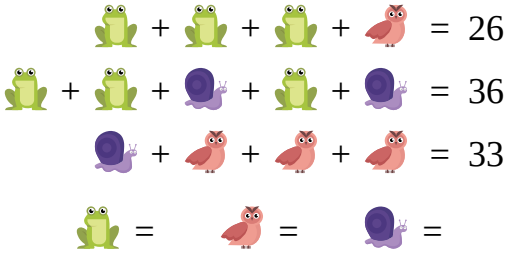

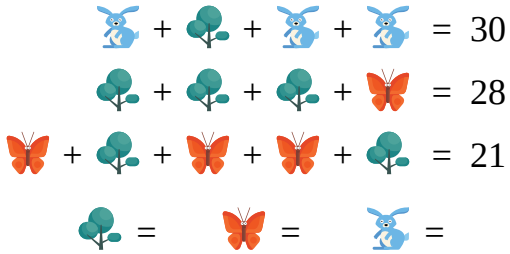

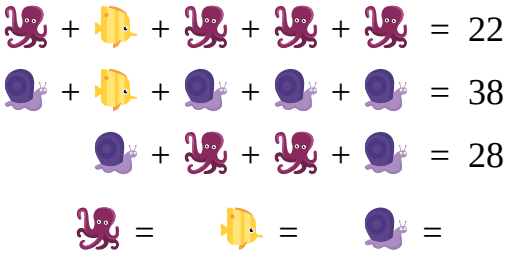

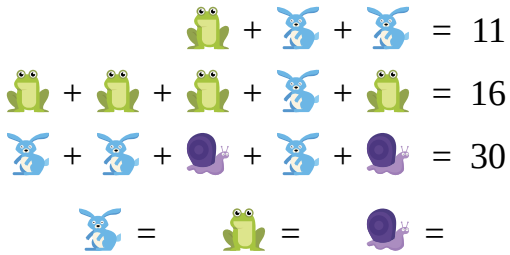

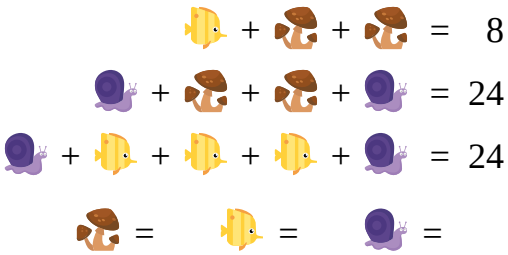

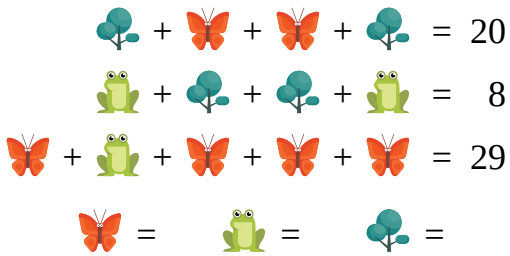

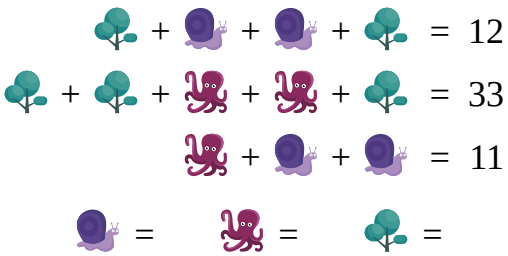

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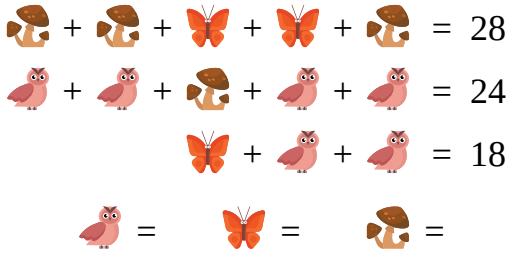

