Hidden coins

This task is inspired by the [Five Coins NRich Task](#) and designed for the Australian context

Use this problem-solving task as an authentic context to apply knowledge of coins and their values.

Why this task?

In this task, students:

- think about money amounts using part-part-whole relationships
- identify equivalent values in coin collections
- think about and represent values of money in multiple ways
- use a systematic approach, including recording and organising findings, to find all possibilities
- apply additive thinking
- engage in both individual and collaborative learning.

Materials and setting up

For this task, students will need:

- a pencil
- blank page (loose leaf or in their maths book).

Getting students to set up before the lesson will support a smooth transition from the task launch to the hands-on component.

Launch the problem

Tune in

Share a situation with students:

Cynthia has five coins in her pocket. Take a moment to picture in your mind what that might look like.

You may wish to invite students to help you make a list of the different coins for reference. Invite students to think about the following:

What's the smallest amount of money Cynthia could have? How do you know?

Invite students to share answers. Collect all answers without judgement. Then invite reasoning; how they got that particular answer.

Who's ready to share what they think is the:
- smallest possible amount
- largest possible amount?

Pose the main challenge

So, we have two possibilities for what the five coins could be:
- The smallest possible amount is 25 cents (made up of five 5 cent coins).
- The largest possible amount is 10 dollars (made up of five $2 coins).

What if Cynthia still had five coins, but they could only be 5 cent and 10 cent coins?
- How much might she have?
- Can you find all the possibilities?

- How will you know when you have found them all?

As you explore, think about how you might make sure that all possibilities are found.

Explore the problem

Give students time to make sense of and get started on the problem before providing prompts like:

- *How does this problem make sense to you?*
- *What do you already know that could help you?*
- *What's something you could draw or write or play with in order to get started?*

As students work, observe the strategies they use and note if they are organising their findings systematically, such as in this example:
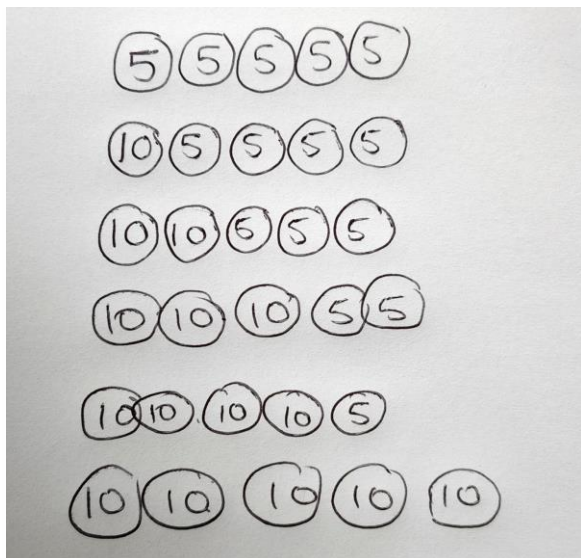
At a suitable time, gather students together for a couple of minutes to share the different or similar approaches they are taking. Then give them more time to pursue their investigations.

Introduce task variations

For students who have completed the investigation and been able to provide convincing reasoning that they have found all the possibilities, encourage them to extend themselves by pursuing a new *What if …?* constraint.

For instance:

- *What if the coins are made up of 5 cent, 10 cent and 20 cent pieces?*
- *What if any coins can be used, but the total must be no more than one dollar?*

Wrapping up

Give notice of wrap-up

Before inviting the class back together, encourage students to gather their thoughts. You might ask student to:

- finalise the organisation of their findings so that their future self can make sense of them
- take a moment to look at their findings and see what they notice about the different coin combinations. How are they the same? How are they different?
- take a moment to think about what they would like to explore next.

Closing discussion

Come together as a group to share findings and recording strategies. In case there are students still working on the original problem, keep the focus on challenges, discoveries and strategies (rather than the answer or being finished). For example:

- *What challenges came up for you? How did you solve / deal with them?*
- *What strategies did you use?*
- *What's something new that you tried in this task? What went well and what was challenging?*

Highlight the extensive scope for further investigation. Ask students to think about how they could explore further questions by using the *What if …?* question stem.

Give example questions which are a variation on the original:

- *What if the coins are made up of 5 cent, 10 cent and 20 cent pieces?*
- *What if any coins can be used, but the total is no more than one dollar?*

Prompt students to think about other *What if…?* variations that could be investigated in the future.