

Algorithmic thinking resources

Year 4: Sushi plates



In this lesson students use their knowledge of algorithms to complete a multi-step problem solving task involving money. The focus is on the process and their recording rather than the final solution.

Level 4 – Number and Algebra | Patterns and Algebra | Define a simple class of problems and solve them using an effective algorithm that involves a short sequence of steps and decisions (VCMNA164)

MATHEMATICAL LANGUAGE

Dollars, cents, multiplication, repeated addition, subtraction, mental strategies, total, arrays, number lines.

MATERIALS

- Money Match 2 Game Board (one between two students)
- Small transparent counters (approx. 18 of one colour each)

- Paper clips
- A3 paper to show students mathematical thinking
- Stimulus photo printed or on data projector
- Play money

WARM UP - INTRODUCING NUMBER CHANT

- Use the Student Resource Number Code, Dr Paul Swan's Money Match
 http://docs.wixstatic.com/ugd/
 c8dd86_3ab59d57bb5d49d58eecc97735e9dc62.pdf
- Students are to work in pairs to complete the games Money Match 2. Instructions are on the game board.

LAUNCH

Tell the students:

'A family eats a meal at a Sushi Train restaurant. The nine orange plates cost \$3.80 and the top purple plate costs \$5.80. How much did the family spend?'

EXPLORE

Students activity explore with a partner the problem or challenge. They are asked to solve the problem, showing their mathematical thinking at least four different ways.

SUMMARISE

Ask students to share their thinking. Choose four different methods to share with the class. Ask the class to identify which method is most effective.

ENABLING PROMPTS

- Question (prepared on a stimulus card) What if the orange plates cost \$4 and the purple plate costs \$6? Students are required to complete the activity showing their mathematical thinking at least four different ways.
- Materials Give the students orange and purple counters to assist.
- Materials Give the students play money to assist, ensure students continue to record their mathematical thinking.
- Model Demonstrate one way of solving the problem by using a number line.

EXTENDING PROMPTS

- Question (prepared on a stimulus card): How much change would the family get if they paid at a register with a \$100 note?
- Question (prepared on a stimulus card): What if the bowls of miso soup cost \$2.60. How much would the final bill be?
- Question (prepared on a stimulus card): If the family had \$79 to spend what could they buy?
- Activity (prepared on a stimulus card): Design a menu for a Sushi Train Restaurant.

QUESTIONS TO ENCOURAGE DEEPER THINKING

- Did it make it easy to calculate an efficient answer because there were ten plates in total?
- Was there anything else about the question that supported efficient mental calculation strategies?

EXTENDED VICTORIAN CURRICULUM LINKS MATHEMATICS

Level 4 - Number and Algebra Number and Place Value

- Investigate number sequences involving multiples of 3, 4, 6, 7, 8, and 9 (VCMNA154)
- Develop efficient mental and written strategies and use appropriate digital technologies for multiplication and for division where there is no remainder (VCMNA156)

Money and financial maths

 Solve problems involving purchases and the calculation of change to the nearest five cents with and without digital technologies (VCMNA160)

Pattern and algebra

- Explore and describe number patterns resulting from performing multiplication (VCMNA161)
- Solve word problems by using number sentences involving multiplication or division where there is no remainder (VCMNA162)
- Use equivalent number sentences involving addition and subtraction to find unknown quantities (VCMNA163)
- Define a simple class of problems and solve them using an effective algorithm that involves a short sequence of steps and decisions (VCMNA164)

Level 3-4 - Critical and Creative Thinking Meta-cognitions

- Consider concrete and pictorial models to facilitate thinking, including a range of visualisation strategies (VCCCTM018)
- Investigate a range of problem-solving strategies, including brainstorming, identifying, comparing and selecting options, and developing and testing hypotheses (VCCCTM020)

Design and Technologies – Levels 3 & 4 Planning and managing

Plan a sequence of production steps when making designed solutions (VCDSCD032)



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Enabling and extending prompts

What if the orange plates cost \$4 and the purple plate cost \$6?

How much change would the family get if they paid at a register with a \$100 note?

What if the bowls of miso soup cost \$2.60. How much would the final bill be?

If the family had \$79 to spend what could they buy?

Design a menu for a Sushi Train Restaurant.



















Money Match 2

11	10c	\$0.50	forty cents	\$1.50	\$0.80	twenty cents
	80c	one dollar fifty	120c	\$2	ten cents	\$1
	\$0.20	\$2.00	\$0.10	fifty cents	\$1.00	\$0.40
Ц	one dollar	50c	two dollars	\$1.20	40c	\$1.50
1	\$1.20	10c	\$2	eighty cents	20c	40c
	50c	150c	20c	\$1	one dollar twenty	80c



Money Match 2

A game for two players.

Aim: To be the first player to place three counters, next to each other, in a row, column or diagonal.

Materials Required: 36 transparent counters, 18 of one colour and 18 of another colour.

- Players take turns to flick the spinner and place a counter on a spot on the board that matches the total of the coins shown on the spinner. For example, if the spinner shows 10c + 10c, the player would place a counter on 20c, \$0.20 or 'twenty cents'.
- Play continues until one player has placed three counters, next to each other, in a row, column or diagonal.

Variation

• Allow a 'bump off' rule

drpaulswan.com.au

Money Match 2

Children need many and varied experiences handling money in order to develop Financial Literacy. When children accompany their parents to the shop they rarely see coins and notes being exchanged but rather a credit or debit card is swiped. Classroom shops are an ideal way of encouraging children to pick out the closest amount to the total and then for the "shop keeper" to count back change using the "shop keepers" method. This game is just one step in developing financial literacy - **counting or adding coins**.

Australian Curriculum Links

Yr 2 ACMNA034

Count and order small collections of Australian *coins* ... according to their value.

Elaborations

- identifying equivalent values in collections of *coins* ..., such as two five-cent coins having the same value as one 10-cent coin.
- counting collections of *coins* ... to make up a particular value.

Teacher notes

In order to count coins, children need to be able to:

- recognise coins and separate coins of the same denomination from a collection of coins, and
- count by 5s, 10s, 20s, 50s, 1s and 2s.

A variety of coin recognition activities may be found on pages 49 - 74 of Swan, P., & Marshall, L. (2009). *Money Matters: A teachers handbook for developing money concepts*. Perth: R.I.C. Publications.

What to look for

- Counting coins is an extension of the counting principles.
- Do they know the counting sequence in the right order, eg 5, 10, 15, 20 25 ...?
- Do children touch (and move) the counts as they say the counting word? Check there is a one-to-one correspondence.
- Do they realise that the last word that they say when touching the last coin in the group indicates the total amount of coins?
- Do they count to milestones, eg \$1?

For further experience with money try setting up and running a class shop.

Collect and Count is another coin counting game that is harder than this game and involves collecting a variety of coins and either keeping a cumulative total as the game progresses or counting a pile of coins at the end.