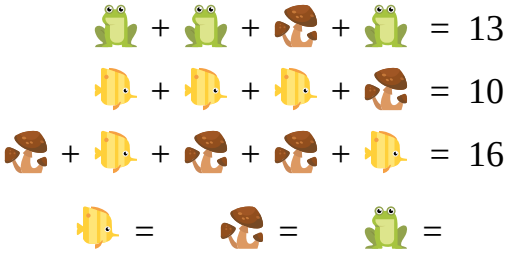

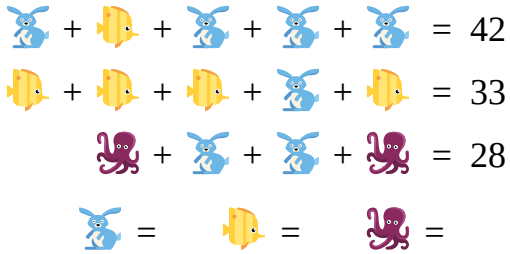

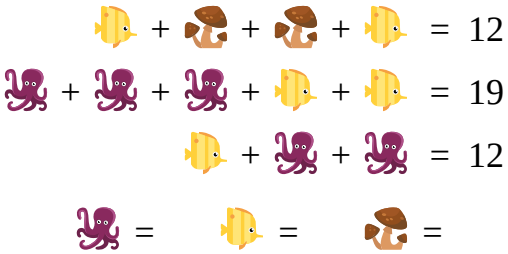

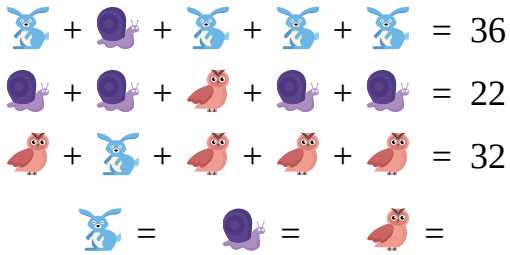

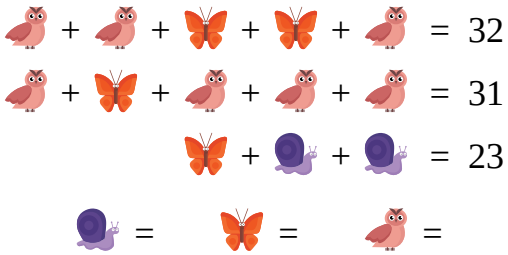

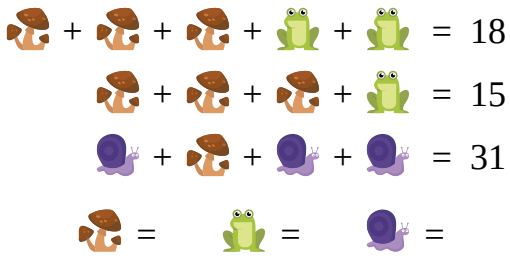

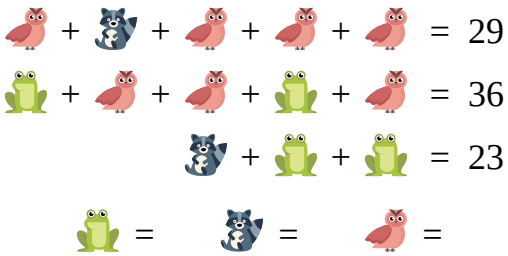

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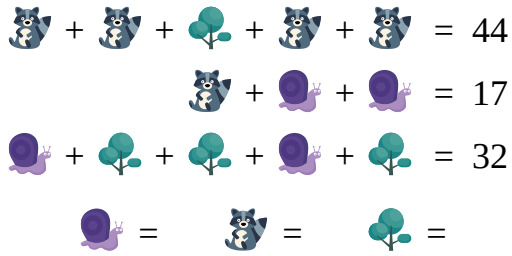

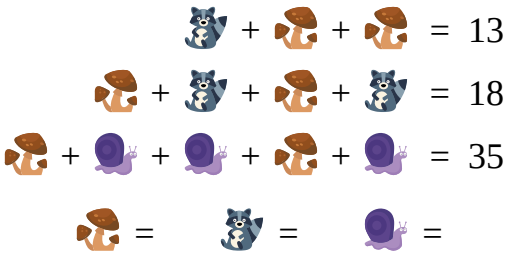

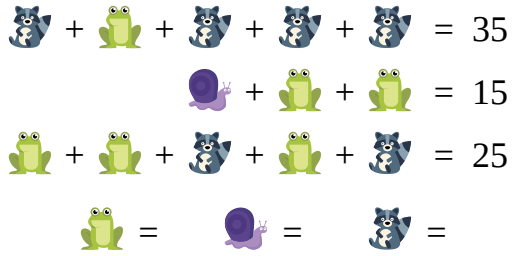

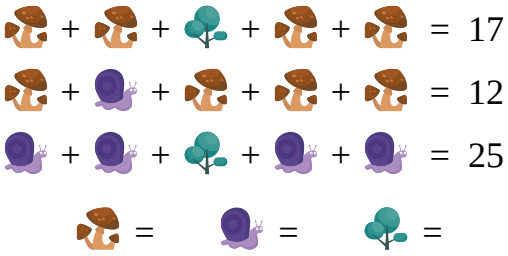

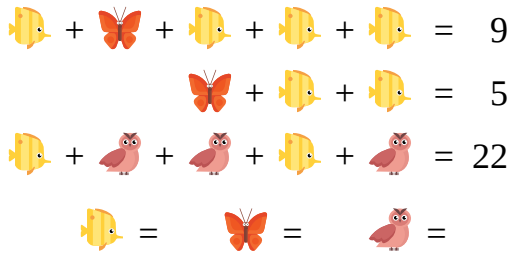

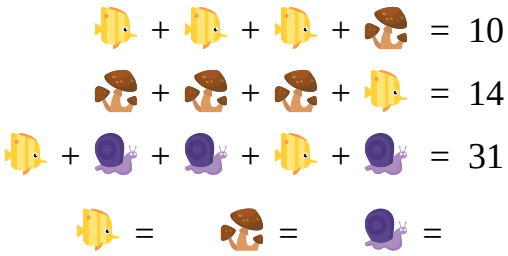

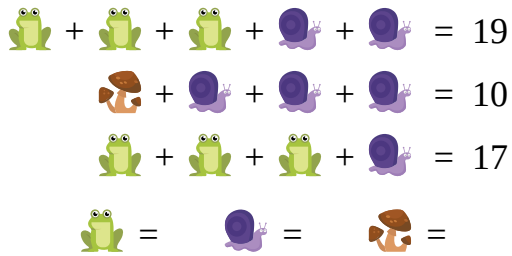

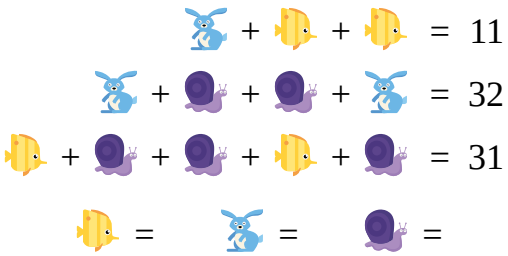

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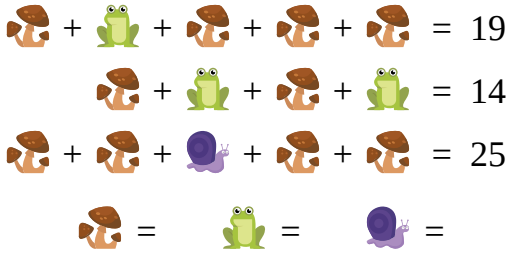

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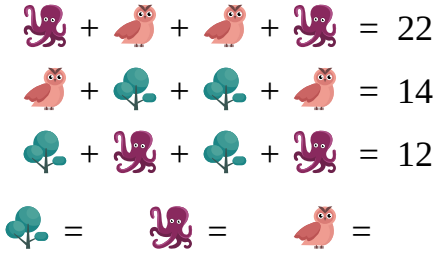

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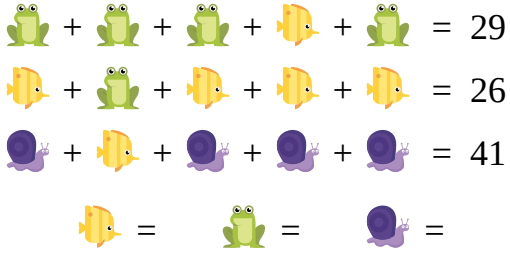

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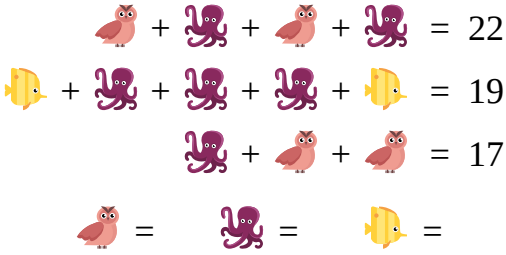

