

# Algorithmic thinking resources

## Year 2: Birthday party fun



**In this lesson students use algorithmic thinking to complete repeated addition as multiplication around the multiple of 3. They engage in an activity where they investigate how many times they need to complete activities to receive party favours.**

*Level 2 - Number and Algebra | Patterns in Algebra  
| Apply repetition in arithmetic operations, including multiplication as repeated addition and division as repeated subtraction (VCMNA114)*

### MATHEMATICAL LANGUAGE

Repeated addition, repeated subtraction, multiplication, division, total, arrays, number lines

### MATERIALS

- Playing cards for the warm-up game
- Obstacle course (cloth tunnel, table, chair, and a small balance beam)

- Plastic counters
- Paper and pencils

### WARM UP - HEADS UP - CARD GAME

- Students are arranged in groups of three, with a deck of cards. If using a traditional deck of cards the Ace is equivalent to one and all face cards are equivalent to ten. Two of the students sit facing each other and take one card each from the pile of cards, and without looking at it, each of these students holds the card up on their forehead, with the number facing out.
- They can see the number that the other person is holding, but not their own number.
- The third student looks at both cards and tells the other two students what the total sum of their cards is. Each of the two students holding a card to their forehead needs to work out the value of their card based on what they know – the value of the other

person's card and the total.

- They can work it out by subtracting, counting back or counting up, bridging through 10 etc.
- After several turns, students can swap roles.
- To further extend the game, the third player could instead provide the players with the difference or the product of the numbers, rather than the sum.

## LAUNCH

You will need to prepare a simple obstacle course to support the launch of this activity.

Tell the students that they have been invited to a birthday party for one of their classmates. One of the activities at the party is an obstacle course. Every time they go through the obstacle course and reach the end of it, they will receive three tokens, which they can then trade in for a variety of party favours. Each party favour requires a different number of tokens each.

These party favours and the number of tokens required for each is as follows (see student resource Birthday Party Favours)

1. A balloon – 9 tokens
2. An ice cream cone – 27 tokens
3. A cupcake – 24 tokens
4. A ball – 15 tokens
5. A jigsaw puzzle – 30 tokens
6. A guitar – 42 tokens
7. A container of popcorn – 18 tokens

## EXPLORE

Ask the students to go through the obstacle course once. At the end, give them each three tokens. Students go off in pairs to explore how many times they would need to go through the obstacle course to receive each of the various party favours.

Have lots of extra tokens available for the students to use when figuring out the various problems. Encourage them to use different ways to solve the problem. Ask them to record and display how they solved the problems, using large paper to record their thinking.

## SUMMARISE

Choose some students to share how they worked out their solutions, ensuring that you cover a variety of methods with the students you choose. Discuss the various methods with the students. Ask them which method they think would be the most efficient.

You could point out, if they haven't already noticed, that if you need 15 tokens to get a ball and 30 tokens to get a jigsaw puzzle, the number of times needed to go through the obstacle course would double.

## ENABLING PROMPTS

- Ask the students to work out the number of times needed to go through the obstacle course for only three of the party favours. You can assign the three smallest numbers, or let the students choose which favours they want to work out the information for.
- Multiples of two. Give the students two tokens after completing the obstacle course, and then give them a separate list containing party favours that require multiples of two (e.g., earning the balloon might require 6 tokens instead of 9 tokens – see the associated research sheet).

## EXTENDING PROMPTS

- What if they wanted both a cupcake and a tambourine – how many times would they need to go through the obstacle course to receive both party favours?
- What are some other combinations of party favours they could combine and what would be the total number of times they would need to go through the obstacle course to obtain these party favours?
- Add in a party favour that is not a multiple of three – e.g. Fairy Floss – 17 tokens

## QUESTIONS TO ENCOURAGE DEEPER THINKING

How many different combinations of two party favours are possible? What are they? How do you know when you have them all? (For example: the ball and the puzzle; the ball and the cupcake; the cupcake and the puzzle.)

How many times would you need to go through the obstacle course to receive each of these combinations of party favours?

## EXTENDED VICTORIAN CURRICULUM LINKS MATHEMATICS

### Level 2 - Number and Algebra Number and Place Value

- Investigate number sequences, initially those increasing and decreasing by twos, threes, fives and ten from any starting point, then moving to other

sequences (VCMNA103)

- Explore the connection between addition and subtraction (VCMNA106)
- Solve simple addition and subtraction problems using a range of efficient mental and written strategies (VCMNA107)
- Recognise and represent multiplication as repeated addition, groups and arrays (VCMNA108)
- Recognise and represent division as grouping into equal sets and solve simple problems using these representations (VCMNA109)

### **Patterns and Algebra**

- Solve problems by using number sentences for addition or subtraction (VCMNA113)
- Apply repetition in arithmetic operations, including multiplication as repeated addition and division as repeated subtraction (VCMNA114)

### **Level F-2 - Critical and Creative Thinking**

#### **Meta - Cognition**

- Investigate ways to problem-solve, using egocentric and experiential language

#### **Level F-2 – Digital Technologies**

##### **Creating Digital Solutions**

- Follow, describe and represent a sequence of steps and decisions (algorithms) needed to solve simple problems

## **PROFICIENCIES**

### **Problem Solving**

Students develop the ability to make choices, interpret, formulate, model and investigate problem situations, and communicate solutions effectively. Students formulate and solve problems when they use mathematics to represent unfamiliar or meaningful situations, when they design investigations and plan their approaches, when they apply their existing strategies to seek solutions, and when they verify that their answers are reasonable.

### **Reasoning**

Students develop an increasingly sophisticated capacity for logical thought and actions, such as analysing, proving, evaluating, explaining, inferring, justifying and generalising. Students are reasoning mathematically when they explain their thinking, when they deduce and justify strategies used and conclusions reached, when they adapt the known to the unknown, when they transfer learning from one context to another, when they prove that something is true or false, and when they compare and contrast related ideas and explain their choices.

## **ASSESSMENT OPPORTUNITIES**

Teachers can assess students using a checklist or anecdotal notes through observation. Student samples and photos of students engaging in the activity can be kept as evidence.

Any of the above-mentioned curriculum links can be assessed through this activity.

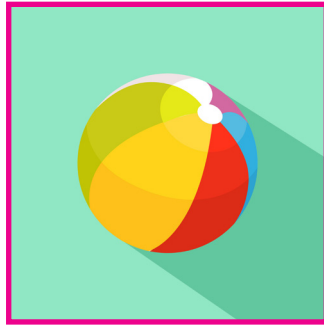
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### Three token reward



30 tokens



15 tokens



9 tokens



42 tokens



18 tokens



27 tokens

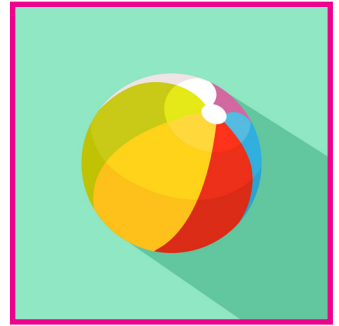


24 tokens

### Enabling prompt - Two token reward



20 tokens



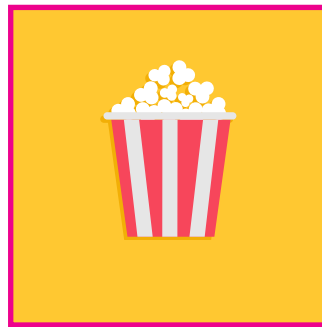
10 tokens



6 tokens



24 tokens



12 tokens



18 tokens



17 tokens



16 tokens