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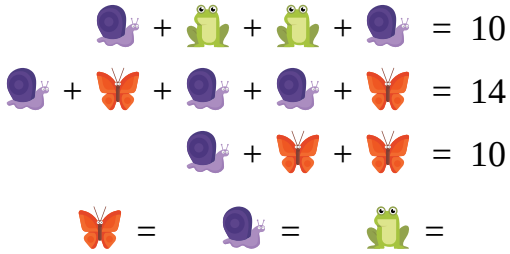

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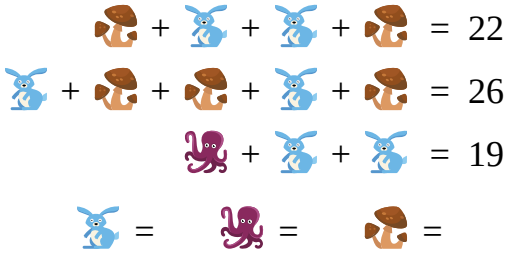

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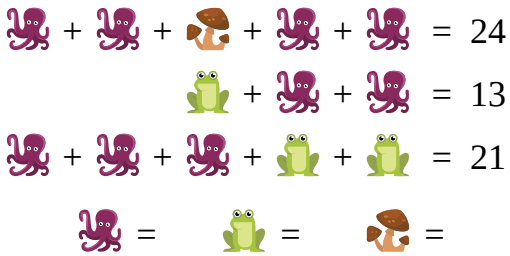

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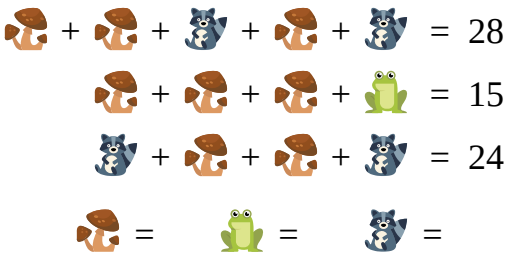

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Mathemals Strategy

A mathemals game gives you 3 equations -- each an expression on the left made of animals and the total value of those animals added up on the right. You have to figure out the value each animal.

Each animal's value is the same across all three equations in that single game, and also each animal has a *different* value. There is exactly one correct answer for each animal. Of course the animals' values can change from one game to the next.

Tactics

Here are some tactics you can use.

- If all the animals in an equation are the same type, you can use **division** to discover that animal's value.
- If you know one animal's value, you can **substitute** it in any equation. You can even do this with multiple animals. For example, if you know 🐤 plus 🌳 is 17, you can replace a 🐤 and a 🌳, in any equation, with 17 -- even if you don't know the individual values of 🐤 and 🌳.
- It doesn't matter which order you add two things, so you're free to **reorder** animals whenever you want.
- You can always **subtract the same thing from both sides** of an equation. So if you have an 🐙 worth 8 on the left and the number 17 on the right, you can remove the 🐙 from the left and subtract 8 from the right, leaving 9.
- You can **join equations**, adjusting for a known difference in value. For example, if 🦉 plus 🦪 is 4 and 🦉 plus 🔮 is 6 then 🦉 + 🦪 + 2 = 🦉 + 🔮. Subtracting 🦉 from both sides, you can see that 🔮 = 🦪 + 2.
- Some equations can be narrowed down with an **educated guess**. If three 🐿️s plus a 🐰 add to 7, then the 🐿️s have to be either 1 or 2 and the 🐰 has to be 4 or 1. Anything else would be too large.

Example

Given this mathemals game:

🐺 + 🐺 + 🐿️ + 🦋 = 21
🦋 + 🦋 + 🦋 + 🐺 = 11
🐺 + 🦋 + 🐿️ = 13

First, notice that we can **reorder** the animals in the bottom equation so they match the 🐺 + 🐿️ + 🦋 in the top equation. Then we can **subtract** the bottom equation from the top.

🐺 + 🐺 + 🐿️ + 🦋 = 21
🐺 + 🐿️ + 🦋 = 13

🐺 = 8

Now we can **substitute** 🐺 = 8 into the middle equation to get:

🦋 + 🦋 + 🦋 + 8 = 11

Subtract 8 from both sides to get:

🦋 + 🦋 + 🦋 = 3

And then **divide** both sides by 3 to get:

🦋 = 1

Finally, we can **substitute** the two known values into any equation containing 🐿️ and then subtract the same amount from both sides to get an equation that contains only 🐿️s:

🐺 + 🦋 + 🐿️ = 13

8 + 1 + 🐿️ = 13

🐿️ = 4

Voila! We now have:

🐺 = 8, 🦋 = 1, 🐿️ = 